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IMPACT OF VALUE CO-CREATION AND CO-DESTRUCTION FOR DIGITAL CONSUMER SERVICES: A CASE STUDY ON ACTIVITY TRACKING SOLUTIONS

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Tässä tutkielmassa tarkastellaan nykyistä markkinoiden tilannetta, jossa digitaalisen palvelut ovat muodostuneet merkittäväksi, ja merkitykseltään yhä kasvavaksi tuoteryhmäksi. Uusia digitaalisia sovelluksia, jotka hyödyntävät uusinta teknologiaa ilmestyy markkinoille kiihtyvää tahtia. Palvelullistuminen ja digitalisaatio ovat muokanneet tapoja, joilla arvoa asiakkailleen syntyy. Tämä tutkielma pyrkii tutkimaan sitä, kuinka sovellusten tuottajat ja kuluttajat toteuttavat arvon yhteisluontia. Toisaalta kirjallisuus koskien arvon yhteisluontia on ollut varsin positiivista. Hiljattain on kuitenkin tunnistettu, että arvon yhteisluonnilla on myös mahdollinen negatiivinen lopputulos: arvon yhteistuhoaminen. Tässä tutkielmassa pyritään myös syventämään tietämystä koskien tätä aihealuetta. Vastausten löytämiseksi tutkielman yhteydessä on toteutettu empiirinen tutkimus, jossa arvon yhteisluontia ja yhteistuhoamista tutkitaan aktiivisuutta mittaavien sovellusten parissa.

Asiasanat: Digitaalinen palvelu, arvon yhteisluonti, arvon yhteistuhoaminen, aktiivisuuden mittaus

ABSTRACT

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This thesis studies the prevalent market situation where digitalized services have become the main offering. More and more new digital solutions utilizing the latest technological innovations are offered to consumers. This has created new ways to create value. This thesis aims to find answers on how digital consumer services establish value co-creation. In addition, since past literature has been overly positive about value co-creation a contribution is searched for to fill this research gap. This research gap includes studying the negative outcomes of a value co-creation process which leads up to value being destructed. In order to make a contribution and find answers, an empirical study is made where value co-creation and co-destruction with activity tracking solutions is studied.

Keywords: Digital service, Value co-creation, Value Co-destruction, Activity tracking

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1 Introduction

This thesis studies the prevalent situation where markets are dominated by digital services as offerings. We are witnessing a strong ongoing trend in which firms have shifted from providing sole goods to providing comprehensive services to customers. The shift which originally firms to start providing mainly services, is called servitization (Vandermerwe & Rada, 1988).

Another factor which has influenced this evolution leading up to the prevalent situation is digitalization. Digitalization refers to an adoption of digital technology in peoples' everyday life (Koiranen, Räsänen & Södergård, 2016). Service-innovations aim to utilize the latest digital technology in order to find new ways to provide comprehensive services to customers. Digital technology has provided innovations and devices, such as smartphones which serve as platforms for service providers. Nature of the prevalent utilization seems to be usage of small carriable devices with high computing power, network connection, and sensor-technology in service concepts.

Markets are now viewed through a fresh logic. In past logic was goods dominant. This meant that goods were the central offering, and logically gained the most interest. The logic was that goods captured value, and customers received the value when they purchased a good. Currently however, the logic has changed. Now, the perspective is service dominant-logic. According to service dominant logic services are the main offering. Value is created in a cooperation between customer, service provider, other customers, and with almost anyone who is somehow related to the process. However, it is not agreed on what level is the value created by one participant. Vargo, Maglio, and Akaka (2008) states that service systems, which refer to participants of the process, co-create value together by exchanging services, and by integrating resources. Grönroos (2011) however, sees that only customer creates value, and through direct interactions service providers possibly are invited to join the process as co-creators. (Vargo et al. 2008.)

Concept of service dominant-logic and value co-creation has also evolved. In its beginning phase, service dominant-logic seemed to be quite optimistic considering value creation (Echeverri and Skålén, 2011). Negative outcomes of

value co-creation are not considered thoroughly in earliest publications. Now however, the possible negative outcome of the process is also witnessed as value co-destruction. According to Plè and Chumpitaz Càceres (2010) value co-destruction is related to misuse of service system's resources. The statement is logical since both Vargo et al. (2008), and Grönroos (2011) agree that customer's value creation is an integration of her own resources (and other resources) into a value proposition. It is overly optimistic to assume that this integration process creates value each time since customer is actually giving away her own resources. Therefore, it is only rational that this integration will not always create value, instead possibly destroys it if integrated resources end up being wasted.

Service providers are creating new digital service concepts in a rapid phase. An example of such are activity tracking solutions. In this study, this category includes smartwatches, activity bracelets, smartphone integrated activity tracking applications, and heartrate monitors. These all represent quite well smart technology which is the latest widely adopted digital innovation. The essence of smart technology is collection of data, processing of data, and creating essential information to both user, and to service provider. Activity tracking solutions track activity of its user, processes it to create valuable information related to the user's lifestyle, shares with the user, and also includes many other functions. These mentioned service concepts include many value creation opportunities for a customer. However, it is logical that in this process also value co-destruction might occur.

In order to study this phenomenon a framework is required. According to Tuunanen et al. (2010) consumer our view of consumer information systems should be adapted to understand current situation in a better way. Users of consumer information systems like digital service are not as interested in utilitarian benefits as we have assumed. In other words, factors such as context, social surroundings, and hedonic benefits have far bigger influence than literature has recognized. For purpose of studying consumers desires and value co-creation in consumer information systems Tuunanen et al. (2010) create CIS framework. This framework will be used in this research as research lenses.

A need to study this prevalent situation is evident. Digital services have possibly created modifications to our understanding of how service systems work. Many new innovations have been adopted to service concepts, and roles of the value creation processes might have been modified. In addition, process of value co-destruction isn't still studied nearly enough, and new studies should be placed in the current context and service concepts. This thesis aims to contribute to service science by creating a deeper understanding of the prevalent situation.

1.1 Objective of the study

Objective of this paper is to study the prevalent phenomenon where digital services have become the main offering. More specifically, concepts of value co-creation and co-destruction are studied in the context of digital services. In practice this means that value co-creation and co-destruction are defined, and known examples are used to illustrate how value is co-created and co-destructed through digitalized solutions. After this, the knowledge gained from the examples are used in context of digital services, and some outlining processes of value co-creation and co-destruction are illustrated.

The study focuses on two main research questions. These research questions are:

- How are the digitalized services establishing value co-creation in consumer services from the perspective of activity tracking solutions?
- In which ways the digitalized services establish value co-destruction in consumer services from the perspective of activity tracking solutions?

In order to answer these questions underlying terms will be defined. In addition, some phenomenon which have been the most influential to the evolvement will be defined and some of the affects are discusses.

1.2 Thesis outline

This thesis aims to contribute to study of service-science and create a deeper understanding of the prevalent phenomenon. This underlying thesis includes a literature review which aims to create a consensus of what is currently known from the digital service systems, value co-creation, and co-destruction. Based on the literature review, drafts are made about value co-creation and co-destruction in digital services.

In order to contribute to the research area an empirical study is conducted. In this study the service concepts of digital activity solutions are studied. More specifically, value co-creation and co-destruction is studied in the context of digital activity tracking solutions. Reason behind a selection for the digital activity tracking to be the concept of study is that this category seems to represent the latest widely adopted smart digital service solutions. It includes a small carriable device, it is adopted in daily routines of its' user, it collects, processes and shares data, and it enhances a connection between other devices and users. This empirical study is executed as a laddering study (Reynolds & Gutman, 1988).

The study is an interview research where users of activity tracking solutions are interviewed in order to understand their value creation process. Also, potential value co-destruction is studied in this context.

2 KEY CONCEPTS

This chapter will look deeper into a background which has led to the prevalent situation. In this chapter we will define and discuss key concept of the research – digital services – and the main driving forces in the fast growth of digital service markets.

2.1 Digital services

Williams, Chatterjee, and Rossi (2008) defined digital services as services which are received through a digital transaction over Internet Protocol (IP). According to Williams et al. (2008) when considering the delivery methods, a digital service is more restrictive compared to traditional services. This implies that the minimum standards are also higher for digital services. This is because digital services require an internet connection, and people cannot cooperate with digital services without the help of computer technology. Williams et al. (2008) also state that digital services might be combinations of digital and physical components, such as for example the virtual bookstore Amazon which delivers physical books through a digitalized service. When considering the core benefit of the service concept which the provider delivers the usual center of the concept is the coordination and delivery of a product or ancillary service, which may or may not be linked to a physical component (Williams et al., 2008).

2.2 Digitalization

Digital services have taken central role in the markets. Firms who are working in roles of providers seek out new ways to create service concepts which utilize the latest technology and try to find ways to engage into peoples' lives through digitalized solutions. In order to understand prevalent phenomenon and how society has come to it, basics of digitalization need to be clarified.

Digitalization refers to an evolvement where digital technology engages in peoples' lives in new ways and seek new actions to engage into. Digitalization started somewhere around 1980s when computers became more popular for consumers. The process of digitalization is still ongoing and new ways to utilize technology are created in an accelerating phase. Some of the apparent effects of the digitalization are modifications in the business models, gathering and utilization of data in large amounts from new targets, and globalization. (Koiranen, Räsänen & Södergård, 2016.)

According to Hagberg, Sundstrom & Egels-Zandén (2016) currently smartphones and similar mobile devices are working as central delivery systems of digitalized solutions in consumer markets. Mobile devices are relatively small, are with their owner throughout every day, and include an internet connection which is available in almost any location in developed countries. Before smartphones and tablets were popular laptops were the closest thing of a carriable device with high computing power and an internet connection. Portability and accessibility of a device with internet connection seem to be the key attributes of a solution through which firms seek to engage with customers and provide their services currently. Therefore, activity bracelet, a newer device, serves also the interest of firms well since the bracelets can be attached into a customer throughout a day, the device includes an internet connection, and high computing power.

According to Hagberg et al. (2016) digitalization does not only serve the purposes of the firms in the provider roles. In addition, digitalization has granted consumers with new possibilities to make decisions and utilize data gathered with different solutions. Customers are able to purchase products easily with their mobile devices, make price comparisons without visiting a single physical shop, and use gathered data for their own purposes.

2.3 Servitization

Term servitization was first introduced by Vandermerwe and Rada during year 1988. According to Vandermerwe and Rada (1988) servitization refers to a shift in markets where companies are focusing on providing services instead of plain goods. Companies aim to create customer-centered bundles which are "combinations of goods, services, support, self-service, and knowledge" (Vandermerwe & Rada, 1988). Distinction between firms which offer goods to customers and firms which offer services is disappearing, because firms which used to focus on providing only goods are now also bundling goods with services in order to gain competitive advantage.

Vandermerwe and Rada (1988) state that bundles include goods, service, support, self-service, and knowledge. In this way, goods refer to tangible parts of the bundle. Service refers to a service concept which is built around the good or can be delivered by goods. Self-service is the encouragement made by firms for customers to become more independent with products. Support refers to

firms' support to customers with use of the product. Last component of the bundle is knowledge which refers to intelligence of the firm which can be utilized to help customers with problem solving.

According to Mathieu (2001) there are three main benefits which can be achieved by utilizing services in manufacturing. The three driving factors are the financial, the strategic benefits, and the marketing benefits. When taking a viewpoint of the financial factors Mathieu (2001) stated that previously conducted research made by for instance Donaldson (1986), or Mathe and Saphiro (1993) discuss increased revenues of a business, which has commercialized a service around a tangible product. In addition, according to Mathieu (2001) in their article Srivastava, Shervani and Fahey (1998) reveal that cash flow seems to be more reliable for a service business. Mathieu (2001) explains that strategic benefits are mainly related to gaining a competitive advantage. Gebauer, Friedli and Fleisch (2006) state that according to an empirical study conducted by Lay and Erceg (2002), as a strategical option of a business competing through services includes the highest potential, when comparing to several other options such as fostering innovation, technology or product quality. The marketing benefits gained from service-based business-model are related to the increased sales of products by using services (Mathe & Shapiro, 1993).

3 Value co-creation

In this chapter the concept of value co-creation is discussed. The discussion includes defining central terms which relate to value co-creation. The terms which are introduced in this chapter are concept of value, basics of service dominant-logic, and service systems. In addition, process of value co-creation is discussed superficially including several alternative explanations. Also, effects of social constructions, and co-creating through customer's experience are studied.

3.1 Concept of value

In order to understand process of value creation a mutual understanding about the concept of value needs to be reached first. Value however, is not a simple term to conceptualize.

The discussion about value goes back all the way to the time when the Greek philosopher Aristotle was active. During that time, the concepts use-value and exchange-value were introduced. The use-value was considered as a "collection of resources and the qualities associated to these collections" (Vargo, Maglio & Akaka, 2008). An important aspect is that there is a difference in how people value these qualities. The exchange-value aims to define substance as a commensurable, meaning that the substance holds commensurable value. However, the concept of exchange-value faces a wall when aiming to make all substances comparable according to their commensurable value, because it is impossible to compare commensurable values of two very different substances. Aristotle suggested that instead "need" should be seen as the commensurable value in exchange-value, but this view also faces problems, because "need" does not possess a unit of measure. Because there were apparent difficulties to conceptualize the term exchange value controversy about the term never really was solved. However, the term use-value was widely accepted. (Vargo et al. 2008)

Steps towards a better understanding of the concept of value were taken when Adam Smith (1776) began to discuss the matter. Smith brought the terms value-in-use and value-in-exchange into the discussion. Value-in-use refers to a utility of a particular object. The value-in-exchange refers to power of buying other goods, by selling the possessed object in exchange. Smith's interpretation was that it was usual that items which possess the most value-in-use, do not have the same amount of value-in-exchange. This view led to Smith's (1776) idea that there are two types of value, called real-value and nominal-value. Real value is based on labor required to afford necessities of life, meaning that the real-value is tied to the value-in-use. Nominal value however, refers to a price paid in exchange. Again however, this view faced problems. The problem was that it is almost impossible to measure the amount of labor. This led to focus shifting towards tangible resources and value-in-exchange, meaning that goods-dominant-logic took over as the primary view of value. Focus was on actions which seemed to be productive because they produced tangible results such as goods. Other actions which were more difficult to tie to the value-creation were mostly ignored, because they did not produce clear and tangible results. (Vargo et al. 2008.)

As the history tells, there has been difficulties to understand intangible aspects of value. Tangible and easily realizable goods have been the main focus and views on services have been very limited. Nowadays however, view on value has been modified towards its intangible parts and the prevalent view is that customer's experience with the product or service will determine the actual value. This widens concept of value delivery and firms should aim their focus on things which have an influence in the customer's experience of value use of a product or service.

Currently, term value is somewhat more accurately conceptualized to answer the prevalent logic. Value is still not considered as to be fully measurable, but it is related to making beneficiary's well-being improved. Grönroos (2008) provided a definition for a value, which fits well into the context of this study. Reasons for the good fit is that the definition is from the customer's perspective, it includes a practical explanation and service dominant-logic is apparent making it timely. According to Grönroos (2008) value from customer's perspective means that customer has been assisted by a self-service process, or a full-service process, and as a result they are or feel better off than before.

3.2 Basics of the service-dominant logic

According to service-dominant logic all exchange is based on service. Goods should not be seen as the center of economical exchange. Instead, goods should be seen as tools for delivery and application of resources. In contrast, the goods-dominant logic which can be seen as the traditional logic placed the goods in the center of the economical exchange. (Vargo et al., 2006.)

Because in the view of service-dominant logic services take central role, knowledge and skills provide competitive advantage in markets (Vargo, Maglio & Akaka. 2008). Knowledge and skills are characterized as operant resources, which means resources that act upon other resources. Value is an outcome of a successful application of these operant resources. Operand resources which are resources that an act or operation is performed on can be used as transmitters in an application of operant resources (Vargo & Lusch, 2004).

Even though a shift from goods-centered view to service-centered view is acknowledged the evolution of the market is not granted with the respect and attention it requires. According to Aarikka-Stenroos and Jaakkola (2012), for instance the knowledge intensive businesses have remained supplier-centered. In practice this means that focus is on finding ways to provide value to the customer even though the servitization suggests that the focus should be on creating collaborative value co-creation processes. This implies that the above-mentioned shift is not completed, and markets have not yet witnessed the ultimate outcome of this evolvement.

Service-dominant logic introduces the concept of value co-creation. When agreed that value is the application of the operant resources, it is logical to state that value is created in cooperation with different parties who are somehow contributing in the creation or the delivery of the service. These parties can be, for instance employees of the firm providing a service, customers, other customers using same service, or almost anyone else who somehow is related to the service. However, even though these various stakeholders are participating in the value creation process, beneficiary will always determine the value. Firm's role is to work in intermediary roles in value co-creation process (Vargo et al., 2008).

Service-dominant logic includes an assumption that there isn't value until a value offering is used. According to this view value should be seen as value-in-use. When agreeing with this assumption concept of value delivery will expand. Reason for this is that because value is determined in use influences affecting the usage will have to be taken in to account. Basically, this means that for instance, perception and experience should be seen as essential aspects of value determination (Vargo and Lusch, 2006).

Expansion of the concept of value determination will include market-facing and non-market facing resources. Market-facing resources include resources from other firms than from the one who is providing the core service. Non-market-facing resources include personal and private resources, and also public resources. Personal and private resources can be for instance skills of the customer and public resources can be related to for instance public infrastructure. (Vargo et al. 2008.)

Vargo et al. (2008) collected the essence of service-dominant logic to ten foundational premises. According to Vargo et. al (2008) these foundational premises are:

1. Service is the fundamental basis of exchange.
2. Indirect exchange masks the fundamental basis of exchange.

3. Goods are a distribution mechanism for service provision.
4. Operant resources are the fundamental source for competitive advantage.
5. All economies are service economies.
6. The customer is always a co-creator of value.
7. The enterprise cannot deliver value, but only offer value propositions.
8. A service-centered view is inherently customer oriented and relational.
9. All social and economic actors are resource integrators.
10. Value is always uniquely and phenomenologically determined by the beneficiary.

According to Grönroos (2011) foundational premises made by Vargo et al (2008) create implications which do not fit well to an understanding of service dominant logic. First of all, Grönroos (2011) sees that the first foundational premise "Service is the fundamental basis of exchange" is not correct. Grönroos (2011) states that this premise excludes the whole purpose of the business which is to gain financial value. According to Grönroos and Helle (2010) service should generate value for both the customer and for the supplier. The aim to create financial value to firm shouldn't be left out. Therefore, according to Grönroos (2011) the basis and logic of exchange is "value created by the customer, through the support of a supplier, enables the supplier to gain financial value in return". Hence, basis of business is the reciprocal value (Grönroos, 2011). It seems logical that the basis of business should include the viewpoint of the firm. After all businesses are created to gain income, not to only serve customers. Therefore, it is rational to look deeper in to the reasons behind the exploit of business and the definition made by Grönroos (2011) does seem to be able to capture the primal reasons.

Grönroos (2011) argues that foundational premise "the customer is always a co-creator of value" made by Vargo et al. (2008) is too simplistic and misleading. Grönroos (2011) states that it also contradicts the very nature of value-in-use, which is that a user of an offering creates value in-use and there isn't any value before an offering is used. Grönroos (2011) insists that role of the customer as a user should be made more clear, and that customer is the only one who creates value in-use. Grönroos (2011) reformulates this particular premise: "the customer as the user and integrator of resources is a value creator". It is true, that the reformulation made by Grönroos (2011) sets roles more clearly when comparing to the premise made by Vargo et al. (2008). It also includes resource integration-view into it and therefore fits more accurately to the process of value creation which emphasizes the integration of resources.

Grönroos (2011) also redefines service. Vargo et al. (2008) defines services as "the application of specific competences on resources for the benefit of someone". According to Grönroos (2011) this definition however, does not indicate what is achieved and how it is achieved. Therefore Grönroos (2011) states that a more accurate definition for the term service could be "service is value-

creating support to another party's practices". This definition does a better work in capturing the term value creation into its logic. However, the definition made by Vargo et al. (2008) does include resource perspective more clearly, and resource integration is an essential part of the process of value creation.

3.3 Service system perspective

According to Maglio and Spohrer (2008) service systems are "dynamic value co-creation configurations of resources (people, technology, organizations, and shared information)". According to Vargo et al. (2008) service systems exchange resources with each other. This was also mentioned by Maglio and Spohrer (2008) who stated that service systems share information, work, risk, and goods. According to Maglio and Spohrer (2008) these are shared in varying levels depending on the business. For instance, in consulting-business information-sharing is the most central type of sharing. Vargo et al. (2008) explained that resources which are shared include internal, private, and market-facing resources.

Vargo et al. (2008) also explain that resources which are related to the process of value co-creation are not limited to resources which are able to be controlled. Vargo et al. (2008) state that "resources such as time, weather, and laws, which are often considered uncontrollable by the individuals and organizations, are integrated – if not relied on – in the value creation process by all service systems (e.g., customers, firms, families, countries)." Therefore, it is important to realize that a size of a service system might be beyond simple understanding, and that influences might become from very far. For instance, a holiday, which can be seen as a service, might become dramatically influenced by underlying weather.

Maglio and Spohrer (2008) argue that a size of a service system varies a lot. Smallest service systems are focusing on an individual including her surroundings, whereas the largest service systems are as big as the global economy. "Cities, city departments, businesses, business departments, nations, and government agencies are all service systems" (Maglio & Spohrer, 2008).

The following figure is made by Vargo et al. (2008) and it represents how service systems are linked to each other.

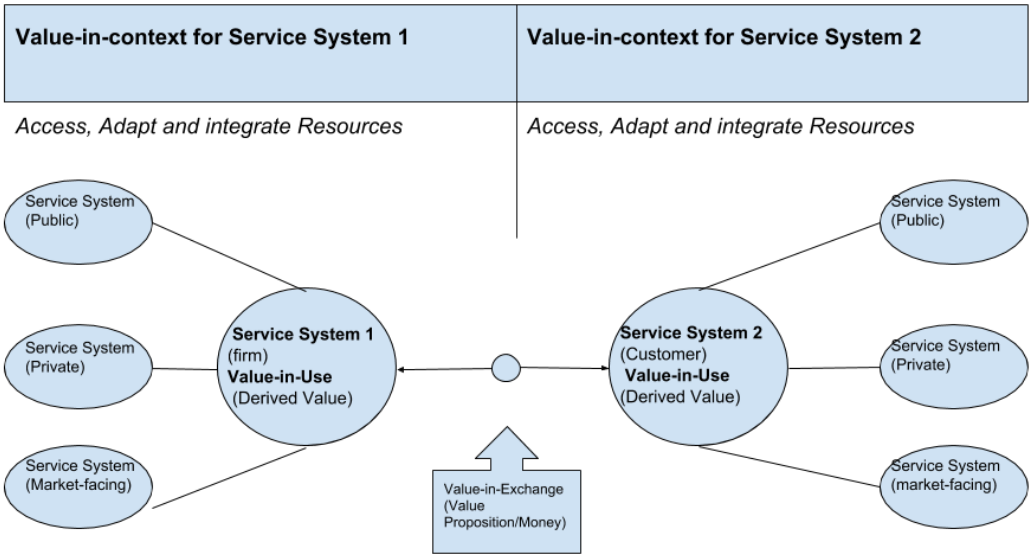


Figure 1 Value co-creation among service systems (Vargo et al. 2008)

From the figure made by Vargo et al. (2008) it is possible to see that value in-exchange is located in between service systems where the transaction is happening. However, it is important to also notice that it is the value proposition which links service systems together. Each service systems integrates resources from other service systems which are public, private, or market-facing.

3.4 Smart service system

Service system-conceptualization presented by Vargo et al. (2008) defined well the logic of service systems in services overall. However, even though it seems like that the conceptualization works well for services in general, it is important to realize that services have indeed been affected by the emergence of new digital innovations. Therefore, it is logical that service system-perspective is at least a bit different when considering digital services in particular.

Newest digital innovations have created services which utilize smart technology. Allmendinger and Lombreglia (2005) argue that requirements for a successful service offering will include that in fact a service should be a smart service. Similar proposition was made by Barile and Polese (2010) who stated that a viable service system should be a smart service system. These propositions indicate that the present, or at least the future of digital services includes smart technology to an increasing extent. Therefore, it is rational to propose that a study considering digital services includes the perspective of smart services.

According to Beverungen, Müller, Matzner, Mendling, and vom Brocke (2017) smart services are applications of specialized competencies through deeds, processes, and performances that are enabled by smart products. In oth-

er words, central part is that service is built around a "smart" product. According to Beverungen et al. (2017) core properties of smart products are unique identification of a single instance of a smart product, localization of service users, connectivity between smart products and therefore remote resources integration, sensor-technology to gather data related to usage, storage and computation, actuators, interfaces, and invisible computers.

What is central in smart services is the building of an intelligence which refers to awareness and connectivity of the products (Allmendinger & Lombreglia, 2005). Through awareness and connectivity, service providers receive essential data related to use of product or service, to its surroundings, and to other products and services. What is also involved in intelligence is readiness to execute modifications and optimization based on the data (Allmendinger & Lombreglia, 2005). Allmendinger and Lombreglia (2005) also mention that the intelligence is not only reacting to different situations, but also trying to predict things beforehand in order to act early.

According to Beverungen et al. (2017) smart services utilize smart technology to create interactions between service providers and service consumers. Beverungen et al. (2017) state that interaction in smart service can be viewed from to different perspectives. The first perspective is service customer's perspective where customer uses the product's embedded functionality as a self-service. Another perspective is service providers perspective where the service provider utilizes a smart product to establish a remote connection to the operations of a service consumer. What happens in the latter perspective is that a service provider collects data with a smart product, and uses this data to optimize the service, hence to create additional value propositions.

Beverungen et al. (2017) argue that in smart service systems smart products should be seen as boundary objects which facilitate transfer of information and knowledge over the borders. In other words, a smart product is placed between a service provider and a service customer, to collect and share information between these parties. Goals of these two participants in a smart service systems naturally differ. According to Beverungen et al. (2017) service customer, as the service dominant-logic proposes, is interested in creating value-in-use. Service provider again aim to optimize the service, based on the data received from the customer's use in. Data helps service provider to gain income which is the ultimate purpose of a business.

The following figure is a conceptualization of a smart service system, made by Beverungen et al. (2017).

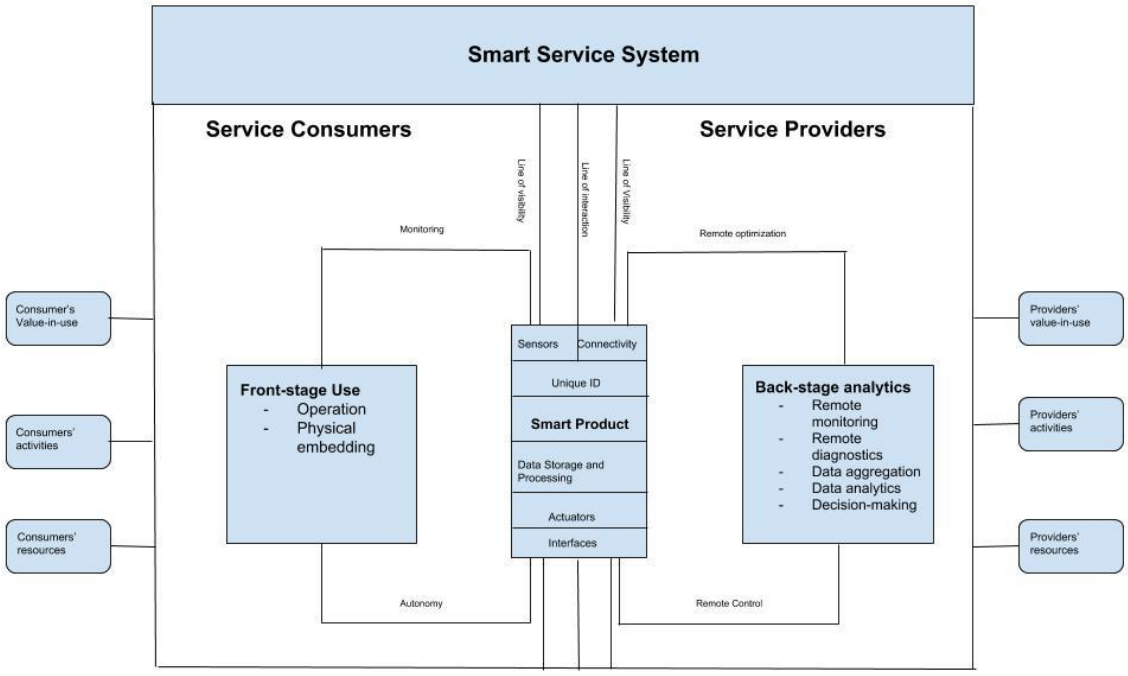


Figure 2 Conceptualization of a smart service system (Beverungen et al. (2017).

Conceptualization of a smart service system (see figure 2) made by Beverungen et al. (2017) demonstrates well the interaction between a service provider and a customer. A smart product, which is placed as a boundary object between the participants, facilitates the effortless and continuous interaction. The properties of a smart product which together create the smart product are included in the figure as well. In addition, what is important is that customer's and provider's own resources which influence the process are not left out.

3.5 The process of value co-creation

Foundational premises made by Vargo et al. (2008) define quite well the prevalent understanding of how economy works in a sense of customer perceived value in service systems. However, these premises do not provide a clear definition of a process of value co-creation. It is not clear whether defining this process is actually possible since it seems like value is delivered in many different ways and customers do perceive value in unique ways. However, it is possible to try to characterize the process, so that some central characteristics of the process will be witnessed.

According to Vargo et al. (2008) firms do not create value, they only create value propositions and deliver these propositions to the customers who will be in charge of the actual value creation. Value that a customer experiences in creation is largely based on a perception of a customer about value. However, the

value that a customer perceives can be defined as a trade-off between benefits and sacrifices received and made by a customer, based on a perception of a customer (Aarikka-Stenroos & Jaakkola, 2012). Obviously, a customer aims to maximize the perceived benefits, and avoid making sacrifices (Lindgreen & Wynstra, 2005).

According to Grönroos (2011) value co-creation should not be seen as an all-encompassing process. This means that firm's actions related to production stage such as design, development, manufacturing, and some parts of delivery should not be included into concept of value co-creation process. Grönroos (2011) explains that these actions related to production are in fact only generation of potential value, which leads to value proposition. In addition, goods represent a potential value to customers. Usage of a good by a beneficiary creates the actual value. Therefore, it seems like Grönroos (2011) focuses on value-in-use instead of paying any attention value-in-exchange. However, value-in-exchange is included in the illustration of service systems made by Vargo et al. (2008) (see figure 1).

Grönroos (2011) illustrates the boundary of value co-creation in the following figure.

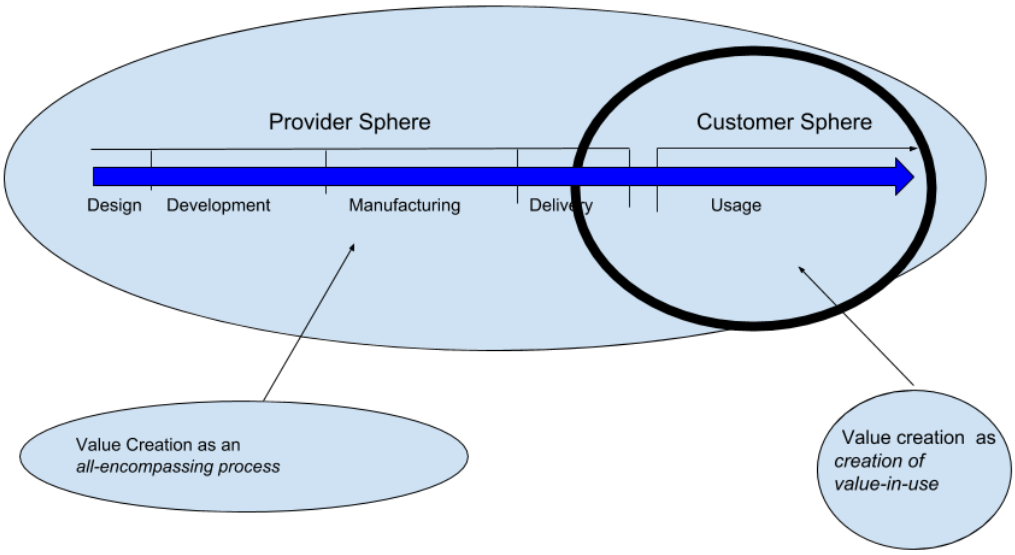


Figure 3 Value creation as the customer's creation of value-in-use (Grönroos, 2011)

Grönroos (2011) states that a firms' aim is to gain financial value through a service offering. In modern business concepts gaining financial value may not mean that customers pay money to use a service. Customers may also instead provide data to firms related to the usage and consumer-behavior which will

lead to financial value for firms in a longer term. Basis of business in this view is that "value created by the customer, through the support of a supplier, enables the supplier to gain financial value in return" (Grönroos, 2011). This defines also the role of a firm in value co-creation. Firm's role is not to create value but facilitate customer's value creation by providing resources in a form of service. In other words, firm's role is to work as a value facilitator (Grönroos, 2008).

According to Vargo et al. (2008) role of a firm is to apply "their knowledge and skills in the production and branding of good, and customers apply their knowledge and skills in the use of it in the context of their lives". Therefore, it seems that Vargo et al. (2008) are more willing to include production stage actions of an offering to value co-creation compared to Grönroos (2011)

According to Grönroos (2011) from a customer's perspective a service means that customers acquire resources from a supplier and use them in a self-service process. In a self-service process customers integrate their own resources and other necessary resources available. Customers also apply their skills, and in this way aim to create value for themselves in their practices. A supplier may try to engage in this process through direct interactions and offer more assistance than just resources. This includes additional services such as customer service. However, Grönroos (2011) highlights the notion that a customer creates value, and firm is only possibly invited to join in it as a co-creator.

Vargo et al. (2008) also discuss about process of value co-creation. Vargo et al. (2008) highlight roles of service systems. The statement is that service-systems co-create value in service-for-service exchange and in resource integration. According to Vargo et al. (2008) firms create value propositions and deliver them to customers. Customer either, accept, reject, or possibly ignores these value propositions. If a customer decides to accept a value proposition, customer will integrate her resources into it. Resources integrated include possibly money which might be required to receive a service, but also other resources such as related skills, time, and personal effort. (Vargo et al. 2008.)

Grönroos (2011) does see the meaning of co-creation differently compared to Vargo et al. (2008). Vargo et al. (2008) sees that the whole process where service systems exchange services and integrate resources is value co-creation. Grönroos (2011) however, states that a process where firms facilitate customers' value creating is not co-creation. The logic made by Grönroos (2011) is that a firm is not automatically a co-creator, even though it provides value propositions to customers. According to Grönroos (2011) firms only get opportunities to engage with their customers' value creation which only possibly makes them co-creators of value. Grönroos (2011) states that if a service process includes direct interactions and a firm makes use of them, it is possible that a firm is co-creating value. However, outside direct interactions firms only serve as value facilitators, and not as co-creators of value (Grönroos, 2011). It seems like Vargo et al. (2008), and Grönroos (2011) have different view of what actually happens in value creation process. Vargo et al. (2008) do see that value is co-created between service systems, but Grönroos (2011) is strict with a logic that only a customer creates value. View by Grönroos (2011) is logical and makes the process

simple. However, Vargo et al. (2008) are having a bit wider view of the process, and their logic of service systems do take more factors into account.

3.6 Capabilities of digitalization

Above, this paper has explained two key terms, digitalization and value co-creation. Digitalization has been a key in evolvement to prevalent market-situation where the digitalized services are they key offering. According to prevalent logic successful service concepts are based on an agreement that customer is a value-creator, and a firm is working in a role of a value proposition provider, hence as a value co-creator. However, it is still unclear how the terms digitalization and value co-creation are tied together.

According to Lenka, Parida and Wincent (2017) digitalization provides three main capabilities for firms to utilize in their service concepts. First capability is intelligence capability. Intelligence capability which includes two subdimensions refers to "an ability to configure hardware components to sense and capture information with low human intervention". This means in practice that new devices such as smartphones and activity bracelets are constantly gathering information about their user, or possibly from surroundings of a user. First subdimension is related to an upgrade of hardware components with smart subcomponents. An example of a smart subcomponent would be a sensor. Second subdimension relates to gathering and providing information about condition of a product, and about customer's use-behavior with the product.

Second digitalization capability which Lenka et al. (2017) have found out is connect capability. Connect capability refers to an ability to "connect digitalized products through wireless communication networks". In other words, this means that more and more devices are connected with each other or at least into a server. First subdimension relates to a connection between a device and a server. This subdimension supports a cloud architecture, as devices aim to not to storage information inside, rather they send data to a server which storages, processes and analyzes the gathered information. Second subdimension is related to a connection between devices. A device can be connected to another device, or to many devices. This enables devices to communicate with each other.

According to Lenka et al. (2017), third digitalization capability is analytic capability, which refers to "an ability to transform the data available at hand into valuable insights and actionable directives for the company". This means that companies gather large amounts of data and aim to extract valuable information from the data. Information extracted is used to support business in finding better ways to serve their customer's needs. This capability also includes two subdimensions. First subdimensions is the creation of rules, business logics, and techniques to information processing, which aims to create predictions about markets and ever-evolving customer needs. Second subdimension relates

to simulation and test techniques which firms can utilize when aiming to optimize their offerings to meet with their customer's needs.

Lenka et al. (2017) created a connection between digitalization capabilities and value co-creation which produces value co-creation mechanisms. Value co-creation mechanisms are mechanisms which have been enabled by digitalization capabilities. First value co-creation mechanisms are perceptive mechanisms. Perceptive mechanisms refer to an ability to "identify, assess and address specific customer needs". Firms collect large amounts of data about their customers and their behavior with various devices and process this data in order to extract valuable information. This information helps firms to understand prevalent and future customer needs. In this way, customers are in a "merged engagement process with the firm". This information is useful both, for firms and for customers. Customers are able to optimize their use of the product, find new additional value creation opportunities, and work together with service-providers in order to improve overall use-experience.

Second value co-creation mechanisms according to Lenka et al. (2017), are responsive mechanisms. Responsive mechanisms refer to an ability of firms to react quickly and proactively to their customers evolving demands. This proactiveness enabled by digitalization capabilities allow firms to participate in value creation process as a value co-creator since they are granted with a possibility to rapidly react to differing situations. These mechanisms again are based on the gathering of data, processing it and executing analytical work in order to stay on the top of customers' demands.

3.7 Effects of the social constructions

Edvardsson Tronvoll and Gruber (2011) discuss effects of social constructions in value co-creation. According to their article social forces have a meaningful amount of influence in a process of value co-creation, and this should be studied in order to understand phenomenon more deeply.

Science of social construction studies social world in order to understand behavior of people in different social situations. Different social situations can be seen as different levels where an actor can be placed, for instance at societal, group, or individual level. It is assumed that individuals learn, adapt and make their own choices. (Edvardsson et al. 2011.)

Service-dominant logic states that we shouldn't see value creation as an output-oriented concept, but as a process-oriented concept. As mentioned earlier, customer is the key player in a process of value co-creation which is a collaboration between many different parties. Customers experience in value co-creation includes various influences. These influences include past experiences, customer´s own skills and knowledge, and other users of a service or possibly even different services which somehow affect the original customer´s service experience. According to Edvardsson et al. (2011) one very essential influencer in a customer's experience is social construction.

Edvardsson et al. (2011) argue in their article that social structures should be seen as more central part of value co-creation, because a process of value-creation do follow these constructions. This means that position where the ultimate value co-creation happens is within social systems. In social systems different parties place themselves in particular social roles. Parties will interact from these roles and reproduction of social structures will happen. Schooler (1996) defined social structures as "patterned interrelationships among a set of individual and organizational statuses, as defined by the nature of their interacting roles".

Based on social construction theories, Edvardsson et al. (2011) make four propositions on how social construction theories should be implemented in concept of value co-creation. First statement is that value in-use should be in fact considered as value in-social context. It has been stated before that value in-use could be better described by using the term value in-context. However, concept of "context" is much wider than only resources arising from the context. Social forces do influence process of value co-creation in a major way, and more importantly how value is perceived. In practice this means, that identical interactions between customer and firm might imply different social and personal meanings depending on the social system where interaction occurs. According to Edvardsson et al. (2011) and Deighton and Grayson (1995) value of products depend on social consensus of such value. In practice this means that value is not solely based on individual's perception of value-in-use, but also by wider social perceptions (Edvardsson et al. 2011). Therefore, individuals' perception of value is affected by a wide social context, and therefore we should use the term value-in-social-context.

Second proposition made by Edvardsson et al. (2011) is that social positions, roles, and interactions need to be taken into account in the design of value proposition. In other word an assessment of resources in basis of value in a social context.

Third proposition is related to an asymmetry of service exchange and value co-creation. According to Edvardsson et al. (2011) and Deighton and Grayson (1995) benefits which are provided with services are not always shared equally. This is because a social consensus includes a compromise, between customer's and firm's desires (Edvardsson et al., 2011). Information in markets usually are asymmetric, and there is a possibility that firms seek to use this asymmetry for their own benefit. In practice this might mean providing misinformation to customers, or wrongfully pricing their services or products. Also, firms might seek take advantage of a social context, for instance by creating luxury services or products which in fact do not possess more value in quantifiable measures. Customers aim to use these luxury services in order to communicate their own status in the social context to other actors. However, this forces us to consider if there actually is an increased amount of value created by a customer if she feels like a product is luxury even though it really isn't.

Fourth and final proposition made by Edvardsson et al. (2011) state that "service exchange's and actors' roles are dynamic in adaptive service systems".

This means that roles of actors participating in services are not fixed. Actors are increasingly interacting, innovating, and learning through technologies and systems. Customers are also producing content, and it should be understood that customers do not only create value for themselves, but co-produce value to others as well. Various social media platforms are excellent examples of platforms in which customer's role is to work as a producer of value to others, by providing content in to platform. Customers' actions shape services and customers have more power than ever. For instance, social media platforms have also become very powerful ways to spread knowledge, or negative word of mouth about companies' actions which forces companies to work transparently. (Edvardsson et al. 2011.)

According to Edvardsson et al. (2011) four proposition which should be applied to the service-dominant logic and value co-creation are:

- Value has a collective and intersubjective dimension and should be understood as value-in-social-context
- The way in which resources are assessed depends on the social context
- Service exchange and value co-creation can be asymmetric.
- Service exchanges' and actors' roles are dynamic in adaptive service systems

3.8 Co-creating through customer's experience

As focus in a value creation-process has shifted to focus on customers, role of a customer has also evolved. Customer no longer has to be a passive participant, who only receives value propositions, and then possibly creates value. In fact, customers are empowered to influence products and services. This influence might be unconscious because methods which are used to collect information about customers' preferences are well integrated into processes which a customer performs with different services. For instance, search platforms such as Google collect data about customer's behavior when a customer is performing search operations, and this data is processed and then used to make conclusions about what are customer's preferences and desires.

According to Prahalad and Ramaswamy (2004) today's customers are "informed, connected, empowered, and active". Prahalad and Ramaswamy (2004) state that competitive advantage in service-markets lay high-quality interactions, which enable co-creation of unique experiences with firms for individual customers. Emphasis is on an experience of a customer, and on creating a feeling that a customer is highly involved in the process or possibly even in charge of it. According to Prahalad and Ramaswamy (2004) firms should focus on creating experience environments where individual customers are able to generate their own unique and personalized experiences. Therefore, a logical statement

made by Prahalad and Ramaswamy (2004) is that "products can be commoditized, but co-creation experiences cannot be".

A later study made by Ramaswamy (2008) state that a competitive advantage in current markets can be found from a continuous interaction with customers through engagement platforms. Profitable interaction produces strategic capital which refers to accumulated knowledge and skills, which can be used to identify and act upon possibilities of new innovation and value creation opportunities. Leaders of markets are ones who are doing the most effective work in co-creating experiences of value with customers, in order to sustain competitive advantage.

Engagement platform provided by a firm enables customers to experience value through their participation in process of creating a product or service. For instance, Nike has used customers intake in design of their products with different competitions where customers can make their own designs and vote for a winner. In this way Nike engages their customers to become a part of creating an offering, and socially networks group of people who share same values and perceptions. In this way true desires of customers are gathered, and risk of dissatisfaction reduces. (Ramaswamy, 2008.)

According to Ramaswamy (2008) key in experience co-creation (ECC) process is to enable co-creative interactions, in order to have individual customers feel meaningful and compelling engagement experiences. In firm's perspective, interactions enable rapid and continuous learning about customers valuing of options firm are providing These processes require management, and one way to manage these processes is based on Dart model, which was used by Nike. The DART-model was presented for the first time by Prahalad and Ramaswamy (2004).

DART model created by Prahalad and Ramaswamy (2004) is presented below.

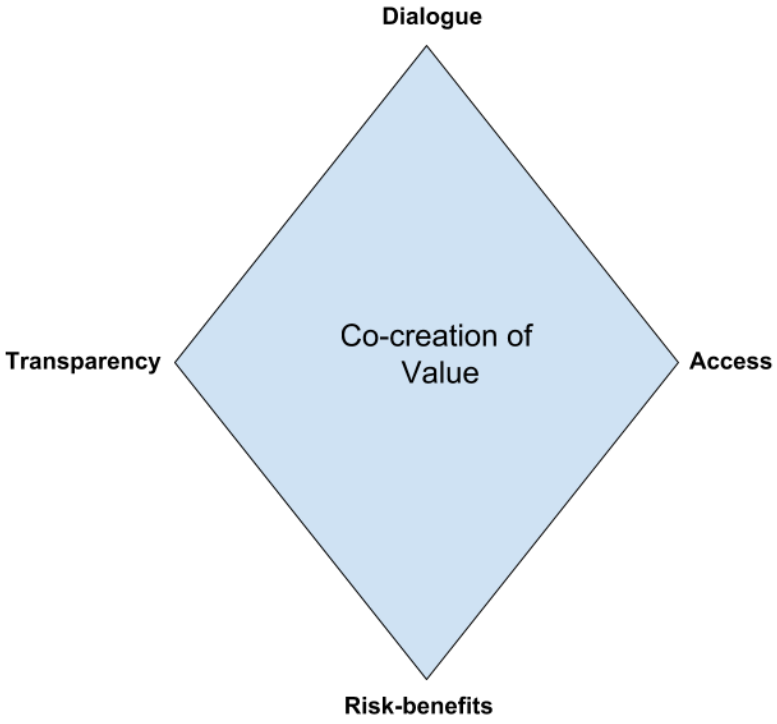


Figure 4 DART- model (Prahalad and Ramaswamy 2004)

DART-model consists of dialogue, access, risk-return and transparency. "The co-creation-model is designed to foster meaningful dialogue, for example, between the customer and the company" (Ramaswamy, 2008). Meaningful dialogue needs to be enabled by company by providing customers with access to each other. According to DART-model, customers risk-return relationship needs also the managed. Both, customer and firm need to have a managed risk-return relationship, where relationships provide some sort of benefit in return for a taken risk. Fourth guideline in Dart-model is transparency. This refers to shared information with firm and customers. In other words, company provides valuable information to customers and customers in return provide information about their behavior and preferences, which a firm can utilize in their business development. (Ramaswamy, 2008.)

Ramaswamy (2008) argue that there is a fundamental shift in a process of value creation. Ramaswamy (2008) state that products and services might not actually be the basis of value creation, but rather the experience co-creation platforms. Also, value creation process is shifting from being firms unilateral process to co-creation with individuals which is called experience co-creation. Experience co-creation refers to a joint process of value co-creation, where co-creation happens through interactions in anywhere in a business system that generate experiences of value.

4 VALUE CO-DESTRUCTION

According to Echeverri and Skålén (2011) discussion about value creation has been overly positive. The first wave of discussion has not included much space for discussion concerning failures and negative outcomes. However, the most recent research has identified a concept of value co-destruction which can be seen as a negative outcome of a value co-creation process. Echeverri and Skålen (2011) state that discussion about interaction between a provider and customer should expand to consider also possible negative outcomes and reasons for this. Value co-destruction should be seen as equally important topic to study as value co-creation.

In this chapter term value co-destruction is studied through research literature which includes practical examples of value co-destruction.

4.1 Practical example of a football game

Just like in value co-creation key of the concept is collaboration between different parties in process. Other side of collaboration is beneficiary, but the second part can be almost anyone who is somehow related to service-experience. An example of a process where value co-destruction has been executed was presented in a research article written by Stieler, Weismann and Germelmann (2014).

In their research experiences of spectators at German Bundesliga football game were studied. During a game a silent protest of 12 minutes were conducted, and during the 12-minute period the fans refused to cheer. This silence influenced experience of spectators who expected a usual atmosphere of a football game to be present. This group was strongly disappointed; thus, they were not able to create value they had expected. Because the main influence was silence due to silent protest, conclusion is that value was indeed co-destructed with fan base who held the silent protest. Even though a football game is not the most representative example of a service concept, it is a relevant one be-

cause service-experience of a spectator of a football game is influenced by many different parties. Players of each team, organization who is responsible of the event, and other fans together are part of a value co-creation process.

4.2 Resource misuse

Zeithaml (1988) discussed in her article about perceptions of value made by customers, and what are affecting on value perception. According to Zeithaml (1988) value can be seen as a "trade-off", in which resources are sacrificed by a customer, and benefits are hoped to be delivered in exchange. According to Smith (2013) these sacrificed resources can be for instance time, energy, money, or effort, and by misusing these resources value can be co-destructed.

A similar finding was made earlier by Plé and Chumpitaz Cáceres (2010), who argued that "value co-destruction occurs when a service system accidentally or intentionally misuses resources (its own resources and/or those of another service system) by acting in an inappropriate or unexpected manner". In the same research article Plé and Chumpitaz Cáceres (2010) provide their definition for a term value co-destruction, which is defined as "interactional process between service systems that results in a decline in at least one of the systems' well-being (which, given the nature of a service system, can be individual or organizational)".

Smith (2013) state that a resource misuse is experienced by a customer when provider unexpectedly does not fulfil resource offer it has made, or resource integration process is not able to co-create value by gaining resources for customer. In addition, customer experiences a resource misuse if an unexpected loss of stored resources occurs, or a combination of these three examples happen.

Lintula, Tuunanen, Salo and Kari (2017) also found out resource misuse when they studied the value co-destruction in an augmented reality platform POKÊMON GO. The study discovered that technological failures related to platform decreased the ease of use of the service. This led to increased loss of user's resources, such as time and effort. In addition, negative feelings had been felt towards players of POKÊMON GO, which led to negative comments resulting in the loss of dignity of the users. Dignity should also be seen as a personal resource of the user.

Smith (2013) provided a list of categorized resources which can be misused in value integration process. For instance, self-esteem of a customer can be easily misused by a firm, if frontline employees do not treat their customers with respect. Time and energy were also a resource, which is quite often misused by a firm, and relates tightly with efficiency of a service and how much time and energy does a service require form a customer in order to co-create desired value.

Value co-destruction due to misuse of customer resources naturally led to behavior which aim to avoid the misuse in future. According to Smith (2013)

avoidance strategies are quite usual after a failed value integration, which leads to a decision to not to use the services of the firm in the future. Majority of the customers who had experiences of misuse of their resources used confrontative strategies, which refer to complaining, or an attempt to resolve the problem. However, these strategies are potential situations for a secondary resource loss. In case the complaining and attempting to resolve the problem does not lead to a successful outcome, customers time and effort is again misused.

4.3 Social-system perspective

As the social-system perspective states, collaboration between a frontline representive of a provider firm and a customer is a central aspect. This was studied by Kashif and Zarkada (2015) in their research article where a collaboration between bank employees and their customers where studied. In their study situations where customers have not been able to control their frustration with the service of the bank was studied in a context of value co-destruction. Customers who were disappointed from level of the service, tended to raise their voice, abuse, and make a scene when service was not what they had hoped. In other words, they were not able to reach the level of value they seeked to achieve when deciding to use services of the bank. This led them to focus on their negative feelings towards bank employees, who were representatives of the bank whose services were used. The bank employees naturally felt these confrontations as very negative experiences leading them to feel sad, unmotivated, and to have negative pre-assumptions about upcoming customer-service events.

At first, it might seem that the problems which occur are located in the communication between the frontline employee and the customer. However, the study revealed that heated arguments between the frontline employee and the customer are only a symptom of a deeper problem. As Kashif and Zarkada (2015) argued that the main responsible for a negative service-experience is the system failure, which leads to employees not being able to serve their customers properly. Employees did not feel like they had the support of the firm which took the customers side, their service process did not seem to be optimal, and in addition the firm had made mistakes in their marketing leading to misunderstanding by customers. Therefore, a conclusion can be made that there are three sides in this example who are co-destructing the value. The bank whose service-system is not optimal, the customers who are abusing the employees, and the employees who receive the customer's abuse leading to lowering level of motivation to provide best possible service.

When applying article written by Smith (2013) where resource misuse was characterized as the root of value co-destruction, a conclusion can be made that several resources were misused in this example. Customer's resources such as time and energy where misused by a frontline employees and bank by not providing efficient service. Employee's self-esteem was also misused by cus-

tomers, but also by bank which did not support the employee leading to confrontations. Also, presumably both, the customer's and the employee's physical energy was also misused with heated arguments and misunderstanding.

4.4 Value co-destruction in IS artifact

Lee, Thomas, and Baskerville (2015) provide a relatively new definition for a term IS artifact. According to Lee et al. (2015) IS artifact consists of three different parts. First part is technology artifact, which can be seen as a tool which helps or supports in solving a problem. Second part is information artifact, which refers to an instantiation of information. Third part is social artifact, referring to relationships and interactions between individuals. Together these parts construct the IS artifact, which is a holistic system.

Vartiainen and Tuunanen, (2016) conducted a research which studied contradictions of value co-creation and co-destruction in an IS artifact. The studied IS artifact was geocaching system. They defined parts of a geocaching system, by applying the recognized parts of an IS artifact defined by Lee et al. (2015). According to Vartiainen and Tuunanen (2016), the technical artifact of the geocaching system is the combination of the Global Positioning System (GPS), and the Geographic Information System (GIS), which help in the defining the exact location of a geocache. The information artifact includes the geocaches experiences related to the geocaching activity, and information about geocaches. The social artifact is the relationships between the geocachers, and also relationships between the outsiders who are not participating in geocaching.

Vartainen and Tuunanen (2016) were able to find four main contradictions which are related to geocaching as an IS artifact. The first contradiction is related to introducing secret society of geocachers to outsiders. Geocache-community can be seen as a secret society which enjoys the secrecy of their hobby. However, geocachers also are social, and like to introduce their hobby to new people and hope that they are able wake interest towards geocaching. Therefore, this contradiction can be seen occurring in the social artifact of geocaching system. The second contradiction is related to rules of geocaching and expanding community. While the geocachers are following their rules quite strictly, there is a risk that rules become deviated when new hobbyists emerge. "The more geocachers there are, the more geocaching as a hobby is threatened by the behavior of non-adherence to the rules". This contradiction is related to the information artifact geocaching. Third contradiction is related to consuming of nature. A large part of geocaching hobby is about enjoying nature. However, as more and more geocachers emerge, more people are wondering in nature, possibly damaging and consuming it. In addition, the hobby requires use of natural resources which also consumes nature and contradicts with the geocachers appearance as close to nature people. This contradiction naturally is related to the technical artifact of geocaching. Fourth and the final contradiction presented in the research was the contradiction between a competition and so-

cializing. Geocachers are social people who enjoy their community, but also at least a playful competition is present all the time. This contradiction also relates to the social artifact of geocaching.

Lintula et al. (2017) studied the emergence of value co-destruction in augmented reality platform POKÊMON GO. In their study value co-destruction also emerged through a contradiction. Some players noticed that they became "obsessed" about proceeding in the game which required them to play more. However, this led to destruction of value because obsession was not a hoped emotion to be gained from playing the game, and the interest towards the game waned after POKÊMONS which were obsessively chased, became caught by the player. In conclusion, it seems like it is possible that IS artefact users may simultaneously co-create and co-destruct value as a result of contradictions.

4.5 Conceptualization of value co-destruction process

Lintula, Tuunanen and Salo (2017) gave an effort to conceptualize the process of value co-destruction, and as a result generated a framework for value co-destruction process for service systems. The framework captures quite well the different ways of value co-destruction which have been found from various studies. Such as the resource misuse, which was presented by, for instance Plé and Chumpitaz Cáceres (2010). Framework provided by Lintula et al. (2017) is presented below:

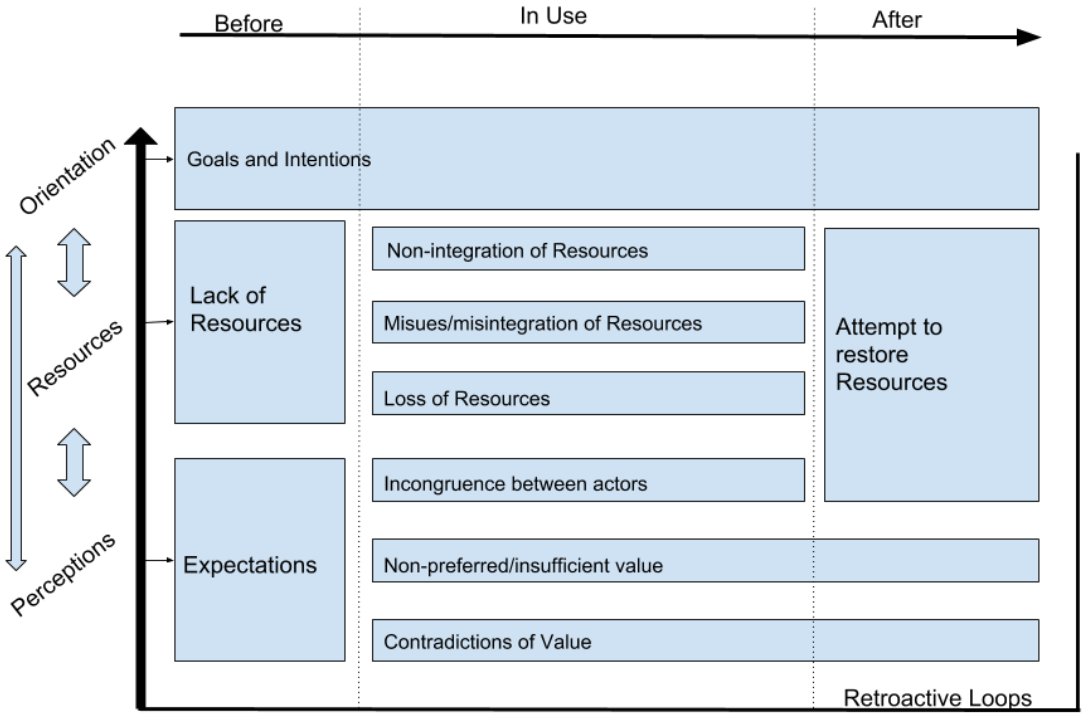


Figure 5 Framework for value co-destruction (Lintula et al. 2017)

Framework provided by Lintula et al. (2017) includes three overlapping dimensions: orientation, resources, and perceptions. Each of these dimensions include components, which appear in different temporal points: before, in use, and after.

According to Lintula et al. (2017) orientation dimension includes intentions and goals. Resources dimension includes lack of resources, which might lead to misuse or loss of resources. As service process goes along, resource loss or misuse might lead to an attempt to restore resources leading to a new retroactive value co-destruction loop. In dimension of perceptions prior expectations are included. Lintula et al. (2017) state that it is important to understand that "the components are interrelated and may occur linearly as well as inter-dimensionally and in retroactive loops". For instance, lack of resources such as prior information may lead to unrealistic expectations of value.

5 FRAMEWORK OF VALUE CO-CREATION FOR CONSUMER INFORMATION SYSTEMS

In this chapter the framework for value co-creation for consumer information systems (CIS) is presented and discussed. CIS framework was presented by Tuunanen et al. (2010). In this chapter framework is presented, and its components are defined. Chapter begins with a look into a background which also defines quite well the current situation amongst consumer information systems. After background has been cleared, components of CIS framework are introduced. First customers value drivers are discussed. Finally, value propositions are presented. CIS framework summarizes quite nicely our literature review where we have discussed value co-creation and co-destruction with help from various sources.

5.1 Background

According to Tuunanen et al. (2010) markets have entered a new era where information systems have started to attract consumers in addition to companies. Information systems which are targeted to consumers are called consumer information systems (Tuunanen et al. 2010).

According to Tuunanen et al. (2010) past literature has been a bit narrow-minded when considering customers' hopes from service usage. Past literature seems to have thought that consumers are mostly interested about effectiveness and efficiency (Lamb & Klin, 2003). Effectiveness and efficiency represent only utilitarian benefits, and according to Tuunanen et al. (2010) more educated way of looking this process recognizes that also hedonic benefits are significant for consumers. Hedonic benefits refer to values such as enjoyment and fun. In other words, customers are not only interested about gaining concrete utilitarian benefits such as cost savings, but also hedonic benefits such as fun experiences during service usage.

Tuunanen et al. (2010) also highlight the customers' active role in service production. This is in line with Prahalad and Ramaswamy (2004) who state that for customers an unique and active role in service production is desired. According to Tuunanen et al (2010) this has led to service offering taking over everything else, and is more important than for instance functionality and effectiveness. This implies that actually service- and use-experience are more important factors for modern consumers than what we have though earlier.

Tuunanen et al. (2010) share similar view with Vargo et al. (2008) by which according to both consumers and developers are active participants in the value creation process. Whereas for instance Grönroos (2011) is more strict about marking service providers out from the process. Grönroos (2011) states that only possibly service providers become invited to the value creation process. CIS is more willing to think that even though customers is the ultimate value creator, service providers role might in fact be active (Tuunanen et al., 2010).

Tuunanen et al. (2010) define consumer information systems as systems which enable co-creation of value. This value co-creation is enabled "through the development and implementation of information technology enabled processes that integrate system value propositions with customer value drivers" (Tuunanen et al., 2010). In other words, similar to the idea of digitalization, information technology is implemented in peoples' everyday life and routines, in order to assist a customer somehow.

Tuunanen et al. (2010) created a framework to illustrate the customer's value co-creation through information system's value proposition. The framework presents customer's value drivers, system's value propositions, and places the value co-creation in the middle. This is in line with service science. Value co-creation according to service science was discussed earlier in this paper. According to Vargo et al. (2008) service providers serve value propositions which are possibly used by customers. Customers and other parties integrate their resources into value propositions and possibly value becomes created.

The framework created by Tuunanen et al. (2010) states that system's value propositions are social nature of use, construction of identities, and context of use. Customer's value drivers are participation in service production, service process experience, and goals & outcomes.

The following figure presents the framework of value co-creation for consumer information systems (CIS) created by Tuunanen et al. (2010).

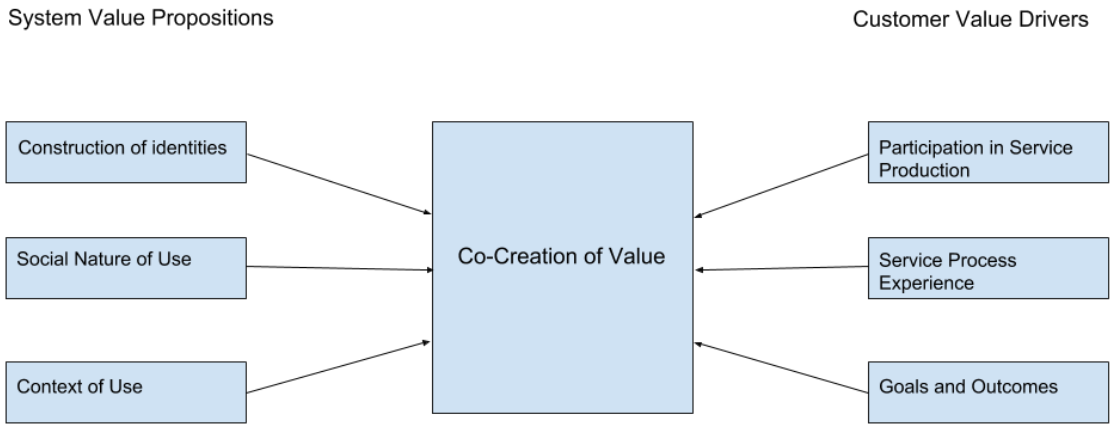


Figure 6 framework of value co-creation for consumer information systems (Tuunanen et al. 2010).

Tuunanen et al. (2010) explains that in CIS framework, left side of figure include customers CIS value propositions and right side of the figure includes customer's value drivers. Co-Creation of value is placed in between system value propositions and customer value drivers. According to Tuunanen et al. (2010) CIS framework implies that in information systems development a reconceptualization is required. This reconceptualization includes that in digital consumer service design focus should be on consumers instead of organizational users.

5.2 Customer value drivers

According to Tuunanen et al. (2010) in CIS Framework customer's value drivers can be divided under three main topics. These value drivers are participation in service production, service process experience, and goals and outcomes.

Like mentioned above, customer's participation in a service process is one of the central value drivers. Tuunanen et al. (2010) explained that one practical example of such participation would be co-creation during on-demand video streaming services where customers are enabled to affect TV service content on real time. Similar participation activity was witnessed by Ramaswamy (2008) during Nike's product design where customer's intake for new designs was collected through a platform. It seems like customers hope to have their voices heard in a production of a service. It can be reasoned that this type of activity benefits both, customers and service providers. Like we have discussed earlier, customers' needs are varying and might evolve as technology and new possibilities emerge. Beverungen et al. (2017) state that new smart service systems exe-

cute high amount of data gathering and analyzation, and one goal with this type of activity is to enhance the service experience for customers. It might be possible to consider this type of data delivery from customers, as the customer's participation in service production even though it might be passive. Benefits for both parties, service providers and customers include that service providers know what their customers desire and are able provide the desired services, and customers are able to receive services which they desire and have their wants heard.

Service process experience is a factor which has also gained a lot of new attention after the significance of use-experience became understood. Tuunanen et al. (2010) use a very good example in their article about what a hoped service experience might in practice be. In their article, experiences of video game players where studied by Microsoft developers. Desired outcome during playing a video game would be that players won't experience interferences and too high level of frustration, and therefore become engaged when playing the video game (Tuunanen et al., 2010). This type of use-experience could be defined to follow the concept of flow where playing experience is described as smooth. Similar smooth and engaging use-experience is something which is hoped to become reached when using a digital service. It seems that service- and use-experience might in fact be at least as important as utilitarian benefits which would be gained with service usage. It is also possible that as service- and use-experiences have become optimized, customers become more sensitive towards problems during service usage. Since technology development and digitalization has created new possibilities to enhance the service-experience and to make it more smooth, customers might also expect to receive high-quality service-experience. This implies that disturbances during use-experience will upset users quite easily.

According to Tuunanen et al. (2010) third customer value driver is formed by customer goals and outcomes. This driver emphasizes that customers' hopes with a use of a service do not limit to only include utilitarian benefits. In fact, the importance of hedonic benefits such as fun and enjoyment are hard to evaluate, but there are indications that their significance is a lot higher than research has realized in past (Tuunanen et al., 2010). Example which was presented by Tuunanen et al. (2010) to illustrate this driver was an iPhone application. This particular application did not produce any concrete utilitarian benefits and its functionality was extremely limited. However, this application became quite popular and it seems like its popularity was based on the hedonic benefits which the application provided. This implies that hedonic benefits are very important in a service use-experience and should be emphasized during service production.

5.3 Value propositions

According to Tuunanen et al. (2010) value propositions in consumer information systems can be placed under three main topics. These value propositions are construction of identities, social nature of use, and context of use.

When considering the value propositions which are offered to customers with services it is important to first consider what "users" actually are. According to Tuunanen et al. (2010) literature has made suggestions that a correct way to characterize users would be to think them as "actors". Lamb and Kling (2003) explain that when users are defined to be actors, the networked nature of use is taken under consider in a better way. Tuunanen et al (2010) state that Lamb and Kling (2003) argue that actors are using IT artifacts to construct their identities. This type of behavior might be the reason why for instance some particular brands become so popular. This is in line with Edvardsson et al. (2011) who argued that social construction theories are far more important in service usage and value co-creation than past literature has recognized.

Edvardsson et al. (2011) state that social context influence significantly users' experiences with a service. Consumers are not using services in isolation (Lamb and Kling, 2003) and service providers need to take this into account when designing service-experience. Therefore, it is logical that Tuunanen et al. (2010) included the context of use as one of the main value propositions in CIS framework. According to Tuunanen et al. (2010) context of a service has a significant effect on service and how it will develop in use. Tuunanen et al. (2010) state that "the context of use, both cultural and situational, has a greater impact on the use of CIS than the business and/or organizational uses of information systems." In other words, it is difficult to predict how context will modify a service and which services become popular in which surroundings. In history we have witnessed many examples where a service has evolved to become some quite different than what it was in its first stage. However, even though predictions are difficult to be made, it is logical to state that service providers need to study the context of a service beforehand and act accordingly.

When considering users as actors, we accept that actors have identities (Lamb and Kling, 2003). Tuunanen et al. (2010) explain that according to CIS Framework another value propositions for customers is that service will work in constructing identities of its users. In other words, customers select and use services in order to construct their identities. This might partly explain customers' reasoning about what services to choose from selection of closely similar services from different brands. Also, just like CIS Framework emphasizes in customer's value drivers, customers hope to have their own voice and handprint in service production (Tuunanen et al., 2010). This also quite well fit into customer's aim to construct own identity with service, because having a part in service production might also work as identity construction.

6 APPLICATIONS OF ACTIVITY TRACKING

In this chapter applications which are used to track activity and their service concepts are introduced. First, studied activity tracking solutions are defined and discussed. Secondly, phenomenon of tracking and analyzing lifestyle is presented and discussed.

6.1 Activity tracker

On-body censoring has been part of science for a while now. Studying human interaction through sensors has been going on for about a decade. However, this activity has been previously performed mostly by scientists with relatively expensive devices which require scientists' handholding. Now, a same kind of measurement and data analysis is shifting to become a part of an everyday life of consumer. (Miller, 2013.)

Applications which perform activity tracking have effectively evolved to become solutions which fit into normal lives of average citizens. Several mobile-applications are now available for smartphones, and smartphone adoption is fast becoming near-universal. Wireless pedometers with network connection are relatively low at cost. These applications and pedometers can be included into a life of a human without a user being disturbed by device's presence. (Miller, 2013.)

Market of wearables which include smart watches and activity trackers, which both are able to collect data related to activity of their user is expanding wildly. "The global wearable technology market is expected to grow from US$750 million in 2012 to US$5.8 billion in 2018" (Wei, 2014). For service providers this is exciting time because activity tracking systems provide a fresh platform to utilize in their service concepts. Current situation is that popularity of adopting digital technology into health and fitness has extended early adopters (Seiler & Hüttermann, 2015). People are adopting healthy and fitness

into their lifestyles, and with the help of social media this fitness lifestyle has become also a status symbol.

Activity tracking applications provide various functions in addition to measuring the level of activity. The applications, which include gadgets such as wearable fitness trackers, mobile applications, and services which process the data, are working together to monitor vitals which aim to keep track of vitals such as heart rate while counting the number of steps a person takes during the day (Seiler & Hüttermann, 2015).

Wearable applications of activity trackers track physical activity. This includes taken steps, calories burned, and overall intensity of a workout. Device is mostly known to be worn in a wrist of person in a form of a bracelet. The trackers collect data through day and night which is then transferred to a mobile application. Connection between the gadget and the mobile device is usually either through a Bluetooth or by plugin. Inside applications goals, progress and activity can be tracked and processed. (Lunney, Cunningham & Eastin. 2016.)

In the following figure and example of a wearable activity bracelet is shown. The figure is provided by Kerley (2016).

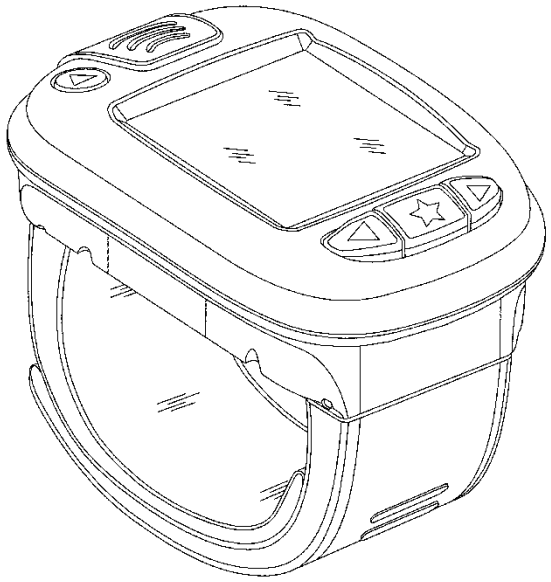


Figure 7 Example of an Activity Bracelet (Kerley, 2016)

As can be seen from the example figure (see figure 6), the wearable activity tracker usually has a similar outlook with a watch. It includes a small screen were user-interface is displayed. However, not all wearable activity trackers include a screen, and the device is in those cases only used to track the activity and results can be viewed from an application via smartphone or computer.

In addition to wearable activity trackers such as bracelets, and smart watches, activity tracking is possible with only a smartphone which includes an application for activity tracking and display. Examples of such applications are endomondo, Nike+Running, Strava run, etc. As stated by Swan (2013) activity tracking is possible with various solutions, starting from a pen and paper, to smartphone applications, and to activity tracking devices. This study however discusses digital services, and therefore the studied solutions include the applications and devices for activity tracking.

6.2 Quantified self

Adoption of smart tracking solutions has intensified people's nature of self-observation. Next level which has been reached in tracking of own personal behavior is the emergence of people who can be identified as quantified self. This part of the thesis aims to present what is meant by the term quantified self, what are the reasons behind such a movement, and also discuss of the potential pitfalls and problems with the lifestyle of a quantified self.

6.2.1 Self-trackers

According to Swan (2013) quantified self refers to an individual who engages in self-tracking. Variety of ways people utilize in self-tracking is very wide. However, this study concentrates on tracking related to physical activity and vitals. Swan (2013) states that quantified self can be evaluated to be already a mainstream phenomenon. The quantified self-evolution has been made possible by smart tools which enhance the tracking. Quantified self may use a range of tools, from pen and paper, to mobile applications and tracking devices (Swan, 2013). According to Swan (2013) solution used by a quantified self usually includes a smart device which is paired with a web interface or application, infographic display of aggregated data, and personal goals and recommendations. Choe, Lee, Lee, Pratt, and Kientz (2014) characterized self-trackers as a group which includes "life hackers, data analysts, computer scientists, early adopters, health enthusiasts, productivity gurus, and patients".

According to Hänsel, Haddadi and Alomainy (2015) one key factor for a tool used by a quantified self is the representation of meaningful data. Hänsel et al. (2015) discovered that a display of a too large amount of unprocessed data leads to a discouragement of a user. Therefore processing, infographic representation, and insertion of a context is essential. According to Hänsel et al. (2015) activity tracking solutions utilize various methods in creating useful information out of collected raw-data. Otherwise, a cognitive overload might occur. Hänsel et al. (2015) states that representation of information has gone as far as gamification, since solutions like for instance Ubifit utilizes display of garden which progresses as user exercises. Hänsel et al. (2015) conclude that a success-

ful contextualization and representation of information potentially leads to positive behavioral changes by users.

Choe et al. (2014) studied motivations of individuals characterized as quantified self or as self-trackers. Their study revealed that self-trackers aim to improve their health, maximize their work performance, and generate new life experiences. In addition, Swan (2013) analyzed that the main motivation to utilize the lifestyle of a quantified self-seem to be optimization of lifestyle issues. For instance, sleep quality seems to be a popular lifestyle issue which is seeked to become improved. People have for instance tracked their sleep, then made adjustments to their sleeping habits, and then again tracked their sleep (Swan, 2013). In this way these individuals have gained information whether their adjustments have improved their sleep or not. This same process can probably be utilized in many other lifestyle functions, such as optimization of workouts or reducing work-related stress.

Another motivation of self-trackers which Choe et al. (2014) discovered was self-experimentation. The study revealed that self-trackers aim to draw definitive conclusions from their data. Such as how sleeping effects on cognitive performance. This also fits well in to optimization of lifestyle issues which was discovered by Swan (2013). Self-trackers analyze how different activities effects on other things, see what is working for them, and make conclusions of how they could optimize their lifestyle.

According to Swan (2013) quantified self is not limited to be a personal activity of an individual. Actually, one basic value which quantified self-individuals seem to seek is collaboration between other peers. Self-trackers seem to enjoy sharing their data and working collaboratively. Swan (2013) mentions that movement might have begun as an individual's activity but has evolved to become group activity of peers. An assumption is that emergence of new inventions which enable limitless communication and sharing have been a key factor. Swan (2009) has noticed the same effect of group-forming. Swan (2009) studied health social networks in her earlier research. According to Swan (2009) "A health social network is a website where consumers may be able to find health resources at a number of different level". The concept includes information-sharing and emotional support. Swan (2009) stated that in health social networks' emotional support was felt explicitly and implicitly. Implicitly referred to a feeling that an individual is not alone with her condition, and explicitly referred to a feeling of being part of a group with similar interest to enjoyment gained from viewing the content provided by other users. It seems rational that similar emotional support is achieved in a group of self-trackers. An individual self-tracker feels the support implicitly when other self-trackers might comment shared results and encourage the individual in reaching her goals. Explicitly self-tracker might feel emotional support by feeling that she belongs in the group with same interest of reaching for instance, fitness-goals.

Even though many researches support the idea that self-trackers in general enjoy sharing their data with others, it might not be the whole truth. A study conducted by Fox and Duggan (2013) revealed that only "thirty-four per-

cent of trackers say that they share their records or notes with another person or group, either online or offline". This indicates that only a small amount, which may be characterized as the most dedicated self-trackers are doing data sharing. On the other hand, the study seemed to be quite open-minded about who qualifies as an individual who tracks her life-activities. It is possible that the study's characterization of a self-tracking individual might not fit in the characterizations made by other studies. Nevertheless, it seems like that currently most of the people might not be interested in sharing data related to their activity or health.

6.2.2 Possible pitfalls

Several pitfalls and problems have been also discovered related to quantified self-lifestyle. These pitfalls partly serve as foundation for possible cases of value co-destruction.

Choe et al. (2014) revealed that self-tracking may become too obsessive. In other words, a self-tracker starts to track too many things which leads to "tracking fatigue" or failure to analyze a large amount of information gathered. This might be a good example of a contradiction. Self-tracker has granted with a wide range of possibilities for tracking, but the number becomes too large leading up to obsessive self-tracking. Similar finding was made by Wu, Sum, and Nathan-Roberts (2016). According to Wu et al. (2016) adoption of quantified self-lifestyle may lead to excessive monitoring. Excessive monitoring might trigger obsessive-compulsion disorder (OCD), mental stress or depression (Wu, Sum, & Nathan-Roberts, 2016).

Another pitfall according to Choe et al. (2014) is related to not tracking triggers or context. This means that the self-tracker focuses her tracking on symptoms, not on the important triggers and context. Therefore, it seems like the service system (self-tracker) which uses the service needs to possess a required level of information in order to use the service accordingly. Third pitfall discovered by Choe et al. (2014) is related to self-experimentation and drawing wrong conclusions due to lack of scientific rigor. Self-trackers might conclude their self-experimentation with a lack of understanding of how measurements work in scientific-means leading up to measurement errors, or improper use of a tracker. This leads up to wrong conclusions made based on information received by the tracker.

7 RESEARCH METHODLOGY

In this chapter the plan for the empirical study is presented. The research method and the techniques which are used in data collection, analyzation and information generation are specified. The specification includes presentation of the framework which will be utilized. In addition to specification of methods and techniques, process of execution of the empirical study is explained which includes definition of laddering interview process. The used method includes generation of stimulis which will be used during the laddering interviews. These stimulis are drawn from the literature research which is included in this thesis. These stimulis are presented and explained in this chapter.

7.1 Approach

This particular research is a qualitative research since it focuses on qualitative measures. The empirical study is conducted as an interview research where users of activity tracking solutions are interviewed. The interviewees used some sort of a solution which could be utilized by a quantified self. These solutions include activity trackers, and/or applications for activity tracking. Each interviewed person was between the age of 18 and 60. Reasons for this include that children and elderly people usually have unique challenges when trying to adopt a new digital technology. In addition, it seems like that a user of an activity tracker might be a young adult or middle-aged, and therefore neither age-group should be ignored.

This empirical study utilized the framework of value co-creation for consumer information systems (CIS) created by Tuunanen, Myers and Cassab (2010). Studying attributes, their consequences and ultimate values is based on Means-end theory (Gutman, 1982). Tuunanen et al. (2006) state that Gutman (1982) proposed that service attributes are meaningful for users for the consequences which derive from use-behavior. Consequences again, are relevant for personal values which are hoped to be satisfied with a help from utilized ser-

vice. A Ladder is a complete description of a sequence of associations from a service feature which goes through consequence and eventually reaches the final personal value. Laddering technique which is used when studying these attribute-consequence-value -chains is created by Reynolds and Gutman (1988).

Laddering interview technique was created by Reynolds and Gutman (1988) to "develop an understanding of how consumers translate the attributes of products into meaningful associations". The technique is a one-on-one interview where interviewer uses primarily directed probes, leading the interview with questions like "why is that important to you?" (Reynolds & Gutman, 1988). Aim is to work a chain of questions and answers towards a determinant value. According to Tuunanen et al. (2010) laddering interview technique contributes towards understanding of digital service usage.

Reynolds & Gutman (1988) present the following example of a chain which can occur in a typical laddering interview: "(V) self-esteem I (C) better figure I (C) don't get fat I (C) eat less I (A) strong taste I (A) flavored chip". V refers to the ultimate value, C is a consequence, and A is an attribute. A chain starts from an attribute (A), and from there a chain proceeds with questions where consequences (C) are asked. A chain ends when the value (V) emerges.

In this particular study, the technique is used with interview stimulis which are presented later in this chapter. The interviewee was asked to choose two most interesting stimulis and rank them. The laddering is started from a stimulus ranked first and proceeds to the second highest ranked stimulus. Only the two highest ranked stimulis are discussed in an interview, other stimulis are ignored. The laddering starts by a question which is something similar to "how does this service help you achieving this (the stimulus), or how does it impede it (the stimulus)?". Then interviewee will answer with an attribute or idea, which somehow either helps in achieving something, or negatively affects the interviewee. From the attribute laddering chain will proceed until the ultimate value is reached.

In analysis of laddering data usually includes content coding, and creation of aggregate matrix to present how many times each construct connects which another. This study includes similar approach, and matrices. Amounts of each attribute, consequence, and value selections are count and presented to discover the most central instances of each. In addition, aggregate maps are created to illustrate how attributes, consequences, and values are connected to each other. Each stimulus has its own aggregate map to show how attributes, consequences, and values vary under different stimulis. (Tuunanen et al., 2016.)

The interviewees for these laddering interviews were collected in a similar way which was used by Tuunanen et al. (2010) meaning that snowball sampling (Olson and Bakke, 2001) was the main collection method. In practice this means that a small group of key participants are recognized, and they are asked to recommend potential participants outside the near vicinity of the interviewer. In this way the potential participants are found who are not closely related to the conductor of the research.

A qualified participant for this interview is a person who uses a solution for activity tracking. This means that interviewee uses either a wearable activity tracker such as an activity bracelet, a smartwatch, or a mobile application which works as an activity tracker. Participant has to be between the age of 18-60, because children, and elderly people usually have unique difficulties when trying to utilize new digital technology.

7.2 Interview stimuli

In this part the stimuli which are used in this particular study are presented and explained. In elicitation of stimuli CIS framework is used. CIS framework was presented and discussed during the literature review of this thesis. According to Tuunanen et al. (2010) customer value drives in consumer information systems are participation in service production, service process experience, and goals and outcomes. Tuunanen et al. (2010) explain that value propositions for consumer information systems are construction of identities, social nature of use, and context of use. Like discussed in literature review CIS framework is in line with our findings from literature review, and summarizes quite nicely the literature review of this thesis.

7.2.1 Stimuli

The framework of value co-creation for consumer information systems (CIS) created by Tuunanen et al. (2010) presents how customer's value drivers should be met with consumer information system's value propositions in order to enable value co-creation. Same logic can be used in when studying value co-creation in digital services. Customers have their value drivers and the offered digital service has to create value propositions which cooperate with these value drivers.

In this study, framework of value co-creation for consumer information systems (CIS) by Tuunanen et al. (2010) is used to bring up stimulis which are used during interviews when collecting research data. Stimulis are used to elicit tacit values and goals that motivate people to use activity tracking solutions. Also, aim is to discover if service includes value co-destruction and if there are attributes in the service which enable co-destruction of value.

The following table includes the preliminary themes which are used in the interviews. From these preliminary themes correct and ultimate stimulis are drawn. The ultimate stimulis are presented in a list under the TABLE 1 of preliminary themes.

Table 1 - Preliminary themes

CIS Element	Stimulus Theme	Description	Hypothesis of value co-destruction	Source
Social Nature of Use	Linking into a group of peers	The self-trackers seem to enjoy sharing the data, and working collaboratively.	• Group activity is not supportive • Individual hopes to not to be associated with the image of general group member	Swan (2009), and Swan (2013)
Construction of identities	Early adopting	Self-trackers can be characterized as a group which includes "life hackers, data analysts, computer scientists, *early adopters*, health enthusiasts, productivity gurus, and patients".	• When the service becomes more popular the position as early adopter vanishes (contradiction,	Choe et al. (2014)
Goals and outcomes	Optimizing lifestyle-issues	The main motivation to utilize the lifestyle of a quantified self, seem to be the optimization of lifestyle issues.	• Obsessive tracking – tracking fatigue(contradiction)	Swan (2013)
Goals and outcomes	Reaching personal goals	Self tracker utilizes service in attempt to reach a personal goal	• Not being able to reach a goal	
Goals and outcomes	Improving activity	Self tracker hopes to be able to resea her level of activity with a help from a service	• Obsessive tracking – tracking fatigue(contradiction)	
Service process experience	Generalization of interesting and meaningful data	Self tracker is specifically interested in data and data-analyzation	• Obsessive tracking – tracking fatigue(contradiction), • service system not having required resources (information) leading up to misuse or wrongful results/conclusions	

(continues)

Table 1 (continues)

Service process experience	Generalization of unique (service) experiences	The self-trackers aim to improve health, maximize their work performance, and *generate new life experiences.*	• Experiences with service are not enjoyable	Choe et al. (2014)
Construction if identities	Self-experimenting	"Q-Selfers want to draw definitive conclusions from their QS practice—such as identifying correlation (e.g., sleep and cognitive performance are not correlated) or even causation (e.g., weight tracking causes weight loss)."	• Drawing wrong conclusions due to improper use, lack of information, or measurement error.	Choe et al. (2014)
Service Process Experience	Tracking solution use-experience	Use-experience with should be easy and enjoyable	• Difficulty to use – resource misuse	

The following descriptions of the ultimate stimulis follow the principles made by Vartiainen and Tuunanen (2013), and the framework of value co-creation for consumer information systems (CIS) by Tuunanen et al. (2010). During the interviews the following list was provided in English and in Finnish, and the interviewee could use either language.

1. **Me as a self-experimenter and health enthusiast (**Construction of identities): This means that self-tracking solutions are used to gain information related to user's lifestyle, to draw conclusions about it, and optimize it based on the information. In addition, this means that self-tracking solutions might be used to strengthen the position as an early adopter, as a health enthusiast or as a productivity guru. However, it is possible that wrong conclusions are drawn due to improper use, errors in the tracking functions of the solution, or lack of information. Also, it is possible that when more users occur the feeling of being "original" or early adopter vanishes.
2. **Social intercourse and socializing (**Social Nature of Use**):** This means that the social aspects of self-tracking solutions are used to gain social cohesion with peers with similar interests. This might mean sharing results goals and such in social media or inside the application, viewing other user's content, commenting and receiving comments on own shared content, in order to belong in a group where comparison, support, and advising is active. However, it is also possible, that user hopes not to belong in a group and hopes not to be associated with other users. It is also possible that comparing to other user's results lead to disappointment, or other users are not supportive.
3. **Goals, values, and wishes in lifestyle-issues (**Goals and outcomes**):** This means that user of self-tracking solutions uses the service to support in reaching personal goals, such as improving condition or level of health. Goal might be also to optimize lifestyle-issues, such as lowering stress-level or improving the quality of sleep. However, it is also possible that continuous self-tracking and effort to optimize lifestyle results in obsessive tracking or tracking fatigue, which refers to lowered interest in measuring various things. Also, not being able to reach the goals might lead to negative feelings which might lower the level of interest to use the service.
4. **Generalization of interesting and meaningful data (**Customer Participation in Service Production**):** This means that the user of self-tracking solutions uses the service to create interesting and meaningful data, and the user enjoys particularly the process of creation and viewing the data. This includes the experiences which can be included when in the moments of data-creation. However, it is possible that the user gets tired of tracking various things, or draws wrong conclusions from the data, leading up to lowered level of interest.
5. **Tracking solution use-experience (**Service Process Experience): This means that the tracking solution (tracker and/or application) is easy to

use. The user's experience smooth and follows the flow concept. The tracking, and viewing results is easy and effortless. However, it is possible that the solution is difficult to use, and the user has to use significant amount of effort in order to track data and view results. If the experience is not smooth, the interest to track data and view it vanishes.

6. **Other theme:** Something else, which interests in the use of self-tracking solutions, or which leads up to negative feelings.

The list of stimulis including their descriptions are also translated to Finnish, in order to make sure that the interviewees understands the stimulis in a deeper level. Interviewees were all Finnish-natives. Stimuli list and descriptions in Finnish can be found from Appendix 2.

7.3 Interview sample

In total, 24 participants were invited to interviews. However, one of the invited participants did not participate to the study. Hence, in total 23 interviews were executed. This fits well in the requirements since the goal was to interview approximately 23 interviewees. Each interview took approximately twenty to fifty minutes.

Interviews were held either in a physical meeting, or through a telephone. In total 17 of the interviews were held in a physical meeting and six of them were held through a telephone. In physical meeting the reading material including the stimuli list were provided during the meeting, and when the interview was held through a telephone the material was sent before the interview to the interviewee.

From the participants thirteen told that they were female and ten told that they were male. The ages of the participants varied from 23 to 60, 23 being the youngest participant and 60 being the oldest. The average age of a participant was 32,12 years. The median age of a participant was 25 years. These numbers prove that the participants were qualified to participate in the research when considering their age, since the age of a participant was supposed to be between 18 and 60 years. The average age also is quite well-proportioned since an average user of an activity solution could be around 30 years old. However, the median is quite low and communicates that ages of interviewees were not evenly spread between the minimum and maximum ages. This means that most of the participants were from the younger end of the spread. However, this is also in line with the assumption that most active users of the studied solutions are young adults. Still, it should be notice that also older people use these solutions, since there were three interviewees who were 60 years old.

Most of the participants had received degrees from either university or from university of applied science, or at least were currently studying in one of them. Most of the interviewees were currently working in some position. However, three of the participants identified themselves as students who do not yet

have a profession. Students of sports science are represented in research in major way, there are seven interviewees who are currently studying or who have studied sports science. No other discipline is represented at same level. This also communicates that sports students might be the most active users of activity tracking solutions. However, also individuals who do not work or study with sports might use activity tracking solutions, as the selection of participants prove.

All but two of the participants were currently using an activity bracelet. One of the participants had used an activity bracelet earlier, but it had broken so she was currently using several mobile applications to measure her activities. Most of the participants were using mobile applications in addition to use of an activity bracelet. Several different activity bracelets were used by the participants; however, it seems like activity bracelets from Polar were the most popular. Not one particular model of an activity bracelet was especially popular however.

The demographical information of the interviewees is included in the TABLE 2 below.

Table 2 - demographical information of interviewees

Id	Sex	Age	Marital Status	Education	Position	Chosen Stimulis
M1	1	26	1	Bachelor of Sports Science	Student	4, 5
N1	0	24	1	Bachelor of Sports Science	Storekeeper	4, 3
M2	1	24	0	Bachelor of Sports Science	Personal Trainer	3, 1
N1	0	57	2	Doctor (Medicine)	Medical Adviser	5, 3
M3	1	56	2	Master of Pedagogy	Principal	1, 4
N3	0	23	0	Bachelor of Sports Science	Coach	3, 5
N4	0	40	1	Rehabilitation counselor (Bachelor)	Rehabilitation counselor	3, 4
M4	1	28	1	Bachelor of Economics	Requirement Consultant	1, 3
N5	0	60	0	Master of Pedagogy	Psychotherapist	3, 4
N6	0	23	0	Secondary school graduate	Student	3, 4
N7	0	24	1	Bachelor of Science	Food Worker	1, 4
M5	1	42	2	Vocational School Graduate	Refrigeration Technician	3, 4
N8	0	23	1	Bachelor of Social Services	Kindergarten Teacher	1, 3
N9	0	23	1	Bachelor of Sports Science	Coach	3, 4
M6	1	36	2	Master of Information Technology	Team Manager	1, 3
N10	0	46	2	Secondary school graduate	Project Manager	1, 3
N11	0	23	1	Bachelor of Science	Operator Customer Service	3, 4
N12	0	25	0	Bachelor of Business Administration	Entrepreneur	4, 1
M7	1	24	0	Bachelor of Sports Science	PE teacher	4, 1
M8	1	28	0	Master of Sports Science	PE Teacher	3, 5
N13	0	25	1	Master of Philosophy	Doctoral Student	1, 6
M9	1	24	1	Vocational School Graduate	Furniture fitter	4, 5
M10	1	35	2	Vocational School Graduate	Warehouse Manager	4, 3

7.4 Stimuli selection

In the beginning of each interview the participant was asked to choose two of the most interesting or most accurately describing stimulis from the provided list of stimulis.

The most popular stimulus chosen was the stimulus number three which was titled as "goals, values, and wishes in lifestyle-issues". This stimulus was chosen 16 times which is 34% from all the selections. The second most popular stimulus was the stimulus number 4 with the title "generalization of interesting and meaningful data" which was chosen 14 times which is 34% from all the selections. The third most popular stimulus was the stimulus number 1 "me as a self-experimenter and health enthusiast" which was chosen 10 times meaning that it is 21% from all the chooses made. Stimulus number five was chosen 5 times and stimulus number six was chosen one time. Stimulus number two was not chosen at all.

The stimulis in a ranked table including the number each stimulus was chosen its percentage is included below.

Table 3 - Stimulus selection

Stimulus	Quantity	%
3. Goals, values, and wishes in lifestyle-issues	16	34,78261
4. Generalization of interesting and meaningful data	14	30,43478
1. Me as a self-experimenter and health enthusiast	11	21,73913
5. Tracking solution use-experience	4	10,86957
6. Other theme	1	2,173913
2. Social intercourse and socializing	0	0

8 FINDINGS

In this chapter interview results are presented including the data distribution. First it is revealed how attributes, consequences, and values appeared in overall across all themes. After this, each theme's attributes, consequences, and values are looked more closely. Each theme includes its own graphical figure which represents how the attributes, consequences, and values are linked to each other.

The style of data-discussion is similar to earlier master's thesis by Kaaronen (2014) who focused on exploring the elements for value co-creation in consumer information systems in B2B context. Data-analyzation technique includes creation of figures in which attribute-consequence-value -chains are presented. Each theme/stimulus is presented in its own figure to present how attributes, consequences, and values are spread through themes. Goal of these figures is to illustrate how attributes, consequences, and values are connected to each other. Another goal is to represent the distribution of elements across stimulis. In some studies, like by Kaaronen (2014) figures are made in a way that on figure includes each attribute, consequence, and their connections once per figure. However, in this particular study, figures are created in a way that each attribute has its own chain. This is because amount the of elements was relatively high, and a risk of figures becoming indistinct emerged. In figures, attributes are located in blue boxes, consequences in green boxes, and values in red boxes.

8.1 Interview results

In this section presentation of interview results are presented. This includes presentation of chain distribution across themes. Secondly, each theme is taken under a more careful discussion.

Here the results of the interviews are presented. First the number of chains assigned to specific themes is analyzed to get a better understanding of the data distribution. Then there will be a closer look at the distribution of attributes or features, consequences and value across different themes to get more detailed understanding of the identifying names and frequency of appearances in each theme.

8.1.1 Data distribution

The most often chosen attribute across the themes was heart rate monitoring which appeared during interviews 21 times. This means a service feature where user's heart-rate is monitored. Attribute with second to most hits was GPS with 19 hits. GPS refers to a feature of a service where location and path of a user is being monitored. Exercise monitoring and activity bracelet both had 18 hits. In exercise monitoring service tracks different factors from user exercising such as heart-rate, steps etc. Together these factors create an estimation of a concluded exercise. Information and ease of use had both 16 hits. Information refers to information the service provides in general. Sleep monitoring appeared 14 times, activity tracking appeared 13 times. In sleep monitoring user's sleep is being monitored and conclusions about its length and quality is being made. In activity tracking an overall impression about user's level of activity is being made based on different factors such as steps and heart rate. Problems with usage and goals & results appeared 11 times. Problems with usage is a generic title for different problems which may occur in service-usage. Goals & results refers to service's activity of creating goals to users, and user receiving various results. Consumption monitoring and data comparison appeared 10 times. In consumption tracking user's consumption is being monitored, and data comparison refers to a comparison of data between peers.

Based on distribution of attributes across themes it seems like attributes which were most meaningful were related to either data collection technique or to use-experience. Features such as clock, timer, and scale did not receive a lot of attention, and can therefore be seen as insignificant. Also, attributes such as battery-life, activity bracelet's outlook, and price were rarely mentioned during interviews, meaning that they did not produce significant feelings to interviewees. The distribution of different attributes is included in TABLE 4 below:

Table 4 - Distribution of attributes and features per theme

Attribute	**1**	**2**	**3**	**4**	**5**	**6**	**total**
Activity Tracking	3	0	4	6	0	0	13
Battery-life	3	0	0	1	0	0	4
Bracelet	2	0	5	3	8	0	18
Bracelet's outlook	0	0	0	0	0	4	4
Clock	1	0	1	1	0	0	3
Consumption Monitoring	4	0	3	3	0	0	10
Data Comparison	2	0	7	1	0	0	10
Ease of Use	2	0	2	5	7	0	16
Exercise Monitoring	2	0	6	10	0	0	18
Goals & Results	0	0	4	6	1	0	11
GPS	1	0	11	5	2	0	19
Graphics	0	0	1	6	1	0	8
Heart Rate Belt	1	0	1	2	2	0	6
Heart Rate Monitoring	8	0	8	5	0	0	21
Inaccuracy/unreliability	3	0	1	5	0	0	9
Information	4	0	7	3	2	0	16
Notifications	3	0	2	1	2	0	8
Novelty	2	0	3	0	1	0	6
Memory	2	0	0	0	0	0	9
Price	0	0	1	0	0	1	2
Problems with usage	3	0	5	1	2	0	11
Scale	0	0	1	0	0	0	1
Settings & Options	0	0	4	2	0	0	6
Sleep Monitoring	5	0	5	3	1	0	14
Step-Count	3	0	4	1	0	0	8
Timer	0	0	1	0	0	0	1

Across all themes the most often appeared consequences were "enables exercise analyzation" and "creation of understanding about lifestyle's healthiness" which both appeared 36 times. "Data gathering, and viewing is easy" appeared 30 times, and "creation of understanding about own amount of physical activity" appeared 28 times. "Service feature or component causes disturbance" and "creation of understanding about own physical Condition" appeared 14 times.

Distribution of consequences seem to advocate a similar discovery with attribute distribution, which is that use-experience is in key role. However, interviewees seemed to see creation of knowledge and understanding as a significant consequence from attributes. This might mean that users are interested in learning new things through a service utilization, and hope to be aware of dif-

ferent factors, such as own lifestyle's healthiness. It might be that users do not trust their own subjective evaluation of things related to health, and rather trust a service to do the analyzation. In addition, enabling actions which would be difficult without service gained attention during interviews. For instance, calculation of taken steps or monitoring own heart rate are close to impossible without a service. However again, it seems like price was not seen as significant factor. In addition, straight encouraging from service, missing features, and the charm of the novelty were not seen as significant consequences. Enabling data comparison with peers did not rank amongst most significant consequences as well, so it seems like sociality with service is not a key reason for service utilization. Service feature causing some sort of disturbance seem to be relatively significant negative consequence. In addition, receiving inaccurate or false results seem to be a clear way to establish value co-destruction. The distribution of different consequences is included in TABLE 5 below:

Table 5 - Distribution of consequences per theme

Consequence	1	2	3	4	5	6	total
Creation of encouragement	1	0	2	2	0	0	5
Creation of Understanding about lifestyle's healthiness	9	0	15	11	1	0	36
Creation of Understanding about own amount of physical activity	9	0	12	7	0	0	28
Creation of Understanding about own physical Condition	3	0	6	4	1	0	14
Data gathering and viewing is easy	6	0	3	9	12	0	30
Enables data comparison with peers	2	0	7	2	0	0	11
Enables exercise analyzation	4	0	14	18	0	0	36
Enables navigation of taken path	1	0	3	3	1	0	8
Intensive use at beginning	2	0	3	0	0	0	5
Missing lacking feature	0	0	1	1	4	0	6
Possibility to modify service experience	0	0	5	2	0	0	7
Price and quality satisfy	0	0	1	0	0	1	2
Receive inaccurate/false results	4	0	4	5	0	0	13
Reviewing data is enjoyable	0	0	1	4	3	0	8
Service feature or component causes disturbance	7	0	5	0	1	1	14
Service lacks interoperability	2	0	3	1	1	0	7
Service usage is laborious	3	0	1	1	2	0	7
Service usage upgrades othe everyday actions	1	0	2	1	6	3	13

Across themes value which appeared most often was convenience which appeared 41 times. Convenience refers to usage being easy to use, or to service

providing practical features for user. Awareness appeared 39 times, and it refers to user receiving information, or to her level of awareness being increased through service. Encouragement appeared 33 times. Encouragement refers to services' encouragement for user to perform different things, such as physical activity. Inconvenience appeared 27 times, and goals & values appeared 20 times. Inconvenience refers to service being impractical, and goals & values refers to service somehow supporting user in reaching her goals and values. Life quality appeared 19 times, and harassment appeared 16 times. Life quality refers to user's quality of life being increased some way. Harassment refers to service disturbing its user some way, physically or mentally.

It seems like values which were most significant across themes were related to either ease of use, practicability, or to utility. Utilities which were most significant in interviews were increased level of awareness, and received encouragement. It is a bit surprising however, that encouragement did not stand out in consequences amongst most significant consequences. Therefore, it seems like users did not receive encouragement straight from the service, like for instance from notifications where user is encouraged to perform physical activity. Rather, encouragement is found from data and increased awareness. In addition, during interviews concrete results seemed to work in an encouraging way. Freedom during service usage seemed to not to be significant value. Anxiety and sociality were value which gained some interest, but were not nearly amongst most significant. Surprisingly, health wasn't amongst the most popular values either. Therefore, it seems like health solely, is not a root reason to for service usage in most cases. Impracticability seemed to be quite often experiences negative value. This again underlines the significance of service use-experience and practicability. Harassment also gained some mentions during interviews, and it seems like users do experience disturbance in a harassing way, and naturally see it as a negative aspect of a service. The distribution of different values is included in TABLE 6 below:

Table 6 - Distribution of values per theme

Value	1	2	3	4	5	6	Total
Anxiety	3	0	3	3	0	0	9
Awareness	9	0	13	16	1	0	39
Convenience	6	0	6	13	16	0	41
Encouragement	6	0	17	9	1	0	33
Freedom	0	0	3	0	0	0	3
Fun & Enjo-yment	0	0	2	5	3	0	10
Goals & Values	2	0	8	8	2	0	20
Harassment	6	0	5	3	1	1	16
Health	7	0	1	4	0	0	12
Impracicability	7	0	9	4	7	0	27
Life Quality	3	0	12	4	0	0	19
Sociality	2	0	5	2	0	0	9
Suitability	0	0	1	0	0	4	5
Will to expoler	3	0	3	0	1	0	7

8.2 Theme 1 - me as a self-experimenter and health enthusiast

Theme number one has the title "me as a self-experimenter and health enthusiast. This particular theme is described to include activity where user uses self-tracking solutions to gain information related to user's lifestyle, to draw conclusions about it, and optimize it based on the information. The theme had in total 54 chains during the interviews.

Attributes: Under this theme attribute which produced most chains was hear-rate monitoring. Heart rate monitoring produced in total 8 chains. Attribute which produced second to most chains was sleep monitoring, which produced five chains in total. Four chains were produced by attributes information

and consumption tracking. Activity tracking, battery-life, step-count, notifications, inaccuracy/unreliability, and problems with usage all produced three chains each.

Consequences: Consequences which produced most chains under this theme was "creation of understanding about own amount of physical activity", and "creation of understanding about lifestyle's healthiness", both of these produced nine chains. Features in which consequence "creation of understanding about own amount of physical activity" was linked were activity tracking, step-count, and information. Consequence "creation of understanding about lifestyle's healthiness" was linked to consumption tracking, heart-rate monitoring, information, and sleep monitoring. Consequence which produced third to most chains under this theme was "service feature or component causes disturbance", which produced seven chains in total. This consequence was linked to attributes problems with usage, heart rate belt, sleep monitoring, and activity bracelet. Six chains under this theme was produced by consequence "data gathering, and viewing is easy". The consequence was linked to attributes consumption tracking, battery-life, ease of use, and activity bracelet.

Values: Under this theme value associated with most chains was awareness, which was associated nine times. Values associated second to most often were impracticability and health, which both were associated seven times. Values harassment, encouragement, and convenience were associated six times each. Value awareness was found from chains activity tracking - creation of understanding about own amount of physical activity, heart-rate monitoring – enables exercise analyzation, ease of use – data gathering, and viewing is easy, inaccuracy/unreliability – receive inaccurate/false results, and from sleep monitoring - creation of understanding about lifestyle's healthiness".

Figure which represents attribute – consequence - value chains from theme one is included below.

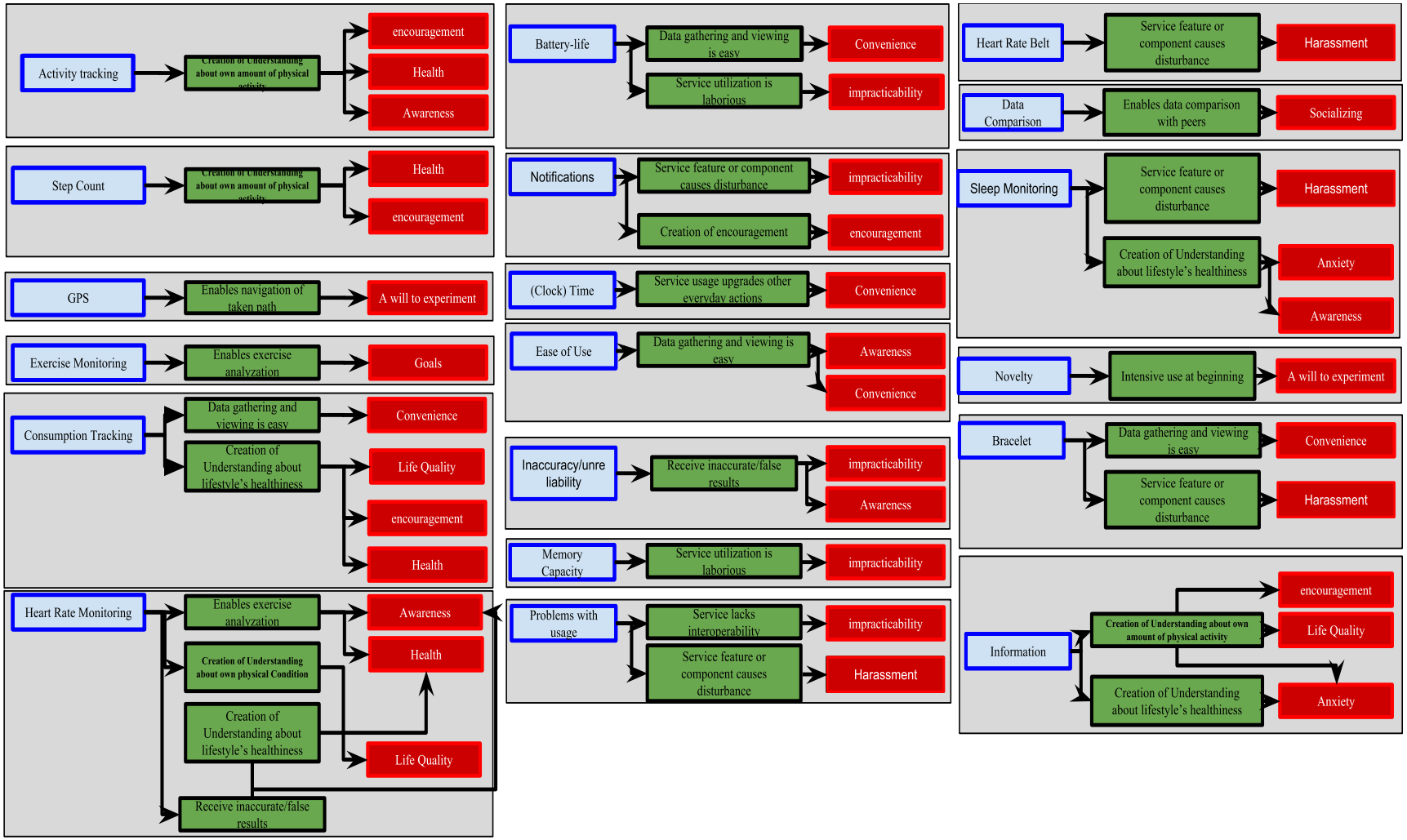


Figure 8 Theme 1

8.3 Theme 3 - goals, values, and wishes in lifestyle-issues

Theme number three has the title "Goals, values, and wishes in lifestyle-issues". This particular theme is described as use of self-tracking solutions to support reaching personal goals, such as improving condition or level of health. The theme had in total 88 chains during the interviews which makes it the most popular choice of a theme in this research.

Attributes: Extracted from interview data as an attribute which produced most chains under this theme is GPS, which tracks the user's location and taken path. This attribute produced 11 chains. Attribute producing second to most chains under this theme was heart-rate monitoring which produced eight chains. Attributes heart-rate monitoring and data comparison both produced seven chains. Six chains were produced by attribute exercise monitoring.

Consequences: Consequence associated with most chains was "creation of understanding about lifestyle's healthiness", which was associated 15 times under this theme. Consequence associated with second to most chains was "enables exercise analyzation" which was associated 14 times. Consequence "creation of understanding about own amount of physical activity" was associated 12 times, and "enables data comparison with peers" was associated seven times under this theme. Consequence "creation of understanding about lifestyle's healthiness" was linked to attributes step count, consumption tracking, information, heart rate monitoring, goals & results, and sleep monitoring. Consequence "enables exercise analyzation" was linked to attributes GPS, exercise monitoring, and heart rate monitoring. Consequence "creation of understanding about own amount of physical activity" was linked to attributes activity tracking, step count, GPS, and information. Consequence "enables data comparison with peers" was linked to attribute data comparison.

Values: Under this theme value which was associated in chains most often was encouragement which was associated 17 times. Value which was associated to second to most chains under this theme was awareness which was associated 13 times. Value life-quality was associated 12 times under this theme. Value impracticability was associated nine times and value goals & results was associated eight times under this theme.

Figure which represents attribute – consequence - value chains from theme number three is included below.

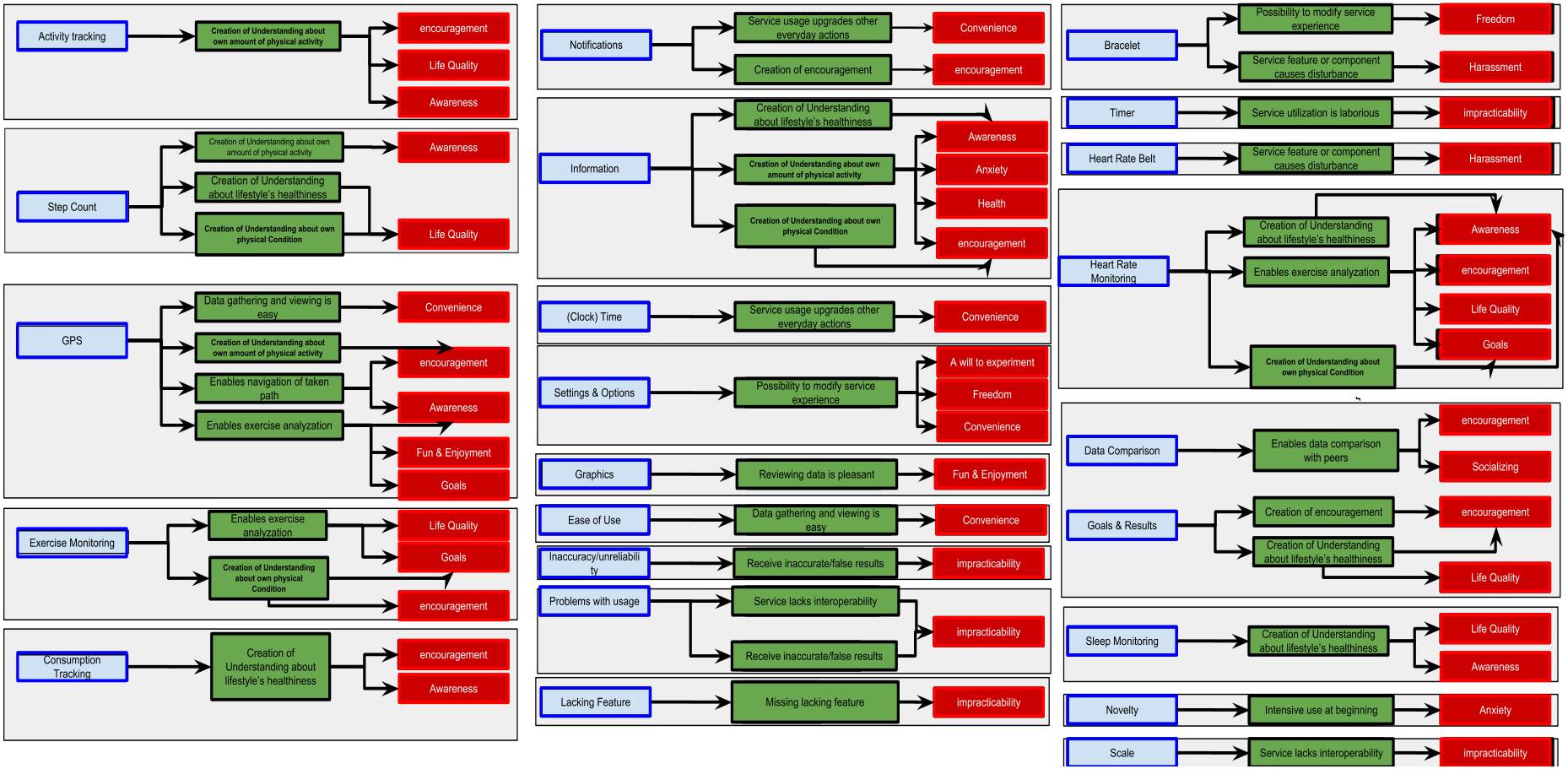


Figure 9 Theme 3

8.4 Theme 4 - generalization of interesting and meaningful data

Theme number four has the title "generalization of interesting and meaningful data". This particular theme is described as use of service to create interesting and meaningful data, and the user enjoys particularly the process of creation and viewing the data. The theme had in total 71 chains during the interviews.

Attributes: Attribute mentioned most often under this theme during interviews was exercise analyzation which was mentioned 10 times. Attributes activity tracking, graphics, and goals & results each was mentioned six times under this theme. Ease of use, inaccuracy/unreliability, and heart rate monitoring were mentioned five times each.

Consequences: Consequence "enables exercise analyzation" was mentioned 18 times under this theme, making it a consequence which was associated with most chains. Consequence "creation of understanding about lifestyle's healthiness" was second to most often associated with 11 mentions. Consequence "data gathering, and viewing is easy" was associated nine times under this theme. Consequence "enables exercise analyzation" was associated with attributes GPS, exercise monitoring, graphics, heart rate monitoring, and goals & results. Consequence "creation of understanding about lifestyle's healthiness" was associated with attributes notifications, information, consumption tracking, goals & results, and sleep monitoring. Attributes linked to consequence "data gathering and viewing is easy" were ease of use, activity bracelet, and heart rate belt.

Values: Value which was produced most often from chains under this theme was awareness with 16 mentions. Value convenience was associated 13 times under this theme. Value encouragement was produced nine times, and value goals & results was produced eight times under this theme.

Figure which represents attribute – consequence -value chains from theme number four is included below.

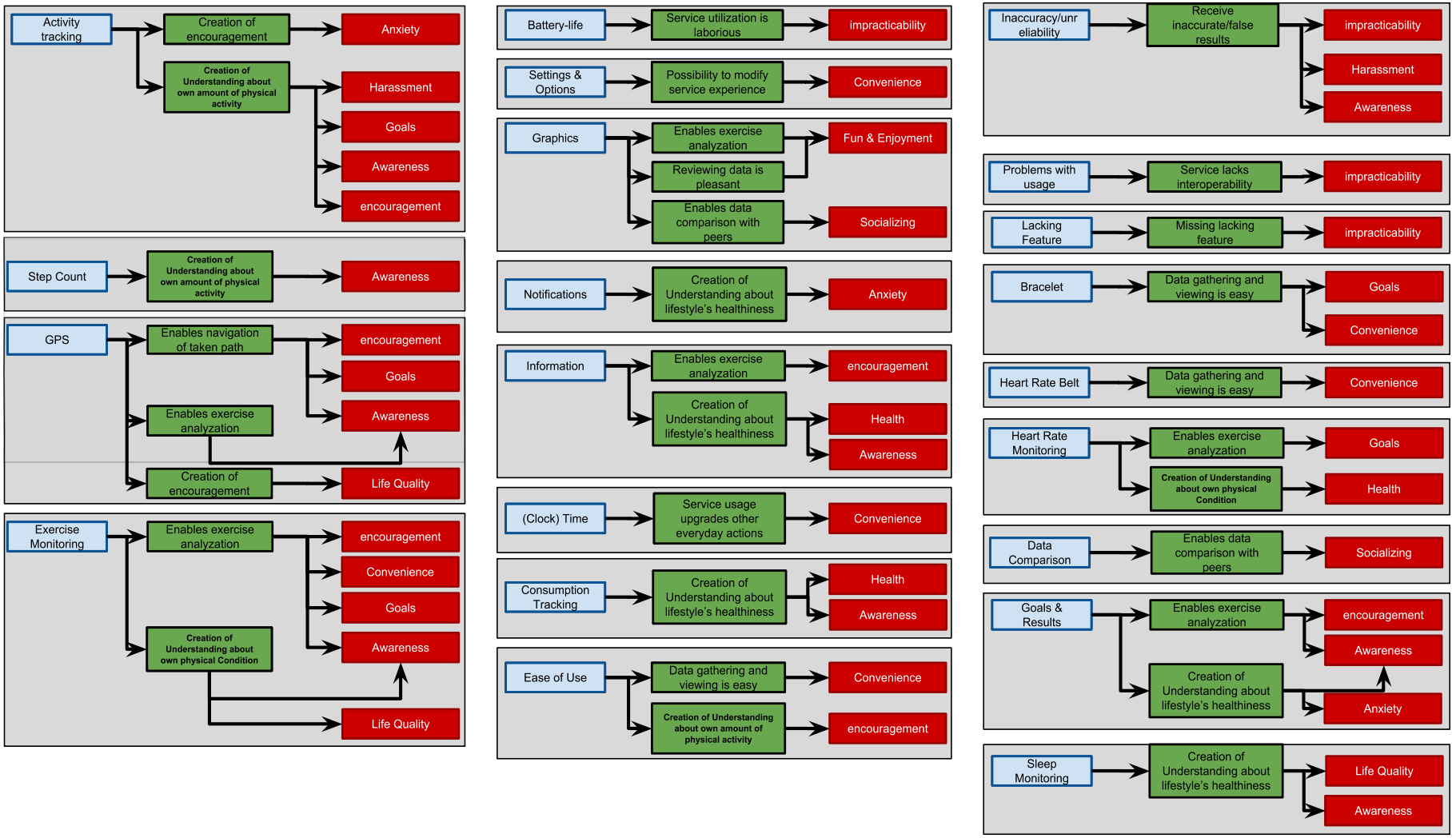


Figure 10 Theme 4

8.5 Theme 5 - tracking solution use-experience

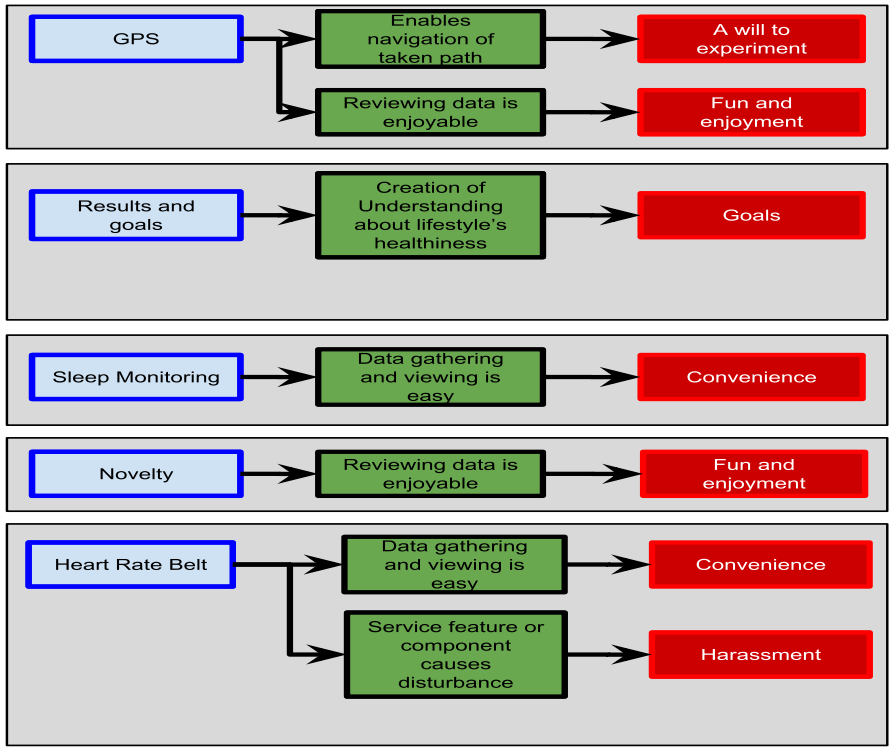
Theme number five has the title "tracking solution use-experience". This particular theme is related to the fact that the tracking solution (tracker and/or application) should be easy to use. The user's experience should be smooth and follow the flow concept. The theme produced in total 32 chains during the interviews.

Attributes: Most often mentioned attribute under this theme was activity bracelet which was mentioned eight times. Attribute ease of use was mentioned seven times under this theme. Lacking feature was mentioned three times.

Consequences: Consequence associated most often was "data gathering, and viewing is easy" which was associated 12 times under this theme. Consequence "service usage upgrades other everyday actions" was associated six times under this theme. Attributes linked to consequence "data gathering and viewing is easy" were sleep monitoring, heart rate belt, ease of use, and activity bracelet. Consequence "service usage upgrades other everyday actions" was linked to attributes notifications, ease of use, and activity bracelet.

Values: Value produced most often under this theme was convenience which was produced 16 times. Value impracticability was produced seven times under this theme.

Figure which represents attribute – consequence - value chains from theme number five is included below.



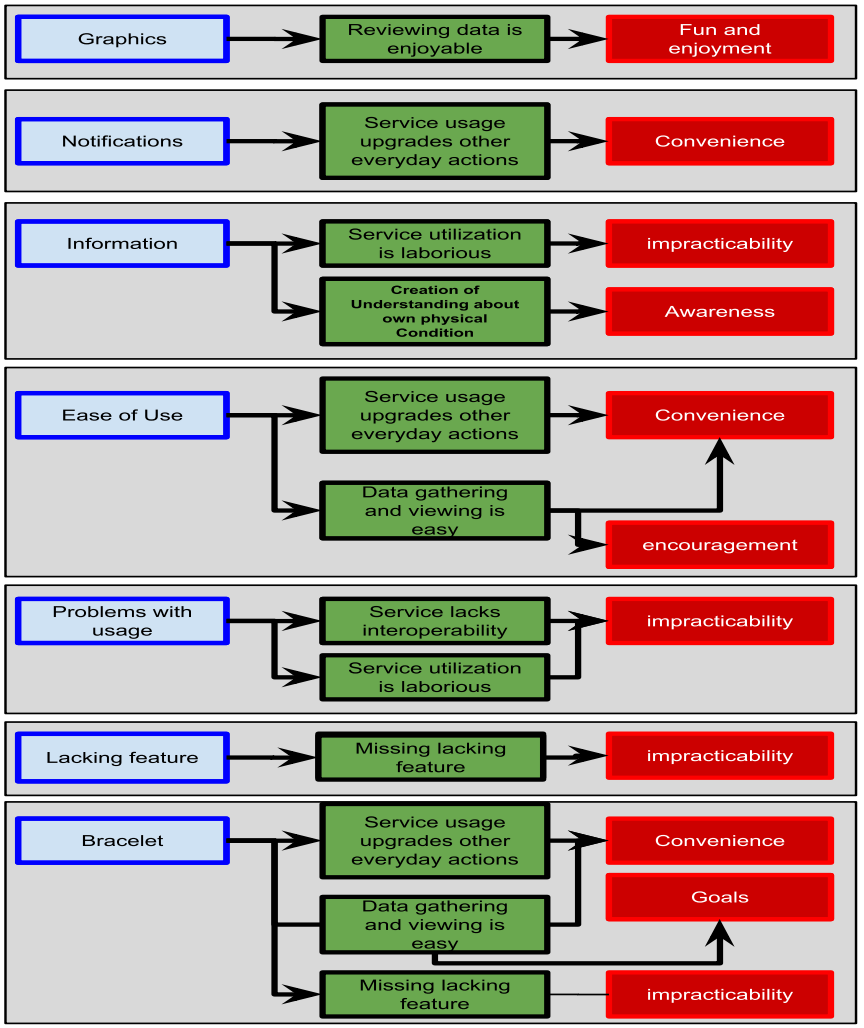


Figure 11 Theme 5

8.6 Theme 6. other theme

Theme number six is title as "other theme", meaning that this theme is reserved for those who did not feel like the provided themes describe their usage. This particular theme was chosen only once. Interviewee choosing this described that she uses service, and particularly its physical component in her enthusiasm for dressing up fashionly. This theme produced five chains in total.

Attributes: Attributes under this theme were activity bracelet's outlook, and price.

Consequences: Consequences associated under this theme were "service feature or component causes disturbance", "service usage upgrades other everyday actions", and "price and quality satisfy".

Values: Values produced under this theme were harassment and suitability.

Figure which represents attribute – consequence - value chains from theme number six is included below.

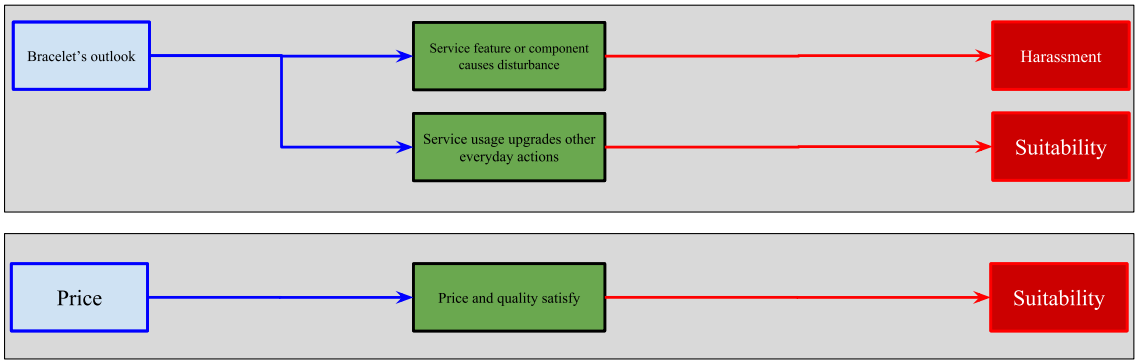


Figure 12 Theme 6.

9 DISCUSSION

In this chapter research questions are addressed, and a review is made on how did this research accomplish its ultimate goals. In this chapter a discussion is made on how did study's findings tie up with past literature. Also, implications are made and presented.

9.1 Addressing research questions

This study focused on two main research questions. First research question was:

- *How are the digitalized services establishing value co-creation in consumer services from the perspective of activity tracking solutions?*

First research question focused on value co-creation in digital consumer services. To be more specific, goal was to find some of the ways how is it possible to establish value co-creation with digital consumer services. Perspective in answering to this questions is from customer's perspective, since literature is quite consistent about a logic which states that customer is always the ultimate value creator (Grönroos, 2011). Therefore, it was only logical to study in which situations and by which ways customers feel like their value creation is being established with digital services. From literature a hypothesis was made that digital services offer value offerings in from of value propositions which aim to meet with customer's value drivers (Tuunanen et al., 2010). According to Tuunanen et al (2010) service providers value propositions include social nature of use, construction of identities, and context of use. In order to see how these value propositions are used in context of digital services an empirical study was made where value co-creation in a form of activity tracking solutions were studied.

Attributes which appeared most often across themes were heart rate monitoring, GPS, exercise monitoring, activity bracelet, sleep monitoring, and ease of use. From these attributes heart rate monitoring, GPS, exercise monitoring, and sleep monitoring represent features which can be utilized in a lifestyle of quantified self. Ease of use is related to service use-experience, and activity bracelet

is a component of a service. From these findings we can deduce that in value co-creation with a digital service, features of a digital service, components and digital service use-experience all matter.

Findings from consequences also communicate that actions made possible with digital service features, use-experience and easiness of digital service usage both are central in value co-creation. Reasoning behind this is based with a fact that the most often associated consequences during interviews were "creation of understanding about lifestyle's healthiness", "enables exercise analyzation" and "data gathering, and viewing is easy". In other words, two of the most often associated consequences are related to possibilities which a digital service enables, and one is related to how is it to use a digital service. This is in line with a study conducted by Zhao et al. (2017). The study revealed that for instance perceived usefulness and perceived ease of use affect significantly on attitude of a customer towards a service.

Analyzing the values found from interviews leads us to discover that in fact the most often produced value was not related to a specific action which is enabled by a digital service, rather than to use-experience. The most often produced value in interviews was convenience which can be described as digital service being easy to use in overall, or to digital service enabling its user to do something which would be difficult without the service. Therefore, it is possible to deduce that digital service should make things and certain actions easier, and at the same time the overall usage of the service should be easy and effortless. This is in line with what service-dominant logic states about perception. Value is based on customers perception, hence customer's experience in service usage is indeed central factor according to this logic (Vargo and Lusch, 2006). However, it is possible that in case of digital service use-experience takes even a greater role in value co-creation, since digitality of a service should make usage easier. This creates higher expectations about use's easiness and flow. Customers might be faster to deduce that service is not easy to use if it is in digital form when comparing to other services.

It appears that activity tracking solutions' main role in value co-creation is to provide user with an easy and effortless use-experience, and to provide interesting and meaningful data to its user. User can use this data the way she wants; service does not force its user to do things differently. In contrast, similar data gathering would be difficult and presumably inaccurate without a help from a digital solution. However, just like discovered in literature review, user is clearly the one who creates the ultimate value. Service offers data from users' lifestyle in an easy-to-use application for a user. User reviews, analyzes, possibly shares, and draws conclusions from this data. Values which emerge in this process, which are the most often produced values from interviews are ease of use, awareness, and encouragement. This implication is in line with Grönroos (2008) who stated that service providers work in a role of a value facilitator. Activity tracking solution facilitates value creation by providing an application which produces data and shares it to its user through an application which is simple to use.

What was surprising that interviewees did not see social cohesion, data comparison, and sociality as important factor as it could have been. Only couple of interviewees mentioned that they like to compare data with other users, usually close friends. None was interested in sharing data to outsiders and did not see that group activity was important value co-creation factor. It seemed like users felt data related to their lifestyle is too private and hope that outsiders won't see it. This contradicts with study conducted by Hamari and Koivisto (2015) who studied social influence in exercise gamification. The study indicated that social support and features of service related to this seemed to significantly desired and used. However, this might be also due the fact that social actions with these solutions seem to be limited to only sharing and comparing results. There was no significant indication about strong negative feelings towards social aspects of service. It just seems like interviewees did not see these social actions beneficial, and did not want to take risk of facing negative experiences with data sharing.

Moving these findings out from a context of activity tracking solutions, it is reasonable to assume that other digital consumer services can use this same approach in their own value co-creation processes. Digital services need to be easy and effortless to use and customers do expect this. Digital services should make actions easier which would be difficult or even impossible without a help from a digital solution. One way to offer a value proposition for a customer with a digital service is to gather data from a topic which is important for a customer. Service can provide this data for its customer, including some sort of data-analyzation. Customer can review and use this information as she pleases. Value-creation happens earliest during service usage where data-review is made by a customer. People seem to not to be ready to share their data with outsiders, however sharing might happen with close friends.

Second research question in which an answer was seeked with this study was:

- *In which ways the digitalized services establish value co-destruction in consumer services from the perspective of activity tracking solutions?*

Negative values which can be addressed as outcomes from a value co-destruction were found during interviews. However, amount of these were a lot lower than amount of positive values which were results from value co-creation. Hence, it is logical to deduce that activity tracking solutions co-create value more than destruct it. For a comparison, most often produced negative value in this study was impracticability which was produced 27 times, and most often produced positive value convenience was produced 41 times. This again resembles how important use-experience is for digital services since both of these are related to digital service's easiness of use.

Most often mentioned consequence which can be seen as a risk to lead value co-destruction was "service feature or component causes disturbance" which was mentioned 14 times. This was led from attributes such as activity bracelet, heart rate belt, and notifications. For instance, activity bracelet was felt

as uncomfortable in some cases resulting its use to become disturbing. Problems with usage such as lack of interoperability or service usage being laborious was also found negative in some cases. These factors are in line with Smith's (2013) study where misuse of user's integrated resources was discussed. In value co-creation process customer integrates her resources in service, and her expectations about results need to reached. Failure in this results in value being co-destructed.

In context of activity tracking solutions impracticability seems to be the most central factor in value co-destruction. Like mentioned earlier, it can be assumed that customers have increasingly higher expectations about digital services ease of use and failing to meet with these expectations lead up to value co-destruction. However, data and results might also trigger destruction of value. This is line with contradictions which were discussed by Wu et al. (2016). Service providers provide data about their customers lifestyle. This data might not always please customers since it might reveal something which their user might not want to know. Also, activity tracking solutions aim to encourage their user to do physical exercises which might also feel distressing. Hints about this kind of an activity was found during interviews. However, amount of occasions where this happened was relatively low.

Stepping out from a context of activity tracking solutions to digital consumers service overall, an assumption can be made that digital services are sensitive in their easiness to use. Customers have high expectations about solutions handiness and if the use-experience isn't seamless customers feel like unsatisfied leading up to value co-destruction. Also, digital service shouldn't cause any disturbance. Loud noises such as notifications, or wearable components might make a service more convenient and offer new features. However, notifications and wearable components also easily disturb service's users leading up to value co-destruction. Finally, a risk for contradiction is noticeable. Digital services might aim to encourage its user to perform actions which would help the user. However, this also might start to stress the user since someone is telling her what to do.

9.2 Implications to research

In this section implications made from findings are presented. Goal of these implications is to take findings out from a context of the conducted empirical study and make careful generalization. Implications are hoped to contribute in service science.

9.2.1 Implication 1: in digital consumer services user-experience is a key factor

Digital consumer services face high expectations from customers. Digitality offers high possibilities for service usability and these possibilities need to be used. Customers feel like ease of use and convenience are top priority in their service usage and judgment. Therefore, digital consumer service providers need to focus on use-experience with an increasing emphasis. This was also confirmed in study by Zhao et al. (2017) which found that perceived usefulness and perceived ease of use are significant factors in mobile health services.

This research indicates this implication, since the most popular values included convenience and impracticability. Therefore, in both, value co-creation and co-destruction factors influencing on ease of use seemed to be significant. If a service is able to establish actions which would be difficult or impossible for its user without a digital solution, users seemed to be quite satisfied. In this research this meant that service established for instance effortless data-gathering and analyzation, and at the same time data was easy to view and interpret. In contrast, if some aspects of data gathering were laborious, or components of the service like battery-life were impractical users felt quite unsatisfied and in result their value was at least at some level co-destructed. However, if battery-life of activity bracelet was sufficient, users experienced quite happy feelings from it. It almost seemed like interviewees had doubts about activity bracelet's battery-life which might have been triggered from current problems with battery-life of smartphones. Therefore, by overcoming a presumption and making user's service usage effortless, value co-creation was established in this case.

In addition, there was other less significant, but all together meaningful indicators which spoke on the behalf of importance of service use-experience. These indicators include appeal of attributes such as graphics, and values such as fun & enjoyment. Even though these were not the most significant attributes and values, they prove underline the importance of use experience. Some of the interviewees mentioned that they enjoyed the graphics which the service included in its interface. Pictures, colors, and seeing data in form of graphs rather than numbers made usage much more enjoyable. On the other hand, it was mentioned that in some cases service usage was solely fun. This means that service was not felt as something which benefits its user in utilitarian way, but rather in hedonic way. Implication about services hedonic aspects being important is in line with Tuunanen et al. (2010) who stated that both utilitarian and hedonic values are significant to service users. This means that even though users aim to reach clear benefits in form of utilitarian values, fun and enjoyment of use-experience in form of hedonic values should not be ignored. Some current and potential ways to produce hedonic benefits for service-user is to use graphics, fun and flawless user-interface, and to integrate aspects of gamification. Benefits of gamification have been promoted for instance by Johnson et al. (2016) who gamification seem to be useful especially in health and wellbeing related solutions.

9.2.2 Implication 2: current trend in digital consumer services is about making things easier, more effective, and enjoyable

Users of activity tracking solutions seemed to reason that best thing about these services is that they make things easier which would be difficult or even possible to do without a help from a digital solution. Users of activity tracking solutions were not able to monitor the various things which the solution monitors and analyzes. Also, it seems like making things more productively seemed to attract users. In addition to this empirical study, similar results were found in a study Zhao et al. (2017) in which it was discovered that among other factors the perceived usefulness is a significant factor in mobile health service adoption.

Data from this research indicates that users seemed to be interested in educating themselves and in raising their own awareness about certain things. Users would like to be aware about the level of for instance their own lifestyle's healthiness. In addition, it seemed like some of the interviewees had been unsatisfied about certain aspects of their life, like stress or health, and wanted to use a help of a service in order to better these aspects.

Being more aware is also related to doing things in better way. In this study this was present in a way that users wanted to know how to perform physical activity, and healthy lifestyle better. They wanted to know how to exercise in an optimal way, and to not to push themselves too hard. This was also seen beneficial by Kranz (2013) who argue that service should suggest some ways to improve current actions.

In addition, users seemed to feel that digital activity tracking solutions encouraged them to push through struggles related to changes in their lifestyles in order to reach higher level of health. Encouragement was felt in increased level of awareness, but also certain aspects of gamification were also felt as motivating. For instance, just looking at new emerging results seemed to make users feel like they are actually producing some concrete evidence. This implication is in line with a study conducted by Johnson et al. (2016) where aspect of gamification in health and wellbeing were studied. Results from the study suggested that "gamification could have positive effect on health and wellbeing especially when applied in skilled way". In addition, Kranz et al. (2013) stated that providing clear results and checkpoints makes it easier for user to acknowledge her own development, which would be difficult to track without a service.

There is no reason to believe that this result could not be generalized in other digital consumer services. Since it seems like customers hope to better their lives at some level and it usually requires some sort of struggle from them, digital services could help in this process. By providing resources and encouragement in form of value proposition for user to help in her efforts, value co-creation should be able to be facilitated.

9.2.3 Implication 3: consumers are not sharing their data with peers

Presumption was that users of activity tracking solutions would utilize the social aspects of service. This could have meant that users would have shared their data with others, compare data, encourage each other, and create a supportive environment inside a group of peers. However, users of activity tracking solutions did not want to share their data with other users, or at least did not feel like it would produce value for them. As an exception a couple of interviewees mentioned that they sometimes compare results with close friends, but not with outsiders. It is not certain if this is because users do not trust the service and are afraid that their data might be used in undesirable ways. This would be in line with study conducted by Guo et al. (2016). In their study it was discovered that privacy concerns do affect negatively on eHealth service usage.

However, there has also been empirical studies, for instance by Hamari and Koivisto (2013) which do advocate that social features in health and wellbeing services are seen as important and are used by consumers. Based on this it seems like findings about the sociality and sharing of personal data with services divides opinions of consumers. In addition, Stragier et al (2016) state that social support is very central factor in physical activity adherence.

Another factor which might have affected on lack of interest to sociality through the studied service is that it might not actually support social cohesion efficiently. Usually these solutions include possibilities to share posts and results, and to view posts and results from others. In practice, this means that sociality with these studied solutions is limited to only include data comparison, not much else. During interviews there was no mentions about data sharing being disturbing or insecure. Usually interviewees just mentioned that it wasn't in their interests to compare data with others. In future digital service providers might benefit from creating more comprehensive aids for social cohesion, such as linking peers to each other to form group. Sociality with services should be something else than just solely about comparing results which might actually create negative feelings. It seems like currently users rather neglect the risk of facing negative experiences with data comparison, than try to seek benefits from it. It seems like currently providers of activity tracking solutions might looking this subject in a relatively narrow way. For instance, Kranz et al. (2013) state that "viewing friends scores, and beating competitor make physical activity more fun than solitary training". This description includes only the most vague ways of sociality with digital services; sharing of results. What if someone is not able to "beat" competitors? This could trigger negative feelings, discouragement, hence value co-destruction.

There are indications about that sociality through services might be very beneficial to users, and possibly something that users would like to find from service-utilization. Sociality provides aspects of gamification, and studies like from Hamari and Koivisto (2015) underline the benefits of this kind of activity. Social cohesion just needs to be established in a more suitable way by service providers in their digital services. Carron and Brawley (2000) state that in social

cohesion, when members of group "believe their group is functioning well they take time to interact in social ways, become familiar with members beyond what they contribute to work, and thus develop heightened aspects of social cohesion". This state could be beneficial in future service innovation.

9.2.4 Implication 4: failure to meet with meet with high expectations about usefulness and convenience might trigger value co-destruction

Results from this study indicated that users have high expectations about service's usefulness and ease of use. Digitality of a service do grant service providers with a wide range of possibilities on what it comes to use-experience. However, it seems to be very important to make sure that high expectations from users become reached, otherwise users are rapid to judge a service to be nonoptimal. In this research, this did not make users to stop to user the service, nevertheless they did express their dissatisfaction and hope that service would be more easy to use. This is always for a service provider, since a competitor might end up making their service easier to use, and modern, educated, and empowered consumer won't hesitate to shift to use the competitor's service.

Also, customers hope to receive a high level of usefulness when using a service. Service should prove itself in being useful and easy to use at the same time. It presumably might even be the very reason for a service usage, that service offers customer useful and practical functions. For instance, in this study, one interviewee mentioned that he switched the utilized service because it did not fulfill his expectations about service's usefulness. This indicates that this particular user's one key reason for service's utilization was to reach a certain level of usefulness. Failure to meet with this expectation resulted in switch of service.

Value co-creation is about integration of resources (Vargo et al., 2008) Customer hopes to received desired results in a trade-off. Results include expectations about service, like use-experience. Therefore, a failure to meet with these desires might result in resource misuse (Smith, 2013). Like Smith (2013) stated, resources which are integrated by user include resources such as time, personal effort, and self-esteem. Service might contradict with these resources by for instance providing a laborious use-interface, which is difficult to use for a user. User might have to use an unexpected amount of effort and time to use a service, and possibly even make a user feel impractical which might effect on user's self-esteem. This is in line with Plè and Chumpitaz Càceres (2010) who state that value co-destruction is about service accidentally or intentionally misusing resources. Therefore, like during this study it was discovered, this might happen when the use-experience and amount resources it requires to benefit from services do not match with each other.

9.2.5 Implication 5: CIS framework works well for studing value co-creation in digital consumer services

CIS framework made by Tuunanen et al. (2010) was used as research lenses in this study. CIS framework supported in this study during the process of eliciting stimuli for executed laddering interviews.

Stimuli which were elicited with CIS framework worked quite well for studying value co-creation in digital consumer services. Interviewees were able to recognize attributes/features they utilize with the studied service, were able to define consequences which the used attributed produces, and discover the determining values for their service usage. Therefore, it is possible to state that this study supports interpretation of Tuunanen et al. (2010) about CIS framework's suitability for studying consumer information systems.

However, for studying value co-destruction in consumer information systems this study did not include much support for stating that CIS framework is an optimal research lenses in value co-destruction research. However, it is also possible that the fact that this research was not able to witness many cases of value co-destruction, partly due the reason that interviewees were still current users of the studied service, influenced this. Therefore, before determining that CIS framework is good solution for studying value co-destruction a lot of new research needs to be executed with more suitable research sample.

9.3 Implications for practice

In this section implications for practice are discussed. Implications are brought from findings of this research in order to create generalizable suggestions for practitioners. Aim is to present implications which would be helpful for actors in digital service providing and design.

9.3.1 Customers respond well to visual representation of data and aspects of gamification

Results from this study indicate that service-users seem to enjoy well designed graphics and visualization in their used service. These are related to use-experience which was stated to be central factor in service satisfaction for its users during implications for research. Therefore, service designers should focus on graphical design, and data visualization in their service development. For instance, one interviewee mentioned that she does not wish to see any numbers in her service, because it feels like she is doing her work-related tasks. She uses this service in her free-time and hopes to not to face associations with her work during that time. Therefore, she enjoyed especially graphs, pie charts, nice pictures and colors included in user-interface.

Another way to increase the enjoyment during service-usage is to include aspects of gamification. Results from this study indicate that various gamification features seem to please users. Features such as service setting up goals, seeing some visual representation of user's development, and receiving feedback in various and creative ways seem to produce encouragement and joy for users. If these sorts of aspect help customers in reaching her goals which she is seeking to fill with a help from a service, it is an efficient way for a service provider to support its customer's value creation process.

9.3.2 Digital consumer services should support social cohesion in a better way in future

Results from this study indicate that users are not unambiguous about current social aspects of services. Like mentioned during implications for research, there has been cases where sociality with eHealth services has been fruitful. However, this particular study did not support these indications because interviewees did not use social aspects of studied solutions. They did not feel disturbed by the presence of these features, but did not feel like they want to use them. Therefore, it seems like customers are waiting for better ways to exploit sociality with digital services. Current solutions seem to not support social actions too well, and provided social features are narrow and not experienced as beneficial for customers.

Like mentioned during implications for research customers seem to respond well if they are able to reach social cohesion. Currently, it seems like digital consumer services are not supporting social cohesion too well. This study indicates that digital consumer service providers should aim to support its customers' in reaching social cohesion with peers. If this could be reached customers presumably would be more willing to use service's social aspects. If customers would be able to fulfill their social need with a help from a service, this again would be an efficient way for service provider to support value co-creation.

9.3.3 Customers are interested in educating themselves

Findings from this study include that customers seem to be interested in learning new things and becoming more aware. Like mentioned during implications for research, users' main reason for service usage seemed to be gaining of knowledge, increased level of awareness, and learning how to do things in an optimal way. For instance, participants seemed to be interested in performing physical activity in an optimal way, and hope to be on top things such as how they are sleeping and how stressed they seem to be based on indicators.

For digital consumer service providers this creates a gap to be filled. With newest technology there is a high amount of targets in customers' life where data can be gathered and processed. Modern customers are hoping to learn new things from various sections of their lives, such as health or finance. Service

providers should try to find these targets and create solutions which help customers to educate themselves and increase their level of awareness. An efficient way of supporting value co-creation is to provide tools and resources for customer to enhance her lifestyle, and help her to reach her goal.

10 CONCLUSION

In this chapter the conducted study is concluded and summarized. Objectives of this study are presented and findings from study are linked to these. Finally, just as a proper study should always include, limitations and recommendations for future research are discussed.

10.1 Conclusions on the study

This study is a master's thesis which is conducted as a research where current trend in markets was studies. Main objective of this research was to study value co-creation and co-destruction in context of digital consumer services. In order to fulfill the objective two research questions were defined. These research questions were "how are the digitalized services establishing value co-creation in consumer services from the perspective of activity tracking solutions?" and "in which ways the digitalized services establish value co-destruction in consumer services from the perspective of activity tracking solutions?".

In order to find answers to these questions first, a literature review was conducted. Literature review included definitions of key terms, and a comprehensive explanation of current situation. After literature review the research continued to an empirical study. In this empirical study a fitting example of a digital consumer service was studied. This studied example was chosen to be activity tracking solutions. Reason for these services to be the studied solutions was that they represent quite well the latest digital innovation, since it includes a small device with high computing power.

In this empirical research value co-creation and co-destruction was studied in activity tracking solutions. The empirical study was conducted as an interview research where users of activity tracking solutions were interviewed. 23 interviews were conducted, and these interviews were conducted as laddering interviews. This technique is a one-on-one interview where interviewer used primarily directed probes, leading the interview with questions like "why is

that important to you?" (Reynolds & Gutman, 1988). From these interviews attribute-consequence-value chains were produced and analyzed. Data-analyzation was conducted as clustering.

CIS framework created by Tuunanen et al. (2010) was used as research lenses in order to study this subject. CIS framework was created to outline how and from what reasons value co-creation occurs in consumer information systems. Framework emphasizes that consumers should be seen as actors, and therefore factors such as context, identity, and social construction should be taken into account.

Main findings from this study include that users of activity tracking solutions currently are not interested in data sharing with peers. Reasons for this do not include factors such as security or concerns related to it. Rather, interviewees seemed to think that sharing their results do not produced significant benefits for them, and therefore rather not do it. In addition, it seems like users of activity tracking solutions are interested in gathering data from many various health indicators such as heart rate, taken steps, paths taken, and quality of sleep. With these indicators' users seem to raise the level of awareness related to their own health and lifestyle. Also, it seems like ease of use and practicability are central factors in user's satisfaction of used activity tracking solution. It also should be noted, that age range for activity tracking solution users is wide. Even though most of the users seem to be young adults, also older individuals are adopting these solutions.

Research implications from this research included that ease of use, convenience, and use-experience seem to be most important factors in digital services. It seems that digital consumer services experience high-expectations on their usability. Another finding was that currently customers hope that digital services make their life-easier and receive knowledge from things which matter to them. Use-experience of a service needs to be enjoyable, fun, and flawless. Integrating aspects of gamification to digital services might be an effective way to make use-experience enjoyable. In addition, even though social-media has taken over it seems like consumers' opinion of data sharing with peers is not unambiguous. At least, it seems like customers might not be too fond with the most vague social actions digital services offer. More creative, engaging, and beneficial solutions of sociality for customers need to be offered by service providers. Final implication for research is that CIS framework (Tuunanen et al. (2010) suits for studying value co-creation in consumer information systems. However, this study was not able to find high amount of evidence which support CIS framework's suitability of studying value co-destruction in consumer information systems. Implication includes a call for more research about CIS framework's suitability for studying value co-destruction.

In future service providers should concentrate on use-experience, visualization, and integration of gamification in digital consumer services. In addition, sociality of digital consumer services requires new solutions and innovation. Digital consumer services should aim to support customers in reaching social cohesion with peers. It seems like digital consumer service providers could find

success in support of value co-creation by finding targets for data gathering, processing and analyzing it for customers, and with these data helping customer to increase her level of awareness and reaching goals.

This study was able to answer to its research questions and fulfills its objective. Findings were able to be linked to existing literature, and there is no reason to believe that results could not be considered as trusted.

10.2 Limitations

In order to prove the maturity of researcher, and that the study does recognize its shortcomings, limitations of the study need to be discussed in an honest way. In this section we will present limitations which affect this particular study.

Limitations of this study include the fact that group of interviewees is relatively one-dimensional. Most interviewees were quite young students, in addition some interviewees represented the max age which was included in to the scope of this study. More interviewees from around middle-age of the scope would have been optimal. However, this indicates that the age range of solution users is wide. In addition, large part of the interviewees were students. Therefore, students were overly represented in sample of this study. In order to make sure that interview does not focus too much on one sole group of users, it should be able to interview users from various groups and backgrounds. Even though this study was able to find interviewees from different professions, amount of students could have been lower, and instead interviewees from other backgrounds could have been represented in higher amounts. Also, group of interviewees was a bit one-dimensional for what comes to solutions they used. 21 of interviewees used activity bracelets, and two interviewees used a smartphone application. In order to have a multi-dimensional group of interviewees a close-to-optimal solution would have been that around half of interviewees had used activity bracelets, and around half smart phone applications. However, it seems like these two user groups experience similar things during their service usage.

Another limitation of this study which is related to sample of interviewees is the fact that all interviewees were from one country, Finland. Therefore, no cultural differences were studied in this research even though it is a well-known fact that cultural factors do influence on use-preferences. However, the scope of this study is also limited, and therefore executing a cross-cultural research might not had been necessary nor possible.

Number of interviewees was enough for this study. However, just as Kaaronen (2014) mentions in his similar study, around 30 interviewees would have been optimal. Hence, this study's number 23 is enough but more interviews could have been conducted in order to reach a higher level of significance. However, this study was conducted under a tight schedule, and a scope which both place constraints for study's execution. When looking at the timetable of

this study, interviews were a stage which took relatively long time. Therefore, reasonable decisions were to execute good-enough amount of interviews, instead of doing them as many as possible.

The solution which was chosen to represent a current solution of a digital service was suitable, but possibly not optimal. Activity tracking solutions and their increased popularity do represent current trend quite well, but possibly a more suitable solutions would have been able to be found. Therefore, it is important to note that some of the findings which are attempted to be generalized might not in fact work well outside the context of this study. However, this is a common problem and risk which is always related in generalization. In addition, scope of activity tracking solutions could have been narrowed to only include some solution, like activity bracelets. This would have eliminated that uneven selection of activity tracking solutions which were represented in the sample of this study. Also, narrowing the studies solutions would have granted a possibility to focus on some solution specific components and features more closely.

Selection and description of stimulis could have been wider and more accurate. Now, it seems like some of the stimulis were a bit too close to each other, and interviewees faced problems when trying to understand the differences between each stimulus. In addition, it seemed like there was couple of cases where interviewees had problems during instilling of a stimulus. This resulted as emergence of attributes under wrong or improbable stimulis. However, used analysis technique gives a permission to a researcher to his own reasoning ability when making an analyzation, and therefore it is reasonable to assume that data did not suffer from misunderstandings. However, the more the researcher has to use his own reasoning, the more risk there is a chance for an incorrect reasoning.

One central limitation in this study is related to researcher's subjective reasoning during analyzation. This analyzation technique includes a relatively large amount of reasoning from a researcher. There is always a risk that researches either makes mistake during analyzation, or for some reason leads the analyzation in direction which is somehow favorable for researcher. This limitation and risk have to be always taken in account when viewing findings and implications from this study. However, this study does include quantitative data as well, these are usually very trustworthy results.

A limitation related to researcher's subjective reasoning is also the fact that researcher's own knowledge related to studied subject effect on analyzation. The researches in this case is not an expert of what it comes to activity tracking solutions, and therefore there might be deficiency in his domain-knowledge. However, the researched did execute necessary background studies about studied solutions, and therefore the knowledge level was sufficient in order to conduct this study.

10.3 Recommendations for future research

A research should always in addition to findings, discover new topics to study in future research. This research area is still relatively young and is still going through an evolvement, and therefore there are numerous topics to study. However, this study aimed to also create more precise topics to study in future.

This study did open up a new topics to study. Especially subject of value co-destruction should be studied a lot more. This study did not find clear and immediate cases of value co-destruction which would have ended in ending up a service usage. This is because the scope of this study was to study individuals who are currently using a certain service. Therefore, all interviewees are still using the service and have not faced problems which would have been significant enough to make them stop their usage. Therefore, one topic for future research would be to study individuals who have ended up stopping using a certain service and try to find reasons for ended use. For the mentioned topic the value co-destruction examples from this study could be used and see if there are cases where these examples have resulted in a discontinued service usage. By finding these reasons a process for value co-destruction should be possible to define.

As mentioned in limitations of this study, the digital service solution used in this research might have not been optimal in order to create generalizable findings. Therefore, a recommendation for future research would be to try to find a digital service solution which would represent current digital consumer services even better. Future research should always note the most currently and if possible currently arising trend in order to make sure that studied solution is a timely one. However, it seems like smart-services are a strong current trend and this subject requires more studying. In addition, either more narrow selection of studied solutions, or more comprehensive representation of solutions in sample of future research would me optimal.

In future cross-cultural studies might also present interesting possibilities and findings for a similar subject with this study. In this study only, interviewees from Finland were studied, and this always create at least a minor limitation. However, in future studies also the differences between cultures, and how these effect on digital service usage amongst consumers, and value co-creation and co-destruction should be studied.

Future studies might also benefit from taking a smaller and more precise group of users under its focus. In this study the scope of interviewees was quite wide, and uneven. Future studies should focus on for a user-group from a particular age-group, or from some particular profession. For instance, studying who elderly people experience value co-creation and co-destruction with digital consumer service should produce interesting and significant results.

This study focused on value co-creation co-destruction in digital consumer services. However, this scope of study might benefit if a more narrow sample is being made about studied domain. For instance, like mentioned earlier, smart-

services seem to take over markets in close future. Therefore, future studies should focus on digital smart-services and their value co-creation and co-destruction. Even though this study got drive towards smart-services, its original goal was to focus on digital services, and how their digitality establish value co-creation co-destruction. Hence, if future studies set their original goal on focusing digital smart-services they should be able to contribute on service-science greatly.

As mentioned by Kaaronen (2014) qualitative nature of this study means that there is usually an absence of quantitative testing. A large part of research which study value co-creation and co-destruction seem to be qualitative. In this subject, qualitative studies seem to be easier to executed, and there is usually need for a possibility for a researcher to do qualitative inference. However, in order to create deeper understanding quantitative approach should be combined with the qualitative. Qualitative approach and collection of large data sets would offer more general results and enable comparison between different socioeconomic groups. Quantitative studies include quantitative testing which eliminate the possibility of researcher's subjective reasoning and failures. Therefore, it can be assumed that if in future more quantitative studies are made under this subject, more even generalizable discoveries can be made.

In future research it would be hopeful to find always for a bit more precise representation of how value co-creation does happen with digital services. Definition for this is still relatively vague due to lack of concluded studies. However, as more research is executed more precise results is hoped to be reached. For instance, in this study, steps were taken towards a more accurate value co-creation process.

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APPENDIX 1 - STIMULI LIST FOR THE INTERVIEWS

Stimulus name	Description
Me as a self-experimenter and health enthusiast (Construction of identities):	This means that self-tracking solutions are used to gain information related to user's lifestyle, to draw conclusions about it, and optimize it based on the information. In addition, this means that self-tracking solutions are used to strengthen the position as an early adopter, as a health enthusiast, or as a productivity guru. However, it is possible that wrong conclusions are drawn due to improper use, errors in the tracking functions of the solution, or lack of information. Also, it is possible that when more users occur, the feeling of being "original" or early adopter vanishes.
Social intercourse and socializing (Social Nature of Use**):**	This means that the social aspects of self-tracking are used to gain social cohesion with peers with similar interests. This might mean sharing results goals and such in social media or inside the application, viewing other user's content, commenting and receiving comments on own shared content, in order to belong in a group where comparison, support, and advising is active. However, it is also possible, that the user hopes to not belong in a group and hopes not to be associated with other users. It is also possible that comparing to other user's results lead to disappointment, or other users are not supportive.
Goals, values, and wishes in life-style-issues (Goals and outcomes**):**	This means that the user of self-tracking solutions uses the service to support of reaching personal goals, such as improving condition or level of health. Goal might be also to optimize lifestyle-issues, such as lowering stress-level or improving the quality of sleep. However, it is also possible that continuous self-tracking and effort to optimize lifestyle results in obsessive tracking or tracking fatigue, which refers to lowered interest in measuring various things. Also, not being able to reach the goals, usually leads to negative feelings, which might lower the level of interest to use the service.
Generalization of interesting and meaningful data (Customer Participation in Service Production**):**	This means that the user of self-tracking solutions uses the service to create interesting and meaningful data, and the user enjoys particularly the process of creation and viewing the data. This includes the experiences which can be included when in the moments of data-creation. However, it is possible that the user gets tired of tracking various

	things, or draws wrong conclusions from the data, leading up to lowered level of interest.
Tracking solution use-experience (Service Process Experience):	This means that the tracking solution (tracker and/or application) is easy to use. The user's experience is smooth and follows the flow concept. The tracking, and viewing results is easy and effortless. If the experience is smooth, the user probably does not even notice the tracker, and can view the results conveniently. However, it is possible that the solution is somehow difficult to use, and the user has to use significant amount of effort in order to track data and view results. If the experience is not smooth, the interest to track data and view it vanishes.
Other theme:	Something else, which interests in the use of self-tracking solutions, or which leads up to negative feelings.

APPENDIX 2 - STIMULI LIST FOR INTERVIEWS FINNISH TRANSLATIONS

1. **Minä itseni-tutkijana ja terveysharrastajana:** Toteutan itseni seuraamiseen liittyvää tiedonkeruuta omasta elämäntyylistäni palvelun avulla. Kerään tietoa, jotta voin tehdä johtopäätöksiä omasta elämäntyylistäni, pyrin korjaamaan havaittuja ongelmakohtia, sekä optimoin elämäni terveellisyyttä. Toisaalta palvelu saattaa myös tukea mielenkiintoani uusia keksintöjä sekä innovaatioita kohtaan, ja otan käyttöön uusia palveluita jotta ”pysyn ajan hermolla”. Toisaalta saattaa olla, että tiedon keruu johtaa vääriin johtopäätöksiin johtuen palvelun virheellisestä käytöstä, palvelun epätarkkuudesta/toimimattomuudesta, tai siitä että ennakkotiedoissa on puutteita. Lisäksi mikäli tunnen erityistä arvoa siitä, että saan olla edistyksellinen palvelun käyttäjä ensikäyttäjien joukossa, häviää kyseinen tunne, kun palvelu yleistee ja kaikki käyttävät sitä.
2. **Sosiaalinen kanssakäynti, ja sosiaalisuus:** Palvelun käytön avulla kuulun joukkoon, joka jakaa yhteisen kiinnostuksen terveyden harrastamiseen. Palvelun kautta voin jakaa tavoitteitani ja tuloksiani, sekä seurata muiden toimintaa ja kommentoida sitä. Ryhmässä voi tapahtua tukemista, vertailua ja neuvontaa. Toisaalta on myös mahdollista, etten halua assosioitua ryhmä jäseneksi. Lisäksi on myös mahdollista, että ryhmässä ei tapahdu neuvontaa tai tukemista. Jatkuva vertailu muihin saattaa myös lannistaa harrastustani ja intoa palvelun käyttöön.
3. **Tavoitteet, arvot, ja toiveet terveydessä:** Käytän palvelua, koska se voi tukea minua tavoitteideni saavuttamisessa. Tavoitteita voi olla esimerkiksi yleiskunnon ja terveyden parantaminen, stressitason lasku tai unen laadun parantaminen. Toisaalta jatkuva itseni mittaaminen, parempiin tuloksiin pyrkiminen sekä tavoitteiden saavuttelu saattaa johtaa pakkomielteiseen toimintaan, tai mittaamiseen kyllästymiseen. Lisäksi jos tavoitteita ei saavuteta, johtaa se helposti palvelun käytön lopettamiseen.
4. **Mielenkiintoisen ja merkityksellisen tiedon tuottaminen:** Käytän palvelua tuottamaan mielenkiintoista ja merkityksellistä tietoa terveyteeni ja elämäntyyliini liittyvistä asioista. Erityisen miellyttävää on mitata toimintaani, ja tarkastella tuloksia sekä analysoida niitä. Mukaan luetaan myös hetket, joita koen, kun olen tuottamassa mittaustuloksia, kuten vaikkapa pyörä- tai kävelylenkillä. Toisaalta on myös mahdollista, että jatkuva mittaaminen ja tiedon kerääminen omasta elämästä kyllästyttää tai ahdistaa. Lisäksi saatan tehdä vääriä johtopäätöksiä johtuen palvelun virheellisestä käytöstä, palvelun epä-

tarkkuudesta/toimimattomuudesta tai siitä, että ennakkotiedoissani on puutteita

5. **Palvelun käyttökokemus:** Palvelun käytön kokemus on minulle merkittävä seikka. Palvelun tulisi olla helppo käyttää, jolloin tapahtuvaa mittaamista ei juuri itse huomaa, ja tulosten tarkastelu palvelun kautta on vaivatonta. Käytön tulisi noudattaa flow-konseptia. Toisaalta on mahdollista, että palvelu ei ole helppo käyttää, ja mittaaminen esimerkiksi häiritsee toimintaani. Tulosten tarkastelu voi olla vaivalloista, jolloin sitä ei tule tehtyä aktiivisesti. Mikäli käyttökokemus ei ole miellyttävä, johtaa se mahdollisesti palvelun käytön lopettamiseen.
6. **Jokin muu teema:** Jotain muuta, mikä palvelussa erityisesti kiinnostaa, tai on negatiivista.