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Becoming a design-driven large organization: Challenges faced and support efforts needed to implement design thinking

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Summary

Nowadays, traditional industries are being increasingly disrupted by innovative solutions that are being brought onto the market by startups. To deal with the pressure from new startup disruptions, large and established organizations need to activate their corporate innovation efforts, to more efficiently convert new ideas into value-creating solutions. For this, one potential solution is to implement 'Design thinking' into company processes. Design thinking is a human-centered method to innovation that seeks solutions to users' exact needs and desires.

No uniform definition for design thinking exists in current literature. For years, the literature focused on challenges that are solved with the method, instead of challenges in its implementation to existing and defined processes. This thesis addresses these gaps by first exploring the differences in perception of design thinking within one large organization, and then investigating the challenges faced and support actions experienced as beneficial in the implementation of design thinking.

This thesis conducted a thematic analysis of nine semi-structured interviews with industrial and user experience designers in a Fortune 500 multinational technology corporation, with operations in around 100 countries. The interviewees represented three distinct organizational contexts pre-defined based on their position and impact in the organization: lone designer in the region, unit-embedded design teams and global-level design managers.

The results echoed previous literature as there was no consensus found in the definition of design thinking among interviewees, and instead the method was seen as a continuous scale of practices. The higher position the interviewee possessed in the organization, the more design thinking activities they were able to recognize, the less challenges they faced and the more supportive actions they knew. The practices of design thinking are implemented most efficiently when introduced in the processes incrementally. The managers had a key role in the success of implementation, both directly and indirectly. However, further research with increased data is needed to prove reliability of conclusions.

Keywords Corporate innovation, Design Thinking, Large organizations

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Tiivistelmä

Tänä päivänä perinteiset teollisuuden toimialat joutuvat muuttamaan strategiaansa ja toimintaansa markkinoille tulevien uusien yritysten ja keksintöjen myötä. Suuret yritykset pystyvät paremmin vastaamaan kilpailijoidensa tuottamiin uusiin ratkaisuihin kehittämällä omia sisäisiä innovaatiokykyjä ja -prosesseja. Tavoitteena on saada ideat tehokkaasti muutettua arvoa tuottaviksi ratkaisuiksi. Yksi tapa kehittää yrityksen innovatiivisuutta on omaksua muotoiluajattelu (engl. design thinking) osaksi organisaation toimintaa. Muotoiluajattelu on käyttäjäkeskeinen menetelmä tai lähestymistapa, joka pyrkii löytämään uusia ja innovatiivisia ratkaisuja palvellakseen käyttäjien todellisia tarpeita ja haluja.

Muotoiluajattelua ja sen sovelluksia ei ole määritelty kirjallisuudessa yksiselitteisesti. Tähän asti tutkimus on pääasiallisesti keskittynyt haasteiden osalta niihin haasteisiin, joita menetelmän avulla voidaan ratkoa, eikä niihin jotka ilmenevät menetelmän tuomisessa suurten yritysten prosesseihin ja yrityskulttuuriin. Toisaalta menetelmän omaksumista ja sen sovelluksia on aikaisemmin tutkittu pääasiassa muotoilutoimistojen näkökulmista eikä niinkään teknologiayritysten osalta. Tämä tutkimus pyrkii ymmärtämään miten muotoiluajattelu koetaan eri puolilla isoa teknologiaorganisaatiota, mitä haasteita tulee vastaan sen omaksumisessa sekä millä tukitoiminnoilla niistä voisi selviytyä.

Tutkimus toteutettiin teema-analyysina yhdeksän semi-strukturoidun haastattelun pohjalta. Haastateltavina toimivat teolliset-ja käyttäjäkokemusmuotoilijat kansainvälisestä Fortune 500 -listatusta teknologiayrityksestä. Haastateltavat edustivat kolmea eri organisaatiokontekstia: alueen ainoita muotoilijoita, yksikön sisällä toimivia muotoilutiimejä sekä globaalien muotoilutiimien vetäjiä.

Vaikka lisätutkimuksia tarvitaan vielä suuremmalla tutkimusotannalla, jo tämän työn tulokset heijastavat aikaisempaa kirjallisuutta muotoiluajattelun termin monista eri tulkinnoista ja merkityksistä. Haastateltavien erilaisten määritelmien pohjalta voidaan todeta, että menetelmä voidaan nähdä käytäntömuotojen jatkuvana prosessina. Toisaalta mitä korkeammassa asemassa haastateltava työskenteli, sitä tutumpi menetelmä oli ja sitä vähemmän haasteita he raportoivat kohtaavansa. Nämä muotoilijat käyttivät myös enemmän tukitoimia hyödykseen. Esimiehet olivat suorasti ja epäsuorasti keskeisessä asemassa muutoksen onnistumisessa jokaisessa organisaatiokontekstissa. Tehokkaimpana tapana omaksua muotoiluajattelu osaksi oman organisaation prosesseja koettiin uusien käytäntöjen asteittainen levittäminen yritykseen.

Avainsanat Organisaatioiden innovaatiokyvyt, Muotoiluajattelu, Isot organisaatiot

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What a journey! Over 6 years of studying and growing up at Aalto is nearing completion. These years brought me irreplaceable experiences - I was forced to learn how to determine what is important for me, how to survive outside of my comfort zone, how to cheer successes but also how to learn from failures. I was also honoured to be surrounded by gorgeous people - thank you to all my friends that has been part of that journey! You added a meaning to the moments that would have been meaningless otherwise.

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High five with all the community members!

I would like to thank my advisor Peter Kelly for all the motivational speeches that made me excited about the topic and showed its real-life implications.

There are two persons that deserves the most special mention, Mama and Tata, who have been present in every single moment of my life with their unlimited support. The way you care about me showed me what it really means to care for another person. There are no words describing how much I appreciate, admire and love you. Without you, I would never be where I am. Dziekuje!

Exclusive mention goes to the first engineer in our family, my grandfather Jan – Thank you for your continuous excitement towards the idea of your only grandchild becoming an engineer, and never-ending questions when I will finally graduate…

With a wistful but extremely excited feelings,

Martyna Kosmala

Otaniemi, 16.9.2018

Table of contents

Glossary

Design thinking (DT)	A user-centered method for problem-solving and an approach to innovation. It helps to change existing solutions into more preferred ones, particularly, in solving ill-defined, broad and complex problems that are continuously changing. It is utilized as an iterative process of empathizing with users, defining the problem, ideating solutions, prototyping and then testing together with users.
User experience (UX)	The overall experience of users when interacting with a product, service or other solution. Particularly, it examines users' emotions and attitudes towards the product, such as utility, ease of use or efficiency.
User interface (UI)	Every part of the offering system which the user interacts with.
Organizational context	The organizational setting of efforts, in this thesis referring to the combination of one's position in the organization hierarchy, team structure and impact range of the work.
Main theme	The category originating from the data analysis to make findings from research question 2 and 3 more comparable. It describes the main influencers of the issue.
Business unit (BU)	A part of the organization representing one business activity, and possessing all supportive business functions, e.g. marketing or sales. Business unit is clearly located in organizational chart and possess own organizational structure.

1 Introduction

Traditional industries are being increasingly disrupted by new and innovative outside-the-box ideas that are being brought onto the market by agile startups. For example, Airbnb's platform service, which has allowed the short-term rental of private apartments to over 100 million tourists in 6 years, has had a significant impact on the market dynamics of traditional players, such as hotels (Guttentag & Smith, 2017). In 2007, Apple brought a completely new, superior product to the market – the first smartphone, called iPhone, which was a disruptive combination of a phone, internet access and computer. The iPhone changed not only the dynamics of phone sales, but also introduced a new business model for application developers (Christensen, Raynor, & McDonald, 2015). Thus, technological disruptions are not only bringing new implications for technology, they are also changing institutional rules and dynamics (Laurell & Sandström, 2016).

There are several theories explaining why startups are able to bring more technological and institutional disruptions to the market than large and established organizations do. Li (2016) claims that startups are able to see the same problems from a newer perspective, behave more agile and responsive towards change, and have ability to analyze and improve existing industry standards. Through their ability to put lean principles into practice, startups can bring their new ideas to the market more rapidly and with greater flexibility, and adjust their products and services according to users' feedback (Kidder & Geraci, 2018). Neren (2011) explains that startups operating in conditions of scarcity are forced to be more creative in their problem-solving, and this leads to new partnerships and collaborations, and often to crowd-sourcing as well. Thus, to deal with the pressure coming from new startup disruptions, large and established organizations need to consider and rethink their innovation activities, which means devising new ideas and inventions as well as implementing them in business models that create value for the organization itself (Thompson, 1965).

Design thinking is one tool to encourage innovation activities within a company that goes hand in hand with entrepreneurial theories, such as bricolage which "applies combinations of resources already at hand to new problems and opportunities" (Baker & Nelson, 2005, p.33) and effectuation which is a means, identity and commitments driven reasoning pattern aiming to control rather than predict uncertainties (Sarasvathy, 2001). Even if the concept of design thinking has been widely known only from 90's, The Design Management Institute's Design Value Index has showed that "design-centric" public

companies tend to outperform (Rae, 2016). Design thinking can be described as "a human-centered approach to innovation that puts observation and discovery of often highly nuanced, even tacit human needs right at the forefront of the innovation process" (Gruber, de Leon, George, & Thompson, 2015, p.2). Design is used as a way to improve existing situations or contexts into more preferred alternatives (Simon, 1969), and design thinking approaches are particularly relevant for problems characterized as 'wicked', i.e. complex and continually changing (Coyne, 2005). Design thinking challenges companies to take another perspective or 'frame' on the problem at hand and change the definition of the problem and how it can be solved (Dorst, 2011).

The overall aim of this thesis is to find out how large, multinational technology organizations can become more design-driven through implementing the method of design thinking. Improved user-centeredness in corporate innovation confers a competitive advantage and can strengthen the substantial (non-monetary) values of companies (Mickahail, 2015; Mozota, 2010). Design thinking can also help large corporations compete against startups. For example, the CEO of Amazon, Jeff Bezos, has stated that Amazon's success relies on their customer-obsessiveness and the assumption that the customer is continually dissatisfied (Bezos, 2016). The current literature suggests that little research has been done on the work of designers in large multinational organizations, especially in technology industries, and the focus in these rare cases has usually been on design consultancy organizations (Kimbell, 2011). While a few studies have examined the challenges (Carlgren et al., 2016) and supportive actions (Liedtka et al., 2017) related to the implementation of design thinking in large organizations, little or no research has taken into consideration the differences in the role and perception of design thinking across large and multinational organizations. Thus, this thesis studies the differences in the role of design thinking between organizational contexts in a large multinational tech organization and explores what kinds of support activities need to be taken up in order to push forward the utilization of design-thinking methods and overcome the challenges faced in the different contexts.

The research questions of this thesis are:

1. How does the perceived role of design thinking differ within various organizational contexts in the case company?

2. What kinds of challenges do designers face trying to implement design thinking in each of the organizational contexts?

3. What kinds of specific supportive actions can be taken to strengthen the role of design thinking in each organizational context?

These research questions are answered through a thematic analysis of nine semi-structured interviews with industrial and user experience designers in a Fortune 500 multinational corporation, with operations in around 100 countries, conducted as a part of a larger research project, Design Plus, at Aalto Design Factory in January–February 2018. The perception of design thinking in different organizational contexts is examined through comparison of the results of themes proposed by Carlgren and colleagues (2016): *the perception of design thinking, the use of design thinking, design thinking in relation to product development efforts, and the employees who use design thinking*. The challenges and supportive actions in each of the design contexts are then identified from the interviews and categorized through thematic analysis.

The thesis continues with four chapters: Background, Methodology, Results and Discussion and Conclusions. Chapter 2, Background, reviews the existing literature about the need for companies to become design-driven, and more precisely, about the methodology of design thinking, its role and maturity level in different organizations, as well as the challenges faced and support efforts needed during its successful implementation. Chapter 3, Methodology, depicts the methodology used in this thesis to answer the research questions, particularly the presentation of the data, the coding scheme and the principles of thematic analysis. Chapter 4, Results, presents the role of design in the three organizational contexts, as well as challenges faced and supportive actions carried out in them. Chapter 5, Discussion and Conclusions, reflects on the key findings in comparison with previous literature, describes the limitations of the thesis, and presents ideas for future research and practical implications in the field.

2 Background

To be able to answer the research questions of how perceptions, challenges and supportive actions around design thinking vary between different organizational contexts, it is crucial to understand the current perceptions of the design thinking method and its implications in academic literature. Design thinking is relatively new and, on the other hand, an ill-defined concept, thus, it is important to examine its definition from several perspectives. Furthermore, in order to be able to identify issues related to adopting the method, a deep understanding of the phases, activities, ambitions and implications of design thinking are required. As the thesis aims to define different levels of design in various organizational contexts (Research Question 1), it is important to investigate the existing ways for assessing maturity levels of design and the differences between them. Furthermore, to investigate how each design level can be supported, it is important to outline the challenges already identified when implementing design thinking (Research Question 2) and the support efforts currently used (Research Question 3).

This chapter comprises 7 sections. Section 0 introduces the method of design thinking, its various definitions and practices, as one of the tool to help companies to become more design-driven. Section 2.2 continues with presenting the framework of Carlgren et al. (2016) for defining differences in perception of design thinking, and thus categorizing different organizational contexts. Section 0 helps to understand the implications and ambitions of implementing design thinking, and how it makes organization more design-driven. Section 2.4 demonstrates various ways to compare the maturity of design within the organizational contexts. Section 2.5 describes what kind of challenges the existing literature has identified while implementing design thinking in organizations everyday work. Section 2.6 depicts what kind of support has been already identified to overcome challenges companies are facing while working with design thinking. Finally, the key issues from the chapter are summarized in Section 2.7.

2.1 The concept of design thinking

No uniform definition for design thinking exists in current literature, but the method has been studied from various perspectives. Gruber et al. (2015 p.2) describes design thinking as “a human-centered approach to innovation that puts observation and discovery of often highly nuanced, even tacit human needs right at the forefront of the innovation process”. In other words, it can be described as human-centered approach to

innovate aiming to find the solution for users' needs and desires (Brown, 2008). Kolko (2015) instead highlights it as a tool for simplifying and humanizing complex problems through focusing on users' experiences and emotions, and simultaneously leveraging on emotional, integral and experimental intelligence (Clark & Smith, 2010). Dym et al. (2005) characterizes design thinking to certain skills, such as ability to handle uncertainty, toleration of ambiguity and maintenance of the big picture through system thinking and system design. Comparing "design thinking" with "design", design thinking is a method that is – unlike design - not connected to a specific education or profession , is utilized by both designers and non-designers (Rekonen & Hassi, 2018) and is not restricted to any specific field, such as for example, service design (Fayard et al., 2017).

To avoid further confusion and disagreement about the concept, Hassi and Laakso (2011) proposed a three-dimensional framework for management discourse (Figure 1) based on an extensive literature review and expert interviews from the Netherlands, Finland, and the United States. They propose that the implementation of the design thinking-concept into workflows can be done through a combination of practices, cognitive approaches and mindset. Design thinking-practices include tangible ways of working and tools such as human-centered approach, thinking by doing, visualizing, combination of divergent and convergent approaches, and collaborative work style. Cognitive approaches depict mentality, cognitive processes and thinking styles revealing design thinking to be related with abductive reasoning, reflective reframing, holistic view and integrative framing. The mindset supporting design thinking refers to the mentality of working and approaching challenges not only by individuals but also by the whole organization. The corporate culture practicing design thinking-method should be experimental and explorative, ambiguity tolerant, optimistic, and future-oriented.

Practices	Cognitive Approaches	Mindset
• HUMAN-CENTERED APPROACH, e.g. people-based, user-centered, empathizing, ethnography, observation • THINKING BY DOING, e.g. early and fast prototyping, fast learning, rapid iterative development cycles • VISUALIZING, e.g. visual approach, visualizing intangibles, visual thinking • COMBINATION OF DIVERGENT AND CONVERGENT APPROACHES, e.g. ideation, pattern finding, creating multiple alternatives • COLLABORAATIVE WORK STYLE, e.g. multidisciplinary collaboration, involving many stakeholders, interdisciplinary teams	• ABDUCTIVE REASONING, e.g. the logic of "what could be", finding new opportunities, urge to create something new, challenge the norm • REFLECTIVE REFRAMING, e.g. rephrasing the problem, going beyond what is obvious to see what lies behind the problem • HOLISTIC VIEW, e.g. systems thinking, 360-degree view on the issue • INTEGRATIVE THINKING, e.g. harmonious balance, creative resolution of tension, finding balance between validity and reliability	• EXPERIMENTAL & EXPLORATIVE, e.g. the license to explore possibilities, risking failure, failing fast • AMBIGUITY TOLERANT, e.g. allowing for ambiguity, comfortable with ambiguity, liquid and open process • OPTMISTIC, e.g. viewing constraints as positive, optimism attitude, enjoying problem solving • FUTURE-ORIENTED, e.g. orientation towards the future, vision vs. status quo, intuition as driving force

Figure 1. Three-dimensional design thinking-definition for management discourse (adopted from Hassi & Laakso, 2011, p.6)

At the level of individual projects, there are various processes to put design thinking to practice. All of the practice models work with a similar underlying logic; Liedtka (2015) found clear overlap while analyzing five different practice models through three stages: data gathering, idea generation and testing. Thus, to get an overview of and deepen the understanding of putting design thinking into practice, this thesis presents the model used by d.school at Stanford University (d.school, 2018). There, design thinking is taught as a 5-step iterative process including empathizing with the users, defining the challenge, ideating broad range of possibilities, prototyping them and testing with users (Figure 2). As the problems that are intended to be solved are rarely our own or at least exclusively faced and caused by ourselves, the process starts through understanding deeper the users and their habits by e.g. observing, listening and engaging. Based on all the data gathered in *Emphasize*-stage, next *Define*-stage choose the point of view (POV) which is the actionable and meaningful problem statement. The next step is *Ideate*, which means that the wide and broad range of ideas should be generated to solve the challenge defined before choosing the most suitable one. In this stage, it is important to go first for quantity over quality to then be able to choose a couple of ideas to be taken further to the *Prototype*-stage. In the *Prototype*-stage ideas are taken forward step-by-step from "quick and dirty"-visualization to more advanced conceptualization. In the next *Test*-mode, prototypes are taken to users for feedback to find out whether the solution needs

to be refined or if there was some information about users was missed or whether the POV needs to be redefined.

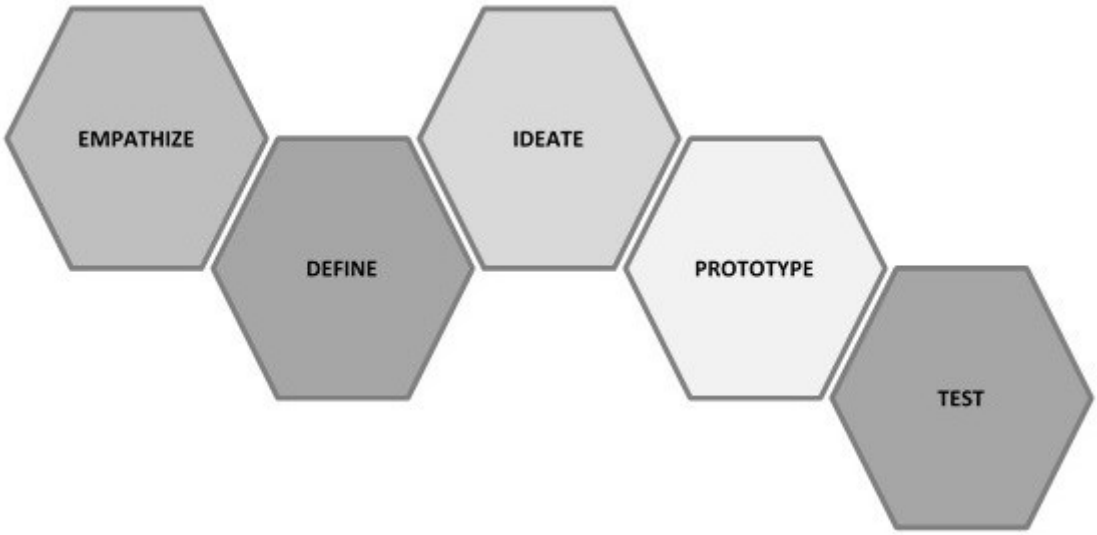


Figure 2. Stanford d.school design-thinking process in practice (adopted from d.school, 2018, p.6)

Some research has been conducted to particularly understand how the concept "design thinking" is perceived in the context of large organizations, and make sense of its ambiguity. Kimbell (2011) examined three design consultancy companies of various sizes specialized in service design and found out the distinction of seeing it either as a tool for problem solving when the desired goal is known or as a process of exploration to together with diverse stakeholders construct the understanding of the situation and desired aim. Carlgren et al. (2016) studied six large organizations from five various industries to find out, through thematic analysis, five main characteristics of the concept: *user focus* including empathy building and deep user understanding and user involvement, *problem framing* meaning to widen challenge and reframe it first instead of directly concentrating on the problem and its solution, *visualization* such as communication of ideas through quick but tangible prototypes and mock-ups, *experimentation* to test and adjust ideas in iterative way, and *diversity* within collaborative team and integration of external partners within the product development process. Thus, as there are five different themes recognized, various companies might highlight some of them more than others and possess tone-changes in understanding of design thinking. To avoid any confusion about the role of design thinking in specific contexts examined in that thesis, this study will first make sense of perception of design thinking in case context utilizing the framework of Carlgren et al. (2016) explained in the next Section 2.2. The framework

proposed by Carlgren and colleagues (2016) represented the most similar setting to this thesis and was flexible enough for adjustment.

2.2 Defining role of design thinking, Carlgren et al. (2016) model

To better understand the role of design thinking in large organizations, as well as to interpret what happens when large companies begin to apply the method in practice, Carlgren et al. (2016) conducted an exploratory study with 31 individuals working with design thinking in a central role from 16 case companies, and 11 industries, and proposed a four-theme method to analyze the role of design thinking for a given respondent: *perception of design thinking, use of design thinking, design thinking in relation to product development efforts* and *who uses design thinking*. The four-theme method brings clarity to how design thinking relates to the profession of designers, as well as design and product development efforts in certain organizational contexts. As the setup of the study of Carlgren et al. (2016) is similar enough to the setting of this thesis, the framework from this study will be later adjusted and reused in the context of this research, as it was one of the few studies found with some potential for replicability.

The first theme defined in this framework is the *perception of design thinking* by interviewees themselves. Carlgren et al. (2016) noticed in their results that most of the interviewees struggled with providing a clear answer, some of them referred to their initial understanding of the term, some would directly provide the literature definition, and some connected it to the actual working style. All in all, the design thinking-method was described as "user-centered innovation" or "a current name for really good user-centered design", process to solve problems and develop new ideas in a systematic method, as well as a mindset or a set of principles. The perception of design thinking is clearly divided between processes and practices, as it is explained by e.g. d.school (2018), versus culture and mindset. It was mentioned as interesting observation revealing then that designers' connection to design thinking is still new and unfamiliar.

The second theme *use of design thinking* describes how design thinking is utilized and what kind of tools and techniques are used. The interviewees associated the questions with new ways of working, such as, iterations, incorporating user feedback, communicating through prototypes, as well as concrete techniques and methods for ideation and creativity. They also mentioned the support of facilities, for example, flexible furniture solutions to boost collaboration and usage of post-its, markers, whiteboards etc. Then, the use of design thinking was also connected to creating a culture that enhance empathic approach, learning from failure and taking new frames to the

problem. The authors suggest that there is a need for more empirical research to understand the dimensions of design thinking and the value it generates within a company's innovation context.

The third theme *design thinking in relation to product development efforts* investigates how design thinking is connected to companies' product development processes which in most cases were predefined, well-structured and formal. There were several ways of including design thinking and innovation processes observed, such as creating entire new development process, adding new process steps, transforming the pieces of current development processes. Also, design thinking was seen to be implemented in various contexts: sometimes only in a few projects but sometimes in company-wide efforts. The results revealed that some companies create change efforts by themselves while some involve external help of consultants.

The fourth theme of *who uses design thinking* describes who in the company is using the design thinking method, as well as the role of professional designers in relation to design thinking. Design thinking is described as an approach inspired by designers; however, it can be used by anyone in the company. The results from the study reveal that the design thinking experts group were usually acting as "innovation team" bringing the expertise of design thinking to the projects. In addition, in some cases their aspiration was clearly in showing examples and teaching others how to use design thinking so they could continue by themselves with process restructuring and include more design thinking there. In several responses, the importance of cross-functionality in the team and involving the right set of individuals were stressed as enabling factors to boost design thinking within the team.

This method is later used in this thesis to characterizes the role of design thinking in three organizational contexts of the case company pre-defined by the title of interviewees. The four-themes presented: *perception of design thinking, use of design thinking, design thinking in relation to product development efforts* and *who uses design thinking,* has been used as themes for coding. The results are explained in Section 4.1. The next Section 0 explains the implications and ambitions for companies to implement design thinking.

2.3 Becoming more design-driven

This section describes work on the concrete implications and benefits of implementing design thinking within context of the larger organization. According to Brown & Katz (2011) implementation of design thinking brings also larger scale assets beyond the better results of designer professionals' work. The method can be summarized as a holistic user-centered approach to innovation (Carlgren et al., 2014). It is a valuable practice for improving innovation efforts in the organization (Liedtka, 2014) and adjusting business strategies accordingly through helping also business managers gather their intentions and make them feasible by clearly setting goals, deeply analyzing customers, and aligning their internal teams to deliver results (Clark & Smith, 2010). From another perspective, its ambition is to improve the current existing situations or contexts into more preferred ones (Simon, 1969) through either solving current problems, creating new products or altering corporate culture (Brown, 2009). In practice, it has been used to solve the problems that are characterized as "wicked" meaning the problems that are complex, continuously changing and combining various opinions of stakeholders (Buchanan, 1992; Coyne, 2005). The changes boosted by implementing design thinking are usually based on taking a new frame, in most cases borrowed from another problem, to the existing situation aiming for desired outcome by changing the dynamics of "what is the problem?" and "how is it solved?" (Dorst, 2011).

To understand the benefits for a company of becoming more design-driven, this thesis combines the findings and presents the framework of economic value added (EVA) (Mozota, 2010). Overall, becoming design-driven converts identification and analysis of users' behavior into customer benefit and business value (Brown, 2008), thus, leading to more probable market success (Brown & Martin, 2015). In addition to increased levels of corporate innovation (Mikhail, 2015), implementing the method of design thinking principles in every stage of peoples' work, creates a flexible and dynamic organizational culture which is able to quickly respond to changing business dynamics, create competitive advantage and empower individual contributors (Kolko, 2015). There is no consensus on whether implementing the method of design thinking increases company's profit as some of the studies did not find correlation through results of survey of 72 participants from 253 LinkedIn Fortune 500 members (Mikhail, 2015), when others noticed that companies investing in design tend to be more innovative, more profitable and grow faster (Commission of the European Communities, 2009; Rae, 2016). However, according to Mozota's (2010) definition, the economic value added (EVA) through increased corporate innovation do not consist only of financial value but also

take into consideration non-monetary substantial aspect: customer value, performance value and strategic value (Figure 3).

Economic Value Added

Substantial Value			**Economic Value**
Customer Value	Performance Value	Strategic Value	

Figure 3. The two dimensions of economic value added: substantial and economic (adopted from Mozota, 2010)

Related to understanding how to become a design-driven company on more practical level, Bucolo et al. (2012) explains how organizations can actually develop their design efforts, demonstrate and facilitate design thinking across various contexts and projects. Their proposed framework (Figure 4) expands the definition of design thinking and links it to strategic organizational change through concluding three iterative key phases situated within two axes: internal-external and operational-strategy. First, to understand deeply the hidden needs of stakeholders, their insights need to be gathered through narratives or scenarios. Then, those insights need to be converted into future oriented solutions with clear value statements for stakeholders. Next, strategy needs to be adjusted accordingly to the propositions and validated with customers. Thus, developing design activities in the organization is an iterative learning process engaging all the stakeholders, as well as organizations and their innovation efforts.

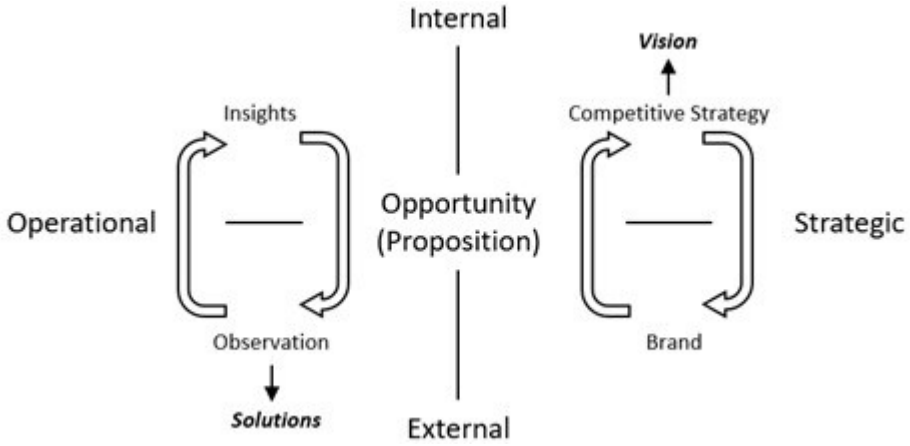


Figure 4. Design-led innovation framework (adopted from Bucolo et al., 2012)

To conclude, design thinking in large organizations is, in most cases, implemented as user-centered practice of innovation that changes existing concepts into more preferred ones. It particularly helps to solve "wicked" problems, that are continuously changing and challenging to define, through creating new frames towards their analyses. Adaptation of the method strengthens at least the substantial value of the company, such as, the customer, performance and strategic value. To fully say that the company is design-driven, the method of design thinking needs to be linked to the strategy of the company, instead of being developed as a way to develop products. The next section 2.4 present several models of comparing the role and maturity of design across various organizational contexts.

2.4 Comparing the maturity of design thinking within contexts

This section reviews four existing frameworks used for comparing utilization of design thinking and its maturity in various contexts. First, the Danish Design Center (2001) proposes the framework of a "Design Ladder" with 4 different maturity levels of design, and extension proposed by Doherty and colleagues (2014). Second, Westcott et al. (2013) use DMI- Design Value Scorecard to measure design within certain organizational setups. Third, Girling (2015) identifies 5 different factors that reveals the integration level of design within the organization. Finally, Mozota (2010) suggests four directions in how the value from design can be created.

The first framework, the Design Ladder is a framework proposed by the Danish Design Centre (2001) dividing different maturity levels of design utilization in organizations into four steps: non-design, design as form-giving, design as process and design as strategy (Figure 5). The framework was created based on the assumption that there is a positive correlation between higher earnings and stronger more strategic position of design within the development process, which has later been verified as true in "The economic effects of design" (Kretzschmar, 2003). The companies located in the first step in the ladder, non-design, do not have a systematic way to use design meaning that the tasks are handled by non-designers and decisions made based on own assumptions instead of users' insights. The second step, design as form-giving, is seen as a finishing action in product development or graphic design, in other words, "styling" which is typically conducted by both designers or people from other professions. The third step, design as process, refers more to the actual mindset of integrating design at an early stages of development process which drives the solution based on users' input and the actual challenge identified. The work is usually done by multidisciplinary teams possessing a

mix of different capabilities and skills. The final step is called design as strategy, and it refers to close collaboration between the designers and management team aiming to rethink the business concept and its value chain now, and in the future.

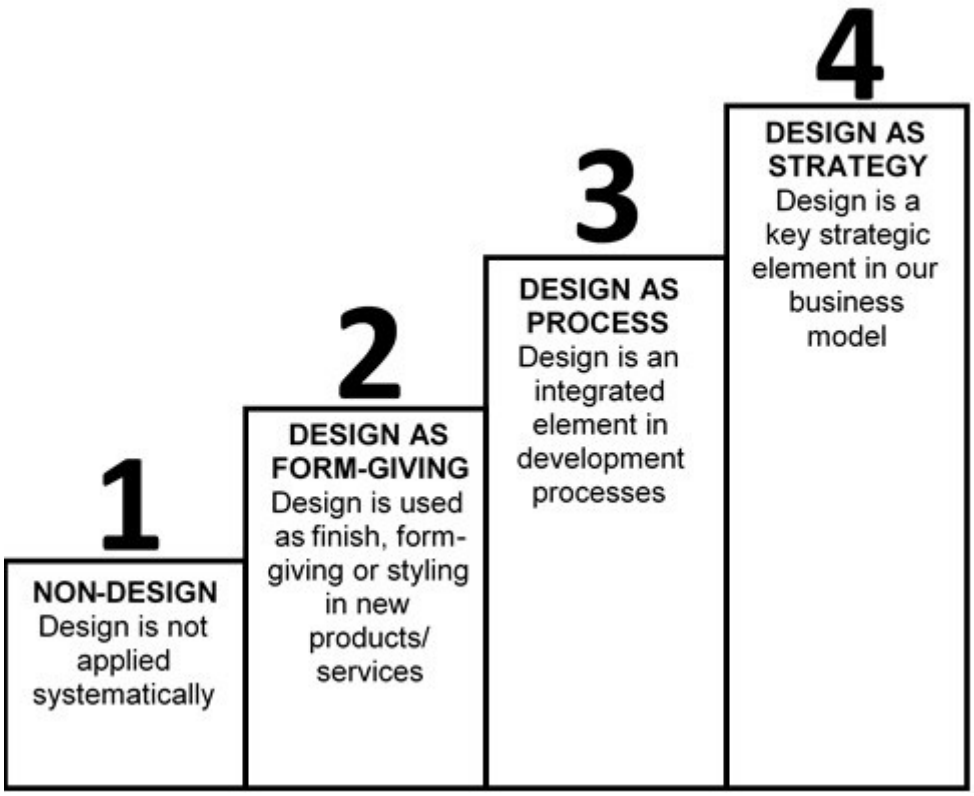


Figure 5. Steps of Design Ladder (adopted from the Danish Design Centre, 2001)

While the Design Ladder framework describes design on an operational level, Doherty et al. (2014) add a strategic perspective to it emphasizing that strategic design deals with more long term indirect and intangible value than mere current operations. Thus, they present three "cultural stepping stones" applied between second and third step of the ladder in order to shift company from product-focus to design integration on strategic level. The first stone is called "Design as Thinking" where design is perceived as a unique tool for approaching and then solving problems. When the company moves forward to the second cultural stone "Design as Value Creation" the company starts to recognize design thinking not only as a tool for problem solving but as a method to create value for stakeholders, short-term outputs and long-term outcomes. The third cultural stone proposed is called "Design as Intangible", and it gives space for uncertainty and accepts that the outcomes of design can be intangible. There are specific assistive tools and approaches use to reach each of the stepping stones presented in Table 1.

Table 1. Assistive tools and approaches for Stepping Stones (Doherty et al., 2014)

Cultural Stepping Stone	**Tools and approaches to reach Stepping Stone**
Design as Thinking	• Business Model Canvas • Persona Creation • Narrative Creation
Design as Value Creation	• Interviews and Feedback • Customer Assumptions • Customer insights generation
Design as Intangible	• Golden Circle Workshop • Value Proposition Canvas

As a second framework, Westcott et al. (2013) propose a DMI-framework which concentrates on understanding how and where the value from design is created in the organization through assessing three usage contexts of design: development & delivery, organization and strategy, on five different levels of organizational design maturity: initial, repeatable, defined, managed and optimized. The score assessed direct the company into three different "zones" of design value: tactical (1), organizational (2), strategic (3). Zone 1 indicates the tactical value of design meaning that design is seen as a service inside or outside the company and can have a visible impact on ROI. Zone 2 stands for organizational value where design is seen as a connector or an integrator of various stakeholders leading to a more holistic customer experience. Zone 3 stands for strategic value and design as a strategic resource, meaning that the organization adopts design thinking as their core competence continuously improving customer experience.

Alternatively, Girling (2015) measures and compares the maturity the level of design through assessing five various factors in organizational activities:

1. *Empathy*, the organization's understanding of its customers
2. *Mastery*, the organization's quality of execution in design thinking and crafting
3. *Character*, the organizational support for design, design thinking and integration of professional designers
4. *Performance*, the market's response to the design output of the organization
5. *Impact*, the maturity of the organization's actions around its culture, social and its environmental legacy through its design

Finally, Mozota (2010) suggests that design has four directions for creating value from a managerial perspective (below). Performance is assessed through a Balanced Score Card which is set of questions directed for the part of organization responsible for design. Once

assessed, the companies are recommended to set the most suitable objective for each direction and then concentrate on implementing it within the company context until next assessment.

1. The customer value perspective - design as differentiator
2. Process perspective - design as coordinator
3. Learning perspective - design as transformer
4. Finance perspective - design as good business

In conclusion, the first two frameworks, Design Ladder and DMI, define the role of design in the organization while the remaining two are used for assessment of the current situation in the organization and suggesting small improvements on the scale. The levels of the frameworks, Design Ladder and DMI are mostly similar, however, Design Ladder has one additional step zero also representing the situation when there is no design involved in the processes at all. On the other hand, the framework proposed by Girling (2015) assess the utilization of design through five design capabilities, which Mozota (2010) used for the assessment of four perspectives of design's benefits. The similarities and differences in the frameworks strengthen the statement that design has no single definition and implication. The insights from the frameworks give a base for later reflection of results presented in chapter 5.

2.5 Challenges in implementation of design thinking

The Research Question 2 concentrates on investigating challenges faced in implementation or strengthening design thinking within certain organizational contexts of a large case organization. It is important to note that little research so far has been dedicated to exploring the challenges in implementing design thinking to a certain organizational setup (Carlgren et al., 2016). The existing literature has been concentrating on challenges that implementing design thinking might solve instead of seeing implementing this new method as a challenge itself (Brown & Wyatt, 2010). Thus, this section highlights the reasons why implementing design thinking as a new method to an organizational setup is challenging, as well as explains what kind of challenges has been found from the current literature.

To begin with, the method of design thinking has an ambiguous nature, including activities such as experimentation and iterations, which easily drift in conflict with pre-define and non-adaptive organizational processes and cultural pressure (Walters, 2011). In other words, Liedtka et al. (2017) explained that most large organizations do not

provide employees with psychological safety to take risks and experiment. Also, the nature of design thinking make communication and reporting difficult as its interpretation is heavily dependent on the surrounding situation and its conditions (Brereton & McGarry, 2000). Then, as it is actually the team in design thinking projects that set the terms and objectives for the outcomes instead of managers, as is the case of traditional projects, thus, the innovative project outcomes might not fit in the organizational boundaries and pre-defined objectives (Dunne & Martin, 2006), as well as be completely understandable for people not fully familiar with that exact specific context. Mozota (2010) suggests that the challenges in implementing design thinking comes from lack of recognition of design and support from higher management, which instead is caused by designers' weak understanding of managerial activities, as well as their difficulties to apply a value model in their everyday work.

Calgren et al. (2016) conducted the most pertinent research to this thesis with the most similar setting to Research Question 2, as they studied 5 different large companies that had been using design thinking for more than 5 years with the aim to become more innovative, to identify whether the companies faced any challenges in implementing design thinking. The results revealed 7 main challenge groups that are presented in Table 2. The first group of challenges support the work of Walters (2011) as to the challenges and misfit of implementing design thinking in established product development and innovation processes. The second challenge group identified the threats regarding the different characters and attributes of new ideas compared to traditional ones, consistent with the findings of Dunne & Martin (2006) who suggested that innovative results from design projects might not fit the organizational boundaries. As Mozota (2010) highlights the challenge of managers' lack of recognition and support for design, third challenge group by Carlgren et al., (2016) provides a broaden explanation stating that organization question the design as it is difficult to measure it and prove its value for the organization. The fourth group presents the challenges in utilizing the activities of design thinking, such as learning from mistakes, with the strong culture of risk-aversion. Then, their interviewees felt threatened by new dynamics brought by design thinking initiatives. The sixth group reveals the difficulties of learning the tools and practices of design thinking, such as visualization or working in multidisciplinary teams. Finally, the seventh group affirm challenges regarding different communication styles and term usage. As Brereton & McGarry (2000) highlighted, difficulties from the sixth and seventh group partially originate from high context-dependency of understanding design.

Table 2. Challenges faced when implementing design thinking in large organizations (Calgren et al. 2016)

Challenge group	**Challenge examples**
1. Misfit with Existing Processes and Structures	• Clash between design thinking activities and established processes for product development and innovation • The perception of design thinking as resource-intense and front-end heavy • Contrary fit of iterations with linear mainstream process • Difficulties to prioritize design thinking activities in times of high workload • The perception of design thinking as additional and non-essential costs • Difficulties to collaborate if teams based in different locations • Integration challenges when the work transferred between teams (e.g. design team pass their work to development team) • Lack of time and no room for failure (choosing less innovative solutions)
2. Resulting Ideas and Concepts are Difficult to Implement	• Misfit of results from user research with the scope of future plans • Necessity of product goals to be defined in advance • Unclear responsibilities as design thinking projects break organizational silos
3. Value of Design Thinking is Difficult to Prove	• Difficulties to measure and evaluate contribution and outcome of design thinking in the projects (e.g. in ROI) • Challenges to set measurable key performance indicators (as DT is a holistic method)
4. Design Thinking Principles/Mindsets Clash with Organizational Culture	• Frontline staffs' risk-aversity as a natural part of their professional role • Organizational avoidance of conflict and disagreement • Insufficient facilitates for interactive and visual work • Judgment of design thinking not being serious (e.g. ice-breaking games as unnecessary nonsense) • Difficulties to find balance between doing things differently and not alienating people in the organization
5. Existing Power Dynamics are Threatened	• The perception of design thinking questioning the established development functions • Being seen as threat and meddling in the areas of expertise, also design functions as design thinking perceived as simplified version of design • Being experienced as reducing authority of management and shifting power in the organization (some decisions moved to team level)
6. Skills are Hard to Acquire	• Challenges to learn visualization (drawing, building prototypes) • Overwhelming to synthesize from large amount of qualitative data from user research • Hard time to know when to stop iterating, difficult to know when the insights are "good" enough • Difficulties to combine different aspects of multidisciplinary team work • Lack of ability to switch between different roles in decision making within the team • Challenges to transfer design thinking activities learnt in training into own context • Problems to find and recruit people willing to practice design thinking
7. Communication Style is Different	• Utilization of other media than PowerPoint considered inadequate • Lack of translation of information into technical requirements • Divergence in usage of design terms, difficulties to find common understanding • Different style of communication, e.g. designers using artistic style

In the previous study of the same research group, Rauth et al. (2014) had identified some challenges related to the implementation of design thinking while they were concentrating on the concept of legitimizing a new method of design thinking in large organizations and on finding out what managers do to make design thinking happen in large organizations. First, they recognize as difficult to communicate and boost appreciation for the important values and principles of design thinking, such as, experimentation, learning from mistakes or having fun. Later, this challenges has been categorized by Carlgren et al. (2016) into two challenge groups: design thinking mindset clash with organizational culture (4) and differences in communication styles (7) (as explained earlier). Rauth et al. (2014) noticed the new concepts or ideas created with the help of design thinking were often outside the existing scope, which made them hard to prioritize on a daily basis where the workload was already high. When Liedtka et al. (2017) highlighted that design thinking requires being comfortable with ambiguity and open-ended questions, Rauth et al. (2014) emphasized in their research that the design thinking is a method hardly traceable on the whole path of development cycle, e.g. it is hard to show how the ideas can be developed into marketable offerings, measure and evaluate key performance indicators (KPI) and then track and quantify the success back to design thinking. Moreover, the results revealed the phenomena called "initial honey moon" when at the beginning of the implementation process the organization did not require proof of usefulness or any other KPIs as the excitement about the new method was so high. Then, design thinking was started to be seen as a method that challenge and question existing dynamics, such as practices, roles and project responsibilities, thus requiring more quantification and KPIs.

Getting into a more specific and practical level, Rekonen & Hassi (2018) studied challenges of utilizing experimentation, which is one activity belonging to method of design thinking, in four teams of experienced non-design practitioners (novices in terms of design skills) working in a large Finnish financial organization through examining their short-term experimentation sprints. Their results support the point raised by Carlgren et al. (2016) of design thinking misfit with organizational culture and brought up four concrete examples of the conflict: resistance to iteration, overlooking the experimentation ideas of other's and one's self, losing sight of the initial problem to be solved and a bias towards planning. The first theme, resistance to iteration, entails an unwillingness to implement the feedback and insights for conducting further iteration. The second theme possess the challenges originating from team dynamics and team members disregarding suggestions of others. Third, it revealed the challenges for the team to keep in mind the initial problem that was meant to be solved, during the process

of iteration. Then, the teams are easily stuck with old habit of planning, thus, creating an 'invisible barrier' that cause procrastination from beginning an experiment.

In summary, Table 3 below presents the main challenges of implementing design thinking identified in the literature. The table shows how challenges overlap among various studies and research settings, however, always bringing some other perspective or point of view to the same challenge. There are also some individual mentions of challenges (7 & 8), however, it is important to note that they might be closely related to some other challenge groups, e.g. conflict with existing organizational processes and structures (1) goes hand in hand with lack of support from higher management (8). The next section 2.6 explains the supportive actions, suggested by current literature, to strengthen the role of design thinking with organizational processes.

Table 3. Challenges in implementation of design thinking recognized from current literature

Challenge	**Literature**
1. Conflict with existing organizational processes and structures	Carlgren et al., 2016; Walters, 2011; Liedtka et al., 2017
2. Adversity to integrate resulting ideas and concepts	Carlgren et al., 2016; Dunne & Martin, 2006; Rauth et al., 2014
3. Difficulties to prove value and benefits of design thinking	Carlgren et al., 2016; Rauth et al., 2014
4. Misfit of design thinking principles' and organizational culture	Carlgren et al., 2016; Rekonen & Hassi, 2018
5. Threatened existing power dynamics	Carlgren et al., 2016; Rauth et al., 2014
6. High context-dependency of design thinking; skills are difficult to acquire	Carlgren et al., 2016; Brereton & McGarry, 2000; Rekonen & Hassi, 2018
7. Varying communication style	Carlgren et al., 2016
8. Lack of recognition of design and support from higher management	Mozota, 2010

2.6 Support efforts to strengthen the role of design thinking

This section provides a background for answering the Research Question 3. It explains what kind of supportive efforts current literature suggest for strengthening the role of design within various organizational contexts. Elsbach & Stigliani (2018) examined empirical research to suggest reciprocal manner where design thinking practices have profound effect on organizational culture and its values, and simultaneously, suitable organizational values support the implementation of design thinking tools. For overcoming cultural challenges in implementing experimentation within novice teams,

Rekonen & Hassi (2018) suggest as necessary to adopt an appropriate mindset which easily accepts changes in the proposed ideas and is open for iteration. On the other hand, Seidel & Fixson (2012) examined 14 cases of novice multidisciplinary product development teams and their habits, and found concrete examples in utilization of need finding, idea-generation and idea-testing tools that distinguished high-performing teams from low-performing ones. High performing novice teams are better able to find consensus on user needs. They brainstorm more often, however, with certain rules to ensure high-quality of the sessions, and prototype their ideas regularly. Similarly, Brereton & McGarry (2000), through multi-year studying of engineering students and professional designers engaged in design project work, identified certain characteristics of how hardware and physical objects supported designers' thinking and communication. They propose that designers actively involve physical props in their thinking and communication methods, however, they prefer quick and rough prototypes for easily modelling key attributes instead of detailed and time-consuming models.

No matter whether the support is needed for implementing certain design thinking tools into processes or boosting mindset open for experimentation, current literature highlight the importance of support from the managerial level Mickahail (2015) examined 73 corporate executives and managers from Fortune 500 companies and found a positive correlation between expanded innovation corporate efforts and managers' support, as well as overall training regarding the method of design thinking. Westcott et al. (2013) conducted 15 interviews with design managers that were identified as top innovators by Booz & Company to create a benchmark how the designs should be led and supported in the organization highlighting C-level support as one of four main themes. The results revealed that design becomes an organization's core focus when there is strong advocacy and support from top management. Similary, Rauth et al. (2014) conducted 36 interviews from six large American and German firms, with at least five years of experience in utilization of the design thinking method to find out the importance of ambassadors' networks as one of the main five results. Some actions from the ambassadors' side proved to be beneficial e.g. inviting executives to communicate as spokesperson for design thinking, supporting bottom-up suggested initiatives and boosting collaboration within different functions. Liedtka (2011) studied how managers should perceive their work in order to be able to support implementation of design thinking. As a result, the author proposed that in order to succeed managers need to focus on growth and innovation, see life as a journey of learning, accept uncertainty, seek out new experiences and broaden their repertoire to better understand customers as people.

Research by Rauth et al. (2014) was inspired by the legitimacy theory proposed by Suchman (1995) and tried to discover efforts taken by individuals to strengthen the role of design thinking to make it perceived desirable, proper and appropriate within an organizational context. In addition to the support from ambassadors' networks, they found out other four types of supportive efforts to implement design thinking: demonstrating the usefulness of design thinking, meshing design thinking with organizational culture, convincing through experience and creating suitable physical spaces and artefacts. Demonstrating the usefulness of design thinking can be conducted through validating concepts with external parts, showcasing success stories and developing project-based evaluation metrics for design. In order to mesh design thinking with organizational culture, they suggest to involve early on powerful influencers within the company, incorporate design thinking activities within organizational processes and introduce an own label for design thinking. In other words, Liedtka et al. (2017) see it more as establishing the structure for design thinking activities to bring the psychological safety to deal with risk, ambiguity and open-ended questions. Convincing through experience highlight the same activities as Mickahail (2015) mean by education and training, however as showing executives and other employees design thinking hands-on via workshops, presenting the principles of design thinking for larger audiences and supporting others in their projects. Also, they agree with previous examples (Brereton & McGarry, 2000; Seidel & Fixson, 2012) which see the need to create physical spaces and artefacts for easy utilization of design thinking tools, such as flexible interiors and whiteboards.

Westcott et al. (2013) mentioned three other themes of findings, in addition to C-level support and leadership, such as: center of excellence, increasing investment for design and user-centered experience innovation. First, the best-practice companies led their design activities through the center of excellence that defined the right terms to use, practices and education efforts. It is worth mentioning, that a significant number of the companies had specific design teams in the divisions who knew the actual product and service and were involved more closely with customer cooperation. This statement goes hand in hand with the theory of Liedtka et al. (2017) who highlights the importance for a clear structure for design to bring the psychological safety for employees when adopting a new method. Westcott et al. (2013) and Liedtka et al. (2017) agree also on the importance of cultivating variance both in the background development team, as well as a holistic approach to the customer journey. The more user-centric approach taken the more organization manage to combine and integrate various parts of the customer experience resulting in more efficient organizational change and better performance in terms of design. Last but not least, Westcott et al. (2013) found a correlation in evolution

of design activities in organizations and the industry's design standards meaning that the more industry invests in design, the more pressure there is on individual's companies to improve their design efforts.

To conclude, Table 4 summarizes the support actions suggested by existing literature. The suggestions possess different perspectives and goals, some of them concentrate on changing mindsets and some of them on influencing concrete working practices. It is also important to note that five different sources highlighted the importance of management support. These suggestions are later a base for reflection for the case data of the thesis.

Table 4. Support actions for implementation of design thinking found in the current literature

Supportive action	**Literature**
1. Receive support from managers and ambassadors' networks	Mickahail, 2015; Liedtka, 2011; Westcott et al., 2013; Rauth et al., 2014; Liedtka et al., 2017
2. Possess better physical facilitates and artifacts for design thinking activities such as prototyping and brainstorming	Brereton & McGarry, 2000; Seidel & Fixson, 2012; Rauth et al., 2014
3. Focus on user-centered experience innovation	Mickahail, 2015; Westcott et al., 2013; Seidel & Fixson, 2012
4. Educate about design thinking and demonstrating its usefulness through e.g. successful examples	Mickahail, 2015; Westcott et al., 2013; Rauth et al., 2014; Liedtka et al., 2017
5. Mesh design thinking mindset with organizational culture	Rekonen & Hassi, 2018; Rauth et al., 2014
6. Build a learning community who sees innovation as a journey	Liedtka, 2011; Liedtka et al., 2017; Westcott et al., 2013
7. Raise more general interest and investment in design within industry	Westcott et al., 2013
8. Establish clear organizational processes for design project and new innovation initiatives	Liedtka et al., 2017; Rauth et al., 2014
9. Cultivate variance and multidisciplinary project teams to get new perspectives	Liedtka et al., 2017

2.7 Summary

This chapter aimed at creating a solid literature base, justifying reasoning behind the thesis, and then providing insights later used in reflecting the results. There is no consensus in the definition of design thinking, some of the theories see the method as practices, some as mindset or as cognitive approaches (Hassi & Laakso, 2011). However, all the definitions highlight similar attributes – iterative and human-centered approach

to solve users' real challenges. Design thinking is a method for innovation (Liedtka, 2015) and solving "wicked" problems (Coyne, 2005). From the organizational perspective, successful implementation of design thinking activities leads to strengthened substantial value, such as flexibility or customer satisfaction (Mozota, 2010). Some research has also connected design to increased profitability of the companies (Kretzschmar, 2003). In this thesis, there is no single definition for design thinking chosen, instead, the understanding of design thinking is defined by each interviewee themselves.

To avoid further confusion on what design thinking really means and to answer Research Question 1, this literature review investigated a method to define the role of design in specific context through analyzing four themes (Carlgren et al., 2016): *perception of design thinking, use of design thinking, design thinking in relation to product development efforts* and *who uses design thinking*. This method has been originally conceived in a similar enough setting to this study to be replicable. Then, there are several frameworks that suggest how to compare similarities and differences in the role of design across various organizational contexts. Some of them distinguish what design is used for in the organization, e.g. non-design, design as form-giving, design as process and design as strategy (Danish Design Centre, 2001), while other frameworks examine the main attributes of design and its usage, for example, empathy, mastery, character, performance & impact (Girling, 2015). Those frameworks are later used for reflecting the results and trying to position them within existing literature.

So far, little research has examined challenges in implementing design thinking to specific organizational contexts (Carlgren et al., 2016), as in the setup of Research Question 2. The existing literature concentrates on difficulties that are solved with design thinking instead of seeing implementing this new method as a challenge itself (Brown & Wyatt, 2010). The most relevant research to that concept has been conducted by Carlgren et al. (2016), and it revealed 7 main challenges that large organization face during implementation process of design thinking: Misfit with existing processes and structure (1), Resulting ideas and concepts are difficult to implement (2), Value of DT is difficult to prove (3), DT principles/mindsets clash with organizational culture (4), Existing power dynamics are threatened (5), Skills are hard to acquire (6) and Communication style is different (7). In this thesis, the study of Carlgren et al. (2016) provides a background for assessing similarities and differences between different organizational contexts in the results relative to Research Question 2.

To better understand the context of Research Question 3, the support actions experienced as beneficial were examined from current literature. Some of the support activities were clearly working on changing mindset, for example, convincing through

experience (Rauth et al., 2014) or boosting organizational culture that is open for changes and iteration (Rekonen & Hassi, 2018). Instead, some highlighted the importance of implementing certain supportive facilities and practices, such as, more brainstorming and more prototyping (Seidel & Fixson, 2012) or creating suitable physical spaces and artefacts (Rauth et al., 2014). On the top, the literature highlighted the key role of managerial support when it comes to implement new methods within the pre-defined company's processes (Liedtka, 2011; Liedtka et al., 2017; Rauth et al., 2014; Westcott et al., 2013). In this thesis, understanding insights from existing literature help to look for the known, as well as unknown supportive actions in the data set.

In general, there is little research done on implementation of design thinking in large organizations, as most of the research either concentrate on challenges solved with the method (Brown & Wyatt, 2010) or then the context of design consultancy (Kimbell, 2011). This thesis tries to find out how large multinational organizations can become design-driven, and understand the supportive actions needed for overcoming challenges in implementation of design thinking. Additionally, it examines differences in perception of design thinking across different designer interviewees. The next chapter 3 explains the methodology of this thesis, present the data set and illustrate the process of answering each of the research questions.

3 Methodology

This thesis aims to find out how large companies can become more design-driven through examining whether there are any differences in perception of design thinking amongst designers working in various organizational contexts, identifying challenges faced in implementation of design thinking, and suggesting supportive activities to overcome them. Therefore, the Research Questions for this thesis are:

1. How does the perceived role of design thinking differ within various organizational contexts in the case company?

2. What kinds of challenges do designers face trying to implement design thinking in each of the organizational contexts?

3. What kinds of specific supportive actions can be taken to strengthen the role of design thinking in each organizational context?

The chart presented as Figure 6 summarizes the path of the research pointing out how each of research questions is answered. First, the data set of 9 interviews is chosen from a larger pool of data involving 37 interviews, aiming both to cover all distinct organizational contexts and to maximize regional diversity. Then, to answer Research Question 1, the role of design is analyzed in each context with the help of a four-theme framework proposed by Carlgren et al. (2016). Next, the Research Questions 2 and 3 are answered with the help of bottom-up thematic analysis of challenges and enhancers identified in the interviews. Each analysis is conducted for each organizational context separately, after which the differences between contexts are systematically identified and compared. Finally, the results are summarized into one table presenting challenges and supportive actions for adopting design thinking in large organizations per context to add another layer of analysis and examine connections between them.

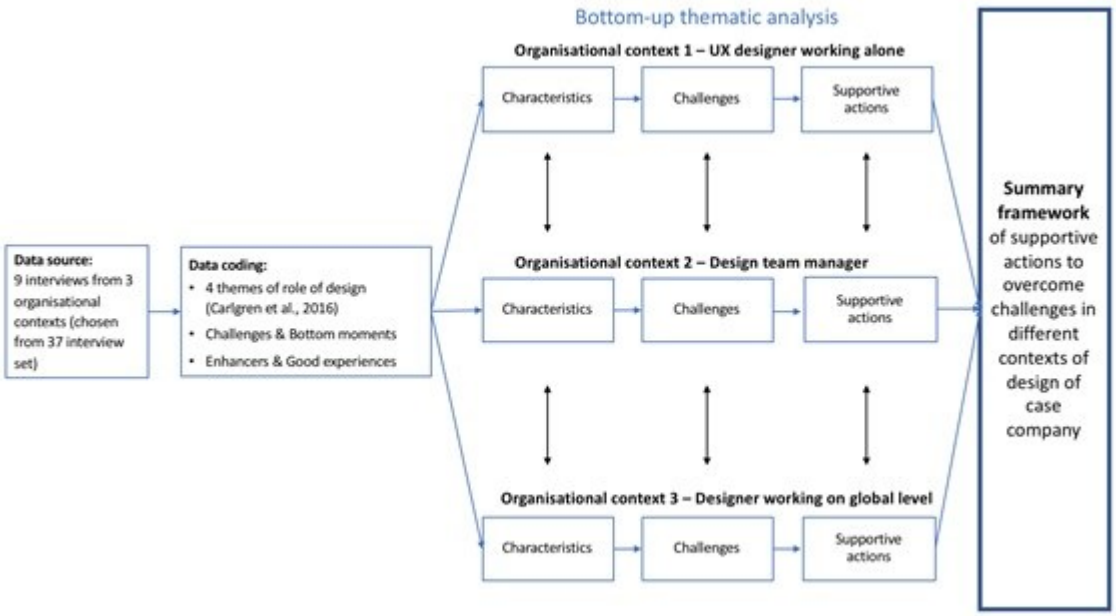


Figure 6. The path of the research method conducted in this thesis

3.1 Data set

The study was conducted based on insights of 9 semi-structured qualitative interviews from the case company, presented in Table 5. For the purpose of this study, semi-structured interviews were chosen as the most suitable method of data gathering as they help to explore the views, experiences, beliefs and motivations of individual interviewees on a research topic but, simultaneously, give flexibility to discover new perspectives (Gill et al., 2008). The case company is a Fortune 500 multinational corporation with operations in around 100 countries and more than 100 000 employees around the world. All the 9 interviews were conducted by the project team in January-February 2018 as part of a larger research project taking place in Aalto Design Factory. The interviews were conducted both face-to-face and via video conference, recorded and then transcribed with the help of an external company. All the interviewees were educated industrial or user experience designers with at least three years of working experience. They were located in 4 different regions: Asia-Pacific, Central Europe, North Europe, North America. Their average time in the company was 5,5 years ranging from 0,5 to 12. The average duration of the interviews was 53 min and the interviews guideline can be found in Appendix 1.

The interviewees were chosen to represent equally the different contexts of design thinking within the organization, which were defined based on their position in organizational structure of interviewee: designers working alone, unit-embedded design team managers, and global-level design managers. The insights from interviews 1-3 came from the UX designers working as the only designer in the whole region or then working as the only designer in that specific unit in the specific location. As mentioned previously, the case company is a large, multinational and fragmented organization where the units work separately enough to compare them as individual organizations. Interviewees 4-6 were leading a team of designers in different business units of the company. Interviewees 7-9 were working at a global level, meaning their work affected several business units at the same time regardless of their location.

Table 5. The summary of conducted interviews

	# of interviews	Duration of interview (min)	Country	Title	Time at the company	Organizational context
Context 1	1	59	Asia-Pacific	UX designer	12	The **only designer** in the region
	2	42	North America	UX designer	4	The **only designer** in the region
	3	49	North America	UX designer	3	The **only designer** in the region
Context 2	4	50	North Europe	Industrial design lead	7	Industrial design **team**
	5	29	Central Europe	Senior UX designer	0,5	UX design **team**
	6	60	North Europe	UX research manager	1,5	UX research **team**
Context 3	7	69	North Europe	Design manager	6	**Global design team manager**
	8	55	Central Europe	Global UX leader	5	**Global UX lead**
	9	67	North Europe	Design manager	10	**Global level** UX team **manager**

3.2 Thematic-analysis

To answer the three Research Questions on designers' perceptions, challenges and enhancers related to implementing design thinking in different organizational contexts, this thesis performed an inductive and semantic thematic analysis of implementing the design thinking method in a large multinational case organization within the chosen data set of 9 interviews. Thematic analysis originates from the field of psychology, however, it has been recently extended into other disciplines of research (Braun & Clarke 2006). As described by Braun and Clarke (2006), the main idea behind thematic analysis is to identify, evaluate and categorize patterns within whole data set rather than within individual pieces of data, e.g. interviews. Then, inductive approach of thematic analysis is data-driven meaning that the data set is analyzed and coded without an aim to fit it into any pre-defined theoretical framework or coding frame. Finally, semantic analysis mean that the coding has been conducted based on explicit meaning of the data without any interpretations beyond what has been said in the interviews. Thus, the data were first top-down coded with pre-defined codes (Role of design, Challenges, Bottom moments, Good experiences or Enhancers), then, bottom-up analyzed into themes and summarized for further interpretations and reflection to existing literature. Braun & Clarke (2006) summarized the process of thematic analysis into 6 phases:

Phase 1. *Accustoming with the data* e.g. through collecting it, listening to interview recordings, reading or re-reading the data set and collecting initial ideas

Phase 2. *Creating initial codes and gathering the relevant quotes accordingly*

Phase 3. *Looking for themes and organizing the quotes accordingly*

Phase 4. *Revising themes* to check whether all the coded quotes has been categorized into the most suitable themes

Phase 5. *Characterize themes* creating clear label and translation for an overall story

Phase 6. *Summarizing findings into report*, presenting the story supported by examples and reflection towards existing literature

3.2.1 Procedure

In this thesis, the procedure of familiarizing with data and conducting thematic-analysis followed the process of Braun and Clarke (2006) with some adjustments originating from the needs of the research project:

1. Research team collecting the data through conducting, in total, 37 semi-structured interviews from the case-company as part of the larger research project in January-February 2018. (Phase 1)
2. Research team coding all 37 interviews according to themes pre-defined with the case-company (Appendix 2) and conducting bottom-up thematic-analysis for all the codes for the purposes of reporting to the case-company. In the first coding round for case-company purposes, there were also relevant themes to this thesis coded such as challenges, bottom moments, enhancers and good experiences. The quotes were coded with theme and short summary of the quote's main point. Then, the quotes, their short summary and interview code were gathered in Excel-file categorized by coding themes. (Phase 1)
3. Research team discussing and selecting nine most suitable interviews for the data set of this thesis based on three different organizational contexts identified during data collection. Once the three organizational contexts have been identified, the selection criteria were organizational and regional diversity, e.g. different business units. The number of interviews (data set) has been limited to nine as this master's thesis is a pilot research with a pre-defined timetable. (Phase 1)
4. Familiarizing with the literature to decide on coding criteria for analyzing the differences in the role of design in pre-defined three organizational contexts of the case-company as it was not part of Step 2.
5. Top-down coding of quotes matching the theory chosen for defining the role of design within three organizational contexts. (Phase 2)
6. Research Question 1: Bottom-up thematic analysis to identify themes of role of design in different organizational contexts. (Phase 3-4)
7. Research Question 2: Bottom-up thematic analysis and categorizing the quotes from category challenges and bottom moments into themes gathered in the Step 2 for all nine interviews. (Phase 3-4)
8. Research Question 3: Bottom-up thematic-analysis and categorizing the quotes from category enhancers and good experiences into themes gathered in the Step 2 for all nine interviews. (Phase 3-4)
9. Combining and comparing the findings across all the three contexts. (Phase 5)

10. Explaining the analysis and concluding the findings in written format of master thesis. (Phase 6)

3.2.2 Research Question 1: Differences in the role of design

To understand more deeply the differences in perception of design thinking across three organizational contexts of this thesis, a thematic analysis of the role of design thinking was conducted. The analysis was structured around the four themes presented by Carlgren et al. (2016) (explained earlier in section 2.2): *perception of the term design thinking, use of design thinking, design thinking in relation to product development efforts, who uses design thinking*. The method was suitable for repetition in this context as Carlgren et al. (2016) did not limit their study to any specific industry or size of company. Their study was based on 16 firms from more than 5 different industries varying from less than 10,000 to over 300,000 employees. However, it is important to note that the case organization in this study is analyzed from the perspective of different units and contexts, which are working independently from each other, thus, being more comparable to smaller companies working separately.

The data was analyzed to uncover insights on the four themes proposed by Carlgren et al. (2016). The insights for the first theme, *perception of the term design thinking*, were gathered from the answers to the interview questions "How do you define design thinking? What does design thinking mean to you?". The insights for the second theme were gathered by identifying activities associated with design thinking known from literature or when the interviewee described their own actions as doing design thinking. The third and fourth theme were based on the activities from theme two indicating how the design thinking activities were used in practice and who used them. The insights for themes 2-4 were identified from the entire interviews. The coded insights from the interviews were thematically sorted for identification of similarities and differences and are later present in the Chapter 0. Table 6 presents an overview of how the insights to define the role of design were gathered from four themes.

Table 6. Method to define the role of design within different organizational contexts

#	Scheme	Interview scope	Insight gathered	Quote example
1	Perception of the term design thinking	Answers to question: "How do you define design thinking? What does design thinking mean to you?".	Interviewees' own definition	*"To me, design is about making a user's life better."*
2	Use of design thinking	Entire interview	Recognition of design thinking activities known from literature, or when the interviewee explains own actions as design thinking	*"We had open house, we have a lab here, room where we have our prototypes and we showed some videos and they could also test (…)"*
3	Design thinking in relation to product development efforts	Entire interview	Practical implication of activities recognized in Theme 2	*"We had the brainstorming with the UX team, because our manager asked us what we can do to show other people in a very simple way what our software is doing."*
4	Who uses design thinking	Entire interview	Individuals involved in activities recognized in Theme 2 and 3	*"We are a small design doing research within this field"*

Once the four themes were coded from each of the interview, the findings were first thematic-analyzed individually within each of the interview to deeply understand the role of design in individual pieces of data. Then, the individual findings were summarized into characteristics for each of three organizational contexts. Once understanding the role of design in each organizational context, three contexts were compared to each other to highlight the differences and similarities between them.

3.2.3 Research Question 2: Thematic analysis of challenges

The Research Question 2 was answered through bottom-up thematic analysis through quotes identified and coded as challenges and bottom moments. Coding theme challenges represented all the challenges mentioned in the whole interviews without any specific restrictions of what they regard to. Instead, bottom moments were collected from the answers of "Thinking about your work and experience at the company in general,

what would be your top 3 and bottom 3 moments so far?". All the quotes were combined within each organizational context and then clustered based on the similar patterns identified. Then, the patterns were organized according to the "Main themes" in order to be able to more easily compare the differences and similarities within the contexts, as presented in Table 7. Later, the main themes were defined based on the most frequent influencers or involved part of the individual themes, in all the three organizational contexts.

3.2.4 Research Question 3: Thematic analysis of support efforts

The third Research Question was, similarly, answered through bottom-up thematic analysis. The quotes were coded based on theme enhancers and good experiences from the whole transcription of all the interviews. More specifically, enhancers included all supportive actions that have taken design thinking method forward within the organization or strengthened its position, without any further restrictions. All the positive examples from the work of interviewee were categorized as good experiences. Then, as with Research Question 2, the quotes were combined within three organizational contexts and then organized based on the repeating themes. The analysis of enhancers and good experiences were organized into same main themes as results from Research Question 2. The Table 7 presents how the themes are organized into main themes for both Research Questions 2 and 3 across all three organizational contexts.

3.3 Final outcome

The final outcome of this thesis is a summary table of the findings from all three Research Questions, as exemplified in Table 7. The aim of the summary is to not only clearly show the current statuses, for example, "If designer is working alone, the role of design thinking is X, the challenges faced Y and supportive actions seen as beneficial Z", but also adds additional layer of analysis and brings the aspect of comparison. The table helps to compare organizational contexts against each other but also across the main themes, which possibly reveal the potential links between the results. The table can be later used for contexts to learn from each other's, thus, be able to overcome challenges and strengthen the role of design more effectively.

Table 7. Final outcome: Summary table of bottom-up thematic analysis for all three Research Questions

Organizational context	Research Question	Main theme 1	Main theme 2	Main theme 3
#1 – UX designer alone in the region: Definition of design thinking	RQ2: Challenges & Bottom moments	• Theme 1 • Theme 2 • …	• Theme 1 • Theme 2 …	• Theme 1 • Theme 2 …
	RQ3: Enhancers & Good experiences	• Theme 1 • Theme 2 • …	• Theme 1 • Theme 2 • …	• Theme 1 • Theme 2 • …
#2 – Design team manager: Definition of design thinking	RQ2: Challenges & Bottom moments	• Theme 1 • Theme 2 …	• Theme 1 • Theme 2 …	• Theme 1 • Theme 2 …
	RQ3: Enhancers & Good experiences	• Theme 1 • Theme 2 • …	• Theme 1 • Theme 2 • …	• Theme 1 • Theme 2 • …
#3 – Designer working on global level: Definition of design thinking	RQ2: Challenges & Bottom moments	• Theme 1 • Theme 2 …	• Theme 1 • Theme 2 …	• Theme 1 • Theme 2 …
	RQ3: Enhancers & Good experiences	• Theme 1 • Theme 2 • …	• Theme 1 • Theme 2 • …	• Theme 1 • Theme 2 • …

4 Results

The following chapter presents and explains the results of this thesis divided in the sections of three research questions. Section 4.1 answers the first research question on how the perception of design thinking differs within three various organizational contexts of the case company, first on the level of individual interviews, then concluding each section with a context-level summary. Section 4.2 examines the second research question "What kinds of challenges do designers face trying to implement design thinking in each of the organizational contexts?" divided into three main content themes based on key influencer in the example: designers' own work (1), non-designers (2) and organizational and structural (3) challenges. The results are explained one main theme at the time, first, by deep diving to each organizational context and then, summarizing main characteristics of the theme. Finally, section 4.3 explores the interviewees' perceptions related to the third research question "What kinds of specific supportive actions can be taken to strengthen the role of design thinking in each organizational context?" by showing positive examples of supporting actions the interviewees had experienced in their careers. Similar to the previous section, these are categorized also into the three main themes identified while answering research question 2. Again, the data is examined one theme at the time, first explaining deeply findings on each context, and then summarizing them into main characteristics.

4.1 Research question 1: The role of design in different contexts

This section presents the findings of clustering and categorizing all nine interviews into three different organizational contexts through a combination of top-down coding (utilizing the framework of Carlgren, et al 2016) and bottom-up thematic analysis (clustering thematically similar content). The findings from three distinct organizational contexts with highlighted amounts of quotes for each theme are summarized in the Table 8.

The next three sections (Sections 4.1.1, 4.1.2 and 4.1.3) walk through the findings for each of the organizational context separately starting with understanding insights from individual interviews supported by quotes from the raw data, and then concluding with the role of design in that specific context. Then, section 4.1.4 highlights the main characteristics of each organizational context and concludes the main differences between them, to later more simply reflect and apply findings across different contexts.

Table 8. Activities and perceptions related to design thinking in three contexts (no. of quotes in brackets)

Perspective into design thinking	**Context 1 - UX designer alone**	**Context 2 – Design team**	**Context 3 – Group level manager**
1. Perception of the term design thinking	Designers hesitant with their understanding of the term but associate it with "making people's lives better"	Method taking user needs into consideration	Mindset of involving users always when possible, keeping continuously the "big picture" in mind
2. Use of design thinking within organization	• Conducting user testing but not in a "proper" way (remotely, internally or with limited access to users) (3) • Simplifying products – combining and throwing features out (2) • Defining personas (2) • Conducting workshops with clients e.g. at user conferences to test and interact (2) • Visiting users but only sporadically (2) • Using user data to support decisions (1)	• Creating experiences for users (3) e.g. both physical and digital; user groups based on their products utilized • Establishing continuous feedback loop with users (2) • Identifying opportunities (2) • Focusing on exact users' needs (e.g. customizing) (2) • Conducting user research (2) • Defining role of designers as an organizational glue – multi-sided collaboration (1) • Defining global design guidelines (1) • Communicating and internal selling through proposals and prototypes (1) • Educating how to focus on users (1)	• Ideating with users from the beginning and creating feedback loop (4) • Thinking system, concentrating on big picture (4) • Implementing agile (3) • Acting as "body of knowledge" (3) • Including DT in concrete ways e.g. checklists (2) • Conducting workshops with different units (2) • Connecting people for collaboration and knowledge sharing (2) • Creating culture of openness (1) • Prototyping (1)
3. Design thinking in relation to product development efforts	• Not enough knowledge how to implement UX design ("half doing", focus on UI) (4) • Developer-centric culture with agile methods by the book (3) • Lacking user-centricity, no expectations for design inside organization (2) • Improving workflows and including designers from the beginning of the project (2)	• Improving products based on clients' feedback e.g. open house, workshops with clients (4) • Communicating design visually and simply; educating others (4) • Involving and budgeting design on daily basis from the beginning of the project (3) • Focusing holistically on humans and their real needs (3) • Coping with highly technology-driven culture (2) • Mixing backgrounds around organization, also hard and soft skills (2)	• Acting as supporting services for BUs and projects (consultancy or guidelines and principles) (6) • Breaking silos and boosting knowledge sharing (workshops/education) (5) • Gathering user insights on spot and from the beginning of processes (4) • Creating open culture of trust, e.g. retrospectives, open office (4) • Being lean and agile - fast prototyping, minimum valuable product (3) • Experimenting to reduce risks (2)

		• Conducting ad hoc testing with people using the products (1) • Defining future vision and strategy for products (1)	• Aiming high, creating a strong connection towards products (2) • Promoting design with organizational design and empirical shows of user-centrism benefits (2)
4. Who uses design thinking	Working mainly alone, some collaboration with other parts of organization	Working in teams	Not specified who uses design thinking, perceived as relevant for all organizational actors

4.1.1 Context 1 – UX designer working alone

Interviews 1-3 represented an organizational context 1 where UX designers were working alone in the region. As exemplified in the quote below (*Quote 1*), interviewee 1 was not familiar with the term of "design thinking", however associated design at large with "making people lives better". The use of design thinking was described as "half doing" without a structured process of design thinking as such – for example, they used to do personas but it required too much work for one person, or they conducted usability tests only with developers or, then, with users but not in their proper working environment. The aim of design thinking activities in this context was described as incorporating a better user experience to the company offering and encourage others to expand utilization of UX resources. One interviewee was working alone for 5 products, however, they mentioned that there were 3 other designers working for other projects.

> *Quote 1 (interview 1): "I would say I'm not familiar enough with it, to be honest. (..) To me, design is about making a user's life better. That's the term I'd like to use, that's my whole focus. My focus is 'Are we doing something that actually makes their life easier?' 'Are we doing something that makes their life harder?', 'What are we doing?'. And often we don't know the answer. We have no idea what the answer is. And that's, to me, been my main focus. And that's how I sell it to others. And they sort of… it's hard to argue with that statement."*

Similarly, when asked about their perception of design thinking, interviewee 2 was not too sure about its meaning but associated it with culture of design and a method to show differences between easy and difficult interfaces. The design thinking activities were visible in improving existing products by throwing out unnecessary features and efforts to visit users in situ in their natural working environment. The developing culture was seen as a very developer-centric lacking knowledge and skills on implementing UX design, as well as resources to prioritizing it among other tasks (*Quote 2*). The interviewee explained that design thinking is perceived by the organization as not the cheapest and easiest way of working, thus learning about its implementation is restricted by limited resources. The interviewee worked on design alone, however, felt that the

surrounding organization understood design, and was sporadically supported by the sales people, product owners and managers.

> *Quote 2 (interview 2): "It's kind of sad because I feel like they don't really set expectations. The expectations are so low – for design. And they say that they want the design but a lot of times my design will end up being brushed off until a later time or put on hold."*

The strong focus on visuals, creating "wow-factor" and making products "not only work well but also look good" were seen in the key findings from Interview 3. Otherwise, interviewee 3 was also not familiar with the term design thinking, however, explaining it as thinking in terms of users and making their life easier through questioning "status quo", breaking the existing roles, simplifying the customers' path and trying to support decisions with in-house testing and data. As exemplified in the *Quote 3*, the interviewee was working on future ideas how to improve complicated existing products to more user-approachable ones. The developing culture was described as very professional and agile development by the book, which involved designers in the project from the beginning until the end. The aim was to make new products pretty or improve existing workflows. The designers' work was done alone without collaborating with anyone regarding product designs but involving project managers or product owners in some big decisions. The interviewee tried to keep up the team feeling with other designers working in the same organization but being placed in other regions or countries.

> *Quote 3 (interview 3): "And I'm also working on future ideas, one is breaking up the system, it's a very complicated application and we are breaking it up into workflows, very specific roles/ personas, they call it personas, but we are not really working as personas, as we know, UX designers know it, but it's more of a role specific. So, I'm doing research, unfortunately not with user, with just people inside the company who know this works. So, this is just the beginning and we are gonna present it to users in conference in April. So, I'll be able to interact with users at this point. And we'll test some of our current features, mobile apps and also present this new concept then."*

To sum up, interviews 1-3 represented organizational context 1 were UX designers were working alone in a region. None of the interviewees were familiar or completely comfortable with the term design thinking, however, interviewee 1 and 3 associated it with "making people lives better" or with general improvements of what the company is doing. There were 12 activities associated with the utilization of design thinking identified, such as personas, usability tests, breaking and simplifying customers' path while using existing products, visiting users in situ and supporting decisions with data. However, changing existing solutions into more simple and user-friendly seemed to be the most important activity mentioned by both interviewees 2 and 3. In relation to product development, there were 11 quotes mentioned in total. All interviewees put

effort in implementing the design thinking activities and UX design, however, interviewee 1 and 2 described it as "half-doing" since there was not enough knowledge or resources to fully conduct the change. More precisely, they conducted testing remotely with limited and coincidental access to users or in-house only with access to people developing the product, with the focus on the UI instead of the UX. To point out some differences, interview 2 brought up budget-constraints while interviewee 3 had a clear focus on visuals while working as part of agile development team. All the UX designers interviewed felt that they worked mainly alone, with some minor collaborations with product owners or developers.

4.1.2 Context 2 – Unit-embedded manager of design team

The second organizational context was defined based on the interviews of unit-embedded design team managers. Interviewee 4 perceived design thinking as taking users into consideration by concrete activities such as sending them test products, gathering and, then, learning from feedback. For example, as visible in *Quote 4* testing revealed architectural mistakes in the product that should have been repaired already immediately when created. In relation to product development efforts, design thinking was part of UX strategy of the whole department, therefore allowed to involve designers from the beginning of the projects resource-wise. Also, even if the strategy was based on technology- and engineering-focus, the customers have been recently segmented in the groups based on similar needs and products used. The work was seen as collaborative not only with other design team members, but also with developers, product owners and software architects on a weekly basis.

> *Quote 4 (interview 4): "We just gathered some people very ad hoc that are working with the machine to test and get some feedback. We conducted tests and then got a list what could be improved. It was kind of an eye opener what should have been done already one and half years ago. We revealed some architectural mistakes, which were expensive to repair now, and there was not even time for them. It was something that helped us to show what should have been done a while ago."*

Interviewee 5 associated design thinking with user-centered approach bringing certainty of the product under development through early feedback loops. They conducted small workshops for multidisciplinary teams and clients to understand their real needs. The development process consisted of brainstorming sessions, workshops with clients to research and test as early as possible, and hopefully in the future to even support decision making. As exemplified in Quote 5 the importance of involving users' feedback to the development was communicated clearly in the organization and led even to increased

budget for client-interaction. The team consisted of 6 designers collaborating closely with business units and participating regularly in Scrum meetings.

> *Quote 5 (interview 5): "I think that we are more about the client or user or human as center of approach than design thinking itself, so we are showing them that, I mean, from my perspective, it's much more value over, for developers, that you are showing, that the things which they developed make sense and they will be useful for the users, and it's as simple as that and they understand that. So, we are not really teaching them about the design, because it's our part, sometimes of course if they want to know something, we're telling them what we know, but we are showing them that what they are doing and why they are working with us, is important. And why we are going to the client or why we are asking the client what they think about our mock-ups and why they, their feedback is important."*

Interviewee 6 described design thinking as a good method for non-designers to understand the purpose of user-centered design and its iterative way of gathering users' inputs. The design activities were described as focusing on the real needs of humans, understanding the domain, involving users through open-house sessions, prototyping and visualizing the results (*Quote* 6) but also mixing backgrounds of development teams as explained in *Quote 7*. The daily work concentrated on user experience through involving business units that understand deeply the domain into development process, combining both physical and digital services and customizing offered solutions. In order to make people understand the purpose and value of design, the interviewee was trying to spread the word about design whenever possible. The team worked as a small team connecting research on interaction with industrial and service design.

> *Quote 6 (interview 6): "Yes, we had, what we did about a year ago, we had open house, we have a lab here, room where we have our prototypes and we showed some videos and they could also test AR and VR. Then we had, because we are about 200 researchers here in the research center of Sweden, so then we had open house here and some of them came and looked at what we had previously and then we started the discussion and then after they wanted us involved in, there were two parts, one project that has almost finished, they wanted visualization of their research what they are doing, they're doing some simulations, this is the power sector, they're doing some simulations that are hidden beneath all safety parts, and they need to communicate the results, they need to explain it for the customer, and they also need to better understand themselves, so there we worked with how to visualize this in a comprehensive way, and also to take it into AR, which I haven't done yet, but visualization is something that people have closer to understand, I guess that is more tangible for them."*

> *Quote 7 (interview 6): "And that's what I'm trying to mix up, I have not an engineer background, from [name] Institute of Design, and it's in fine arts, and then I have one from the cognitive science, also in my team, and I want to mix up that more, and I have one with business background and design on top of that. So that is something that I'm trying to mix up more, but it is a very engineering-heavy company, so working with these softer values, they have a*

little bit difficulty sometimes to see why they should do that because that is still quite new."

In total, interviewees 4-6 mentioned 15 various activities of design thinking and proposed 20 ideas how they are implemented in relation to product development. To conclude, the three managers of design teams in context 2 connected design thinking with taking users into consideration. The focus was concentrating on the "bigger picture" creating and combining physical and digital experiences for exact user needs based on the customers segments according to the products they utilize. The culture was still seen as technology-driven, however conducting some design thinking practices budgeted from the beginning of the project, such as, user research, gathering user insights (open house, workshops) and conducting ad hoc testing with the people using the products. The designers were seen as "organizational glue" boosting multi-sided cooperation within different soft and hard organizational backgrounds, communicating design visually (e.g. prototypes) and in a simple and understandable way inside the organization. There were some mentions that the teams work on global guidelines, educate others about design and define future vision and strategy for products. Naturally, the work felt as conducted in teams with more frequent collaboration with other organizational parts, such as product managers or product owners.

4.1.3 Context 3 – Designers working on global level

In the organizational context 3, designers worked on a higher, global level of the organization meaning that their decisions affected a wider range of the organization or its offering. Interviewee 7 described design thinking as a development starting from the bigger picture, bringing new radical solutions, collaborating with users, testing concepts, experimenting and not getting locked to the first solution, as well as involving even external (to the projects) expertise from different backgrounds (*Quote 8*). Overall, the customer was involved in product development already from the beginning of the projects to first gather insights, then prototype and test. In practice, the projects reserved some time at the beginning for "understanding the big picture" before going into details, implement agile-methods in software and hardware development and support open conversations through prototypes, all to avoid misunderstandings. The interviewee did not specify who exactly use design thinking in the development efforts.

Quote 8 (interview 7): "We tested our concept by travelling all over the world and gathering our internal insights from engineers and project-engineers located in Singapore, China, USA, England, Sweden and Norway"

Interviewee 8 perceived design thinking as human-centered and co-creational approach that let people find solutions to their own problems, as showed in *Quote 9*. The activities

utilized included research, conceptualization and prototyping in agile working practices. Interviewee 8 highlighted the importance of culture of design including open communication, trust and transparency, experimentation, high aims, as well as strong connection between employees and their work (*Quote 10*) encouraging to respond the problems as they emerge. Understanding the "domain" and "big picture" was seen as crucial enhancer in successful product development and risk mitigator. In practice, the designer was joining agile teams at the beginning of the projects and discussing, as the first task, what kind of value and service the design can bring to the project. In this context, design thinking was used by the whole IT department.

> *Quote 9 (interview 8): "For me, it means… well, it's a co-creation with users, I would boil it down to just one sentence. People have natural capability to solve their own problems, if they are given freedom, space and responsibility. So, I think (with) design thinking, want to nurture exactly it. So, we want to invite users to help them solve the problems, and then, just work together to pack it and wrap that up into a good solution."*

> *Quote 10 (interview 8): "Because, again, we strongly believe that if people love the products, they work hard, the products will be good. It's like with food. Unless you love food and treat it with love, you can't cook tasty dishes."*

Interviewee 9 identified design thinking as a lean and agile method focused on understanding the users to develop easy and usable user interfaces. On the other hand, it was described as a mindset that holistically aim for creating value, both for users and the company, using human-centered tools, such as empathy, business model canvas or prototyping. As exemplified in *Quote 11* highlights the importance of UX design and system thinking once providing the customers with process industry solutions. The design was implemented not only to involve users' opinion early enough through prototypes and MVP, but also to break silos and connect people with each other combining their expertise and boosting knowledge sharing. In practice, the team was responsible for providing tools supporting the work of all business units, such as guidelines, principles and checklists whether the key customer segments are defined. Additionally, the products were quickly prototyped and exposed for users' feedback. Design thinking was used by the whole R&D department, product management and naturally all the designers, as well as digital leads and evangelists located in each business units.

> *Quote 11 (interview 9): "Those products need to work together when we build those kinds of process industry solutions, we connect different products and make a system. However, UX-design is included now only through "bottom up" work of designers – we need some more higher support to get it on next level and create competitive advantage out of it."*

The interviewees situated in organizational context three, global level operations, associated design thinking with a mindset of involving users as early as possible, as well as examining every situation from the perspective of "big picture". The design was promoted within the organization through empirical shows of the value of user-centrism and workshops with different units. The projects were working in an agile way with the methods of lean releasing the prototypes and minimum valuable product as soon as possible. They involved users as early as possible to ideate together and establish feedback loops through e.g. prototyping and gathering insights in situ. Also, their main responsibility was to act as "body of knowledge" thinking system and providing supporting design services for business units and projects, such as, design consulting or company-wide guidelines and principles e.g. checklists for projects. One of important activities was to connect the right people with each other encouraging collaboration, boosting knowledge sharing and breaking silos. The culture was explained as open, with continuous efforts to be even more open and transparent through retrospectives or supporting facilities e.g. open offices. The employees were encouraged to aim high and create a strong connection and ownership towards the products they work on. Then, the experimentation was seen as a way to reduce risk. In numbers, the interviewees mentioned 22 examples of design thinking activities and 28 of their application in the product development process. They did not mention any specifications who was involved in design thinking activities, except on general level - whole IT or R&D-department.

4.1.4 Summary - Three different contexts of design

This section recaps the main characteristics of all three organizational contexts presented in Table 8. Designers working alone in their regions, and representing organizational context 1, were not familiar with the term design thinking, and conducted their work mainly on their own with some coincidental collaboration with others. The main activities of design-thinking mentioned were testing (3), simplifying (2), personas (2) and various kind of user interaction (4). However, the organizations did not have high expectations regarding design, thus, the work was described a half-doing e.g. testing not with the real-users or focusing on UI instead of UX. Unit-embedded design team managers, representing organizational context 2, were naturally working in teams who were taking user needs into consideration (description of design thinking). Context 2 concentrated on creating experiences for the users (3), through continuous involvement (2), focus on exact needs (2), user research (2) and opportunity identification (2). The representatives of third design contexts, group level managers, associated design thinking with mindset of involving users always as possible and keeping "big picture" in mind. They did not specify who exactly worked with design thinking. In practice, their

main role was to act as supporting services (6), breaking silos (5) and gather user insights from the beginning (4) through activities such as creating continuous feedback loop (4), thinking system (3) and implementing agile-methods (3), such as minimum valuable products into development processes.

To summarize the differences between perceptions of design thinking and who use design thinking across three organizational contexts, the first context represented designers that were not completely familiar with the term of design thinking and its implementation while conducting their work mainly by their own. Designers from context 2 working in teams perceived design thinking as involving user needs in the development process through concrete actions and directing the outcomes accordingly. The third context perceived the term more on high-level describing it as "mindset" towards working with users at earliest possible stage and having continuously the "big picture" in mind. Interviewees did not specify who use design thinking in context 3, except general answers like "IT department". Thus, the three organizational contexts covered the range from little awareness of the term, through taking users into consideration as concrete practices of work to connecting the term to the organizational culture and principles of doing. Additionally, the organizational settings varied from working as a designer alone or in design teams within some organization, e.g. one business unit, or then working as designer on global level affecting several organizations at the same time, however, without any specification with whom design thinking is used.

To compare and grasp the differences between contexts in concrete design thinking activities (coded "use of design thinking"), bottom-up thematic analysis was conducted and combined for general overview of the context. It is important to notice the overall amount of design activities mentioned growing from context 1 to context 3: 12 mentions in context 1, 15 quotes in context 2 and 22 in context 3 (total 49). UX designers working alone (Context 1) mentioned mainly very concrete and individual practices how they involve design thinking in their daily work, e.g. some kind of user testing (3), simplifying existing products and solutions (2), defining personas at the beginning of the project (2), conducting events for users to test and interact (2). Moving forward to context 2 where managers of design teams were interviewed, the use of design thinking were described as more continuous and holistic, as well as used to drive the bigger parts of development processes, e.g. creating holistic experiences for users based on all the products they use (3), customize solutions for exact user needs (2), gathering feedback continuously (2), identifying opportunities (2) and conducting user research. Instead, where designers were working on group level (Context 3) design thinking activities were seen as holistically driving the organizational culture and mindset of development, e.g. ideating

together with users from the beginning to create continuous feedback loop (4), implementing agile-principles (3) and including design thinking through making it as concrete part of the process, such as checklists whether the end user is clearly defined and widely known to development team. Also, in insights from Context 3 design thinking was seen as a connector of separate development process or organizations through e.g. system thinking and concentrating on "big picture" (4), acting as "body of knowledge" (3), workshops with different units (2) and connecting people to boost collaboration (2).

The insights from coded examples of design thinking in relation to product development explains the implications of identified design thinking activities described above into practical usage. Correspondingly to previous theme use of design thinking described above, the number of quotes identified as theme 3 was growing across the contexts: 11 quotes in context 1, 20 mentions in context 2 and 28 in context 3 (total 59). Interviewees from context 1 concentrated mostly on the challenges they were facing or solving, e.g. not enough knowledge how to properly implement UX within processes (4), strict agile culture by the book (3), no expectation towards design from other organization (2), including designers from the beginning of the process (2). Applying design thinking was described in context 2 mainly as actionable and continuous change effort, e.g. improving on client's feedback (4), educating others through simple and visual communication of design (4), involving and budgeting design on daily basis from the beginning of the projects (3), focusing holistically on exact needs of users (3), working technology-driven (2) but also mixing backgrounds (2). To continue further, context 3 characterized their efforts of design thinking as more cultural and on higher structural-level, which was in line with the activities they are using. The efforts were presented as acting as support services (6), breaking organizational silos (5), creating open culture of trust (4), gathering users' insights on spot at the very beginning (4), helping in implementation of lean and agile (3), reducing risk by experimentation (2) and aiming high with own work (2).

The overall differences between the contexts are summarized below in Table 9 highlighting the growing path in the number of quotes identified in specific theme across contexts. It is important to note that total number of quotes identified from coding theme 2 and 3 more than doubled from context 1 (23 quotes) to context 3 (50 quotes).

Table 9. Perception of design thinking across three organizational contexts (total no. of quotes in brackets)

Perspective into design thinking (coding theme)	**Context 1 - UX designer alone**	**Context 2 - Design team**	**Context 3 – Group level manager**
1. Perception of the term design thinking	Not familiar	Involving user needs	Mindset of involving users always when possible, keeping "big picture" in mind
2. Use of design thinking	Concrete and individual actions within the process (12)	Continuous and holistic approach to drive the bigger parts of development processes (15)	Driving the whole development process, connecting different processes (22)
3. Design thinking in relation to product development efforts	Facing and solving challenges (11)	Actionable and continuous change efforts (20)	Cultural change, and breaking existing structures (28)
4. Who uses design thinking	Working alone in the region or one organization (e.g. business unit)	Team of designers working in one organization (e.g. business unit), some external collaboration	Not specified more than whole department, e.g. IT

4.2 Research question 2: Challenges in implementing design thinking

To answer research question 2, bottom-up thematic analyses was conducted from the quotes identified in the interviews as challenges or bottom moments. In total, there were 96 challenges identified among 9 interviews distributed among contexts: Context 1 – 49, Context 2 – 14 and Context 3 – 33. As described in Methodology the identified quotes were divided in the main themes to bring more clarity and comparability among contexts. The main themes were defined based on the key influencer in the examples: designers' own work, non-designers and organizational structure. Challenges categorized in the first main theme, designers' own work, were related to the work and actions of the designers themselves, including challenges that limited or restricted designers from doing their work properly. Challenges categorized in the second main theme, in turn, were related to the work of other people, and comprised challenges that complicated design activities due to non-designers' actions. The third main theme, organization related, consisted of challenges originating from organizational structure, resource availability or product strategies. The following sections will explain the results from each of the main theme: Section 4.2.1, Designers' own work, present results from main theme 1, section 4.2.2, Non-designers, findings from main theme 2 and section 4.2.3, Organization, from main theme 3.

4.2.1 Main theme 1 - Designers' work

In total, there were 42 challenges identified related to designers' own work among the three contexts: 28 for UX designers working alone, 5 for unit-embedded design team managers and 9 for design managers working on global level. The detailed results are presented in Table 10 where each bullet point describe one challenge identified with explanation on theme-level from how many interviews the challenges came from.

Table 10. Challenges designers facing in their own work (Main theme 1)

	Theme	**Insights**	**# of quotes**	**# of inter-viewees**
Context 1	No team in the same location to collaborate with	• Hard time to engage anyone else in the ideation process, doing most work by their own • Difficulties to communicate as other colleagues were working on different products • Lack of collaboration as colleagues were working in different organizations • Lone feeling as working as the only designer in the project • Poor collaboration as all designers placed in different locations • Lack of team to collaborate with • Lack of colleagues to collaborate, even in own project team • Difficulties to conduct ideation together with the team • Barriers to hire an intern to the same location as junior colleagues mostly located in low-cost country	9	3
	Not enough human resources for implementing design	• Overloaded developers with work amount, who needed to compromise among design and other tasks • Product owner prioritized bug fixing rather than additional time for design • Management seeing design as additional work • Not enough developers to implement design (a) • Not enough developers to implement design (b)	5	3
	Misfit with managers	• Argues with higher director and their opinion • Micromanaging project manager (difficult personality) • Micromanaging project manager (very technical approach) • Aggressive manager • Various opinions of executives, requiring continuing changes	5	3
	Resources spent on copying with hierarchy	• Limited space to work (only one product), taking larger perspective feels like stepping on someone's toes • Hard to express need for changes without being taken as critique • Need to stay polite and professional, hard to get respect and recognition to work on things	4	3

		• A lot of time spent on convincing executives and developers to do something (for design)		
	Limited access to users	• No access to users • Using only 20% of own capacity without access to users	2	1
	Other (Human resources)	• Unclarity how to progress to UX senior designer • Lack of senior mentor in the company • Rapid changes of things (industry), need to learn all the time new	3	3
	Total		*28*	*3*
Context 2	Designers' work underestimated	• Underestimation from the side of other organization, designers not included early enough in the project • People forgetting to involve designers in meetings • Need to sell design inside the company	3	2
	Limited access to users	• Budget restrictions, can send only 1-2 designers to client • Hard access to users (as they are hard to reach)	2	1
	Total		*5*	*3*
Context 3	Challenges regarding community of design	• Whole responsibility on one person's shoulders • Not enough proactivity from the side of designers' colleagues to take initiative further • Difficulties to arrange meetings colleagues are placed in various locations	3	1
	Limited access to users	• Not enough involvement of users and examination of their natural environment • Culture of expertise not accepting to show something unfinished to clients	2	1
	Poor collaboration among designers	• Lack of learning from each other's among designers • Too many unexperienced people in the company (need to have special interest towards technology)	2	1
	Stakeholders restricting designers' space	• Stubborn stakeholders wasting designers' resources for endless discussion instead of letting them verify things with users • Not enough freedom and responsibility for designer on their own work as they work alone and need to do just everything	2	1
	Total		*9*	*2*
Total			**42**	**8**

In context 1 – as well as in the entire data set - the most frequent challenge theme was regarding lack of team in the same location to collaborate and share ideas with (9), as exemplified in Quote 12. As designers were working alone, they faced challenges to establish desire and interest towards their work within team structures, such as, being criticized and restricted by managers (5), conducting own work in a way that does not

step into others' territory (4) and lack of resources to implement own work (5). As evident in Quote 13 interviewees from context 1 needed to work their way through and convince others to change their mindset towards their work and assign resources for implementation. Additionally, one interviewee mentioned twice an example of challenges regarding getting access to users, thus, not being able to conduct own work fully. There were also some individual challenges recognized that could not be themed with any others, e.g. no senior mentor support or clear promotion perspective.

> *Quote 12 (interview 1): "To be honest, the biggest issue is we've got four designers all in different locations (…). We've got nobody else we work with here."*

> *Quote 13 (interview 3): "Manager was really frustrated and, in a hurry, and every time I would open my mouth you could see, oh, this is another two hours of work or he said, you know, you did it, you said it was gonna be one way last time and now you say you don't like it."*

Moving forward to context 2, there were 5 challenges identified regarding designers' work. Two interviewees complained about their work not being taken into consideration or regarded as meaningless by others, for example, Quote 14 describes the situation where the designer was forgotten to be invited to a relevant meeting. Additionally, one interviewee mentioned two examples of limited access to users (2) due to budget restrictions, as exemplified in Quote 15, as well as users' accessibility in their natural working space, e.g. nuclear plants.

> *Quote 14 (interview 4): "Sometimes they just forget about me when meeting the customer, even if it is very relevant meeting for me. It is very annoying."*

> *Quote 15 (interview 5): "The company had policy that because of the budget, we can send only one or two designers on a workshop with the client or on a big conference, so I didn't really like it because sometimes we've got chance to learn a lot from the client."*

Finally, there were 8 challenges identified regarding designers' work in context 3. There was one interviewee that mentioned two challenges related to limited access to users: not enough examination of users in their natural environment and a culture that does not accept showing something unfinished to clients (Quote 16). As there was an initiative on the global level to connect all the designers from different organization within the company for regular meetings or video conferences, one interviewee showed dissatisfaction that it was driven only by one person (1), other designers are not proactive enough (1) and it is just challenging to meet each other (1). Additionally, there were two challenges identified regarding poor collaboration among designers (2): missing learning among each other and having inexperienced colleagues with lack of interest towards technology. One interviewee brought up two challenges restricting designers' space to

work (2), such as stubborn stakeholders (Quote 17) with strong opinions or limited responsibility given.

> *Quote 16 (interviewee 9): "Typically in R&D people think like engineers, the more complicated technological involvement, the better solution it is. Thus, the users have no input for technology perspective and nothing unfinished and imperfect can be shown."*

> *Quote 17 (interviewee 8): "I would say stubborn stakeholders which don't realize how much time and money they waste by continuing and maintaining endless discussions about future, instead of just verifying it with users."*

Context 1 (28 quotes) included over twice as many challenges related to the designers' work than contexts 2 and 3 combined (with 5 and 8 challenges, respectively). In these challenges, each context included an interviewee that reported two different examples of challenges limiting access to users. However, in context 1 the focus in these was in the restriction to own potential, context 2 as budgeting-challenge and context 3 as a cultural incident. On the other hand, all the other challenge themes reported in context 1 were not repeated in other contexts: difficulties of establishing desire and interest towards their work, e.g. other people saw the designers' suggestions as critique for own work, and frustration as implementing their suggestions were in many cases not prioritized due to lack of resources leading to their work being brushed off. In context 2, designers did not concentrate anymore on such a big amount of challenges within different steps of their work, however, they were still facing some general underestimation of their work from organization side e.g. not being invited to meetings. Then, the challenges identified on context 3 described more high-level difficulties regarding collaboration, e.g. inexperienced colleagues to share knowledge with, and too restricted tasks, such as, too many stakeholders with strong opinion or not enough freedom. To sum up, except for the repeated challenge regarding limited access to users, context 1 contained challenges on different steps of designers' work, context 2 pointed out the work of design being just forgotten by others, and context 3 struggled with limited freedom and collaboration possibilities.

4.2.2 Main theme 2 – Non-designers' work

Altogether there were 20 challenges categorized in main theme Non-designers' work: 8 quotes in context 1, 4 in context 2 and 8 in context 3. The detailed results are presented in Table 11. In context 1 all the interviewees pointed out challenges originating from others' attitude towards design (5), such as, others finding excuses why design is not needed (Quote 18) and resisting to redesign their products. One interviewee specified that challenges (1) in changing the attitude of design are restricted by old habits and long careers in the company. Then, there were two other individual challenges

mentioned: one pointed out how developers are not open for feedback as they see context behind decisions and understand it fully (1) (Quote 19), and then that there is not enough knowledge among organization how to implement design in the processes (1).

> *Quote 18 (interviewee 1): "What they do say is: 'oh-no, but there's a business need for this and that and from marketing point of view it won't work cause how we sell.' They find excuses. You'd be surprised."*

> *Quote 19 (interviewee 1): "And they understood cause they're technical and they developed it, so they knew the context and they understood what was going on, but if you brought a user into it, they would be so confused. The way I dealt with that was we did some user testing at a conference and we got some users and they were all confused, so that opened their eyes a little bit…"*

Table 11. Challenges originating from non-designers' actions (Main theme 2)

Context #	**Theme**	**Insights**	**# of quotes**	**# of inter-viewees**
Context 1	Resistive attitude towards design	• New excuses by non-designers why design does not work in that specific situation • Others not seeing importance and value of design claiming that products doing well also without design • Challenges to get people to "design frame of mind" • Hard time convincing people to redesign their products • Organizational structure not supporting involvement of design; non-designers not seeing the value why it should be implemented	5	3
	Old habits restricting changes	• Difficulties to influence people who has been working in the company for 20 years	1	1
	Other challenges	• Developers not understanding how the product might be confusing for users as they understood the context • Not enough knowledge how to implement design within the process	2	2
	Total		*8*	*3*
Context 2	People resource shortage	• Very limited people resources making work tough; hard to get help if needed • Overstressed people • High turnover of employees, not efficient for knowledge management	3	2
	Old habits restricting changes	• Hard time getting things through, especially with people used to do things in certain way for 30 years	1	1
	Total		*4*	*2*

Context 3	Resistive attitude towards design	• Industrial design associated only with styling • Not enough knowledge about design and its benefits • Some parts of the company still not understanding value of design • Challenges to understand that reacting fast to customer needs is a competitive advantage • No top-down support for design	5	2
	Old habits restricting change	• Hard time changing old habits • Non-designers' attitude stuck with old habits • Old habits limiting development space	3	1
	Total		*8*	*2*
Total			**20**	7

Moving forward to context 2, there were two themes identified: people resource shortage (3) and old habits restricting change (1). Shortage of people resources caused challenges for getting help (1), people were feeling overstressed (1) and there was high turnover of employees causing lack of knowledge continuity (1) (*Quote 20*). Then, similarly as in context 2 one interviewee mentioned how hard is to get things through with people who have been working in the company for 30 years and are used to do their work in certain way (*Quote 21*).

> *Quote 20 (interviewee 6): "Getting more sustainability in the team because it's been a little bit chaotic with people leaving and new coming in, it's changing everything, I mean, it's normal change, but to get more stabilized."*

> *Quote 21 (interviewee 4): "Getting people to understand that things can be done differently even if something has been done a certain way for the past 30 years."*

In context 3, there were 8 challenges identified regarding other's work and categorized into two themes. Firstly, designers faced challenges originating from others' attitude towards design (5), for example, industrial design was associated only with styling (1), there was no understanding design's value and benefits (3), also within top management (1). As exemplified in Quote 22 designers struggled with people not understanding the increased competitive advantage when reacting quickly to customer feedback and needs. Similarly, one interviewee mentioned three times how challenging it is to try to work against old habits (3) as, e.g. they resist change (1), limit people's open thinking (1) and restrict developing space (1) (*Quote 23*).

> *Quote 22 (interviewee 9): "The speed of doing, of evolving things is the most crucial. People need to understand that it is competitive advantage and it need to be invested in."*

> *Quote 23 (interviewee 7): "Then, there are a lot of situations that an old habit or rule restrict the creation of something new. Or then, the requirement from the users' side is very specific and restricted."*

To sum up, there were twice as much quotes on both context 1 (8 quotes) and 3 (8 quotes) in comparison to context 2 (4 quotes), in total 20 challenges. One interviewee on each context mentioned about challenges to get things through when people are stuck with their old working habits. Then, there were 5 challenges identified both on context 1 and 3 regarding the resistive attitude towards design. However, the challenges explained in context 1 highlighted difficulties to convince individuals to redesign their products and see the value of it, when in context 3 challenges were described from a broader perspective, such as, parts of the companies having a wrong understanding what design is and what kind of benefits it brings, more specifically industrial design was associated with visuals, there was no support from the top for design and reacting to customers' needs is not seen as competitive advantage. Instead, context 2 highlighted the difficulties emerging from the shortage of people resources leading to limited availability of help (1), people being overstressed (1) and high turnover of employees (1). In conclusion, every context struggled with the difficulties of changing old habits of other people having been involved in the organization for a long time. Otherwise, context 1 struggled with the individuals' attitude towards design thinking, context 2 with people resource constrains when context 3 identified differences in understanding design value and seeing its implications among different parts of organization.

4.2.3 Main theme 3 - Organization

The third main theme, identified for characterization the quotes, was organization-related challenges, e.g. organizational structure and its changes, indefinite involvement of design, resource constrains. In total, there were 34 challenges distributed among contexts: 13 quotes in context 1, 5 challenges in context 2 and 16 mentions in context 3. The detailed results are presented in Table 12 below.

Table 12. Challenges originated from organizational structure and procedures (Main theme 3)

Context #	Theme	Insights	# of quotes	# of inter.
Context 1	Resource constrains	• Design thinking perceived not as the cheapest and easiest way of developing • No resources (money) to implement new products done with design thinking • No budget for visiting remote teams • No money for visiting remote team members • No time (busy with own work, UI) to collaborate with people in different organizations	5	3
	Organizational changes	• Fear of organizational change • Continuous organizational changes	2	2
	Fragmented organization structure bringing challenges of knowledge management	• Difficulties to fit style guides into operations of each team, need to make several versions • Hard time to know what fragmented teams all over the world are working on	2	1
	Indefinite involvement of design within organization	• Separate reporting structure, no push from top management for design • Agile way of doing forcing to add new features but not making users' life easy	2	1
	No future plans for products	• No vision for products • No strategies for products	2	1
	Total		*13*	*3*
Context 2	Indefinite involvement of design within organization	• Lack of standards for design practices • Design strategies not lined up within managers • No design responsibility in upper management (e.g. chief design officer)	3	3
	Bureaucracy constrains	• Shared recruiting budget between separate teams • Wasted time for spare administration and reporting	2	1
	Total		*5*	*3*
Context 3	Indefinite involvement of design within organization	• Lack of clear design vision needed to successfully work with external partners • Diverse ways of measuring (KPIs), hard to come up with a solution that can be used everywhere • Easy loss of holistic picture and projects' interrelations when each project need to have own outcome	6	3

		• Group-level not understanding value of design, necessary to support ideas forward • Varying terms for the same things across organization • Diverse design maturity on very different levels of organization		
	Silosed organization	• Cultural tendency to silos • Loss of knowledge what is going on the other side of organization (silos) • Fragmented teams all over the world • No organization for design	4	2
	Low impact within organization	• Possibility to impact only small part of organization, as it is so huge • Hard time to provide "one fits all"-solutions	2	2
	Continuous organizational changes	• Frequent organizational changes • Frequent turnover of employees, e.g. managers	2	1
	Changing regulations	• Changing regulations • Varying regulations in different locations	2	1
	Total		*16*	*3*
Total			**34**	**9**

As visible in Table 12 above, in context 1 all the interviewees mentioned some challenges restricting implementation of design thinking that originated from resource constraints (5), for example, no budget (2) or time (1) for collaborating with remote teams, no willingness to use design thinking (1) or implement its outcomes (1) without additional help. For example, Quote 24 showed how one successful product was not implemented due to budget constrains when the interviewee was on maternity leave and could not actively work on its progression. Then, two interviewees brought up challenges arising from continuous organizational changes as exemplified in Quote 25 (1), or then fear about it (1). Additionally, there were some individual themes mentioned twice but only by one interviewee such as, knowledge management objections (2), indefinite involvement of design (2) or lack of future plans for products (2).

Quote 24 (interviewee 2): "I made a dashboard that was very visual, the sales guys loved it, everyone loved it. And then I went away on maternity leave and when I came back they said 'Oh well, don't even mention that' the executive said it cost too much to do'."

Quote 25 (interviewee 2): "And then as for a third one I think, yeah, I think it was when my boss who I felt as a mentor left. That was hard. I got kicked around from manager to manager, I went through, I think, five managers in the last four years, and that brings very unstable feelings, it feels like I don't have anyone that I can build a working relationship over time cause they're just gonna get fired or leave or something. I wish I could just maintain under one group."

Moving forward to context 2, there were 5 organizational challenges. All the interviewees mentioned challenges originating from indefinite involvement of design within organizational structure and processes (3), such as lack of company-wide standards for design practices (1), design strategies not lined up with managers (1) and lack of design responsibility in upper management (1). As exemplified in Quote 26 interviewee claimed that there are no design standards within the company, which make especially difficult to pass experience on to others. Additionally, one interviewee mentioned two different examples how bureaucratic processes made recruitment very challenging, as well as how administration and reporting consumed resources (Quote 27).

Quote 26 (interviewee 5): "Probably something like maybe company's policy or company's approach with a workshop and research, because right now, every team is doing this differently, I think that every designer has their own way and we don't have really a standard for the company for that. So, it's really hard to pass our experience to others, because we need to describe the whole thing, it's not like, you know that we got that way that you can, I don't know, download from the website and this is our approach and this is our work - we need to describe the whole thing all the time."

Quote 27 (interviewee 6): "But I think that and also that is coupled with that. There is so much reporting in this company, so much administration and reporting. Of course, it's more because I'm a manager, but still, there are, suddenly someone in the global organization realizes, oh, let's see what the result of all the Agile projects is. Then, they send out a request to all the projects that are running Agile. It leads to a heavy PowerPoint and two slides, which, I mean, sometimes I'm thinking, do they really understand, cause us researchers, we're quite, our rate is quite high compared to the business units, and those, I mean, us managers, and if you think about what it would cost, do they really need it just because they need to follow up one thing, it's too much follow-up that they're taking time. I think those are, that prevents us to work with the strategies and work with line work. It's taking time"

In context 3, there were 16 quotes in total. All the interviewees somehow raised an issue about indefinite involvement of design within organization (6), for example, lack of design vision (1), various performance measurements (2), no support from Group-level (1), volatile terms for same issues across organization (1) and different maturity levels for design (1). As exemplified in *Quote 28* every project needed to present their own

results, thus, it was very easy for the organization and product strategies to lose the "big picture" and ensure that individual projects work well together. Then, there were 4 examples of siloed organizational structure (4) mentioned, such as no organization for design (1) (*Quote 29*), tendency to silos due to the large size of organization (1), colleagues located all over the world (1) brining communication difficulties (1). As the organization was seen as rather large, two interviewees mentioned that they could not work on "one fits all"-solutions, thus, were able to affect only small parts of the organization at the time with their own work (1). In addition, there were some individual themes mentioned by same interviewees several times, such as, continuously changing organizational structure and working environment (2) and changing regulations (2).

> *Quote 28 (interviewee 7): "This organization is project-based, thus, every project need to have measurable result. Designers are only involved at the end to do final styling. Every product is working well as itself when I see them at customers', however, there is no connection between them."*

> *Quote 29 (interviewee 9): "There is no organization for industrial design, which is very challenging as product management support R&D but do not take ownership fully, similarly sales and marketing. So, it is not well-defined function that could be just linked into R&D only."*

To conclude the main similarities and differences regarding organizational challenges identified across all 3 different contexts, it is important to note the smaller amount of challenges identified in context 2 (5 quotes) compared to context 1 (13 quotes) and context 3 (16 quotes). The interviewees from all of the three contexts brought up challenges originating from indefinite involvement of design across organization, however, with a different tone. Challenges identified on context 1 applied to individual working habits and separate reporting structure for teams. Interviewees from context 2 highlighted lack of support from top management as there is no one with design responsibility assigned to line up the strategies. Instead, designers from context 3 complained about differences in terms, KPIs and design maturity level across organization. Additionally, both context 1 and 3 mentioned some challenges from the organizational changes or fear about it. To highlight the differences, each context presented an individual and unique group of challenges which were not presented in any other context. Context 1 raised resource concerns, such as, not enough budget for visiting other remote teams or for implementing the designers' work. Then, context 2 explained the challenge regarding bureaucratic processes, such as onerous reporting and administration, as well as shared budgets. Instead, context 3 complained about siloed organizational structure leading to low and limited impact of work. To sum up, the challenges regarding organizational structure and processes concerned limited resources and separate reporting structures on context 1, bureaucratic processes and lack of

management support on context 2 and siloed organization with different terms and measurements on context 3.

4.2.4 Summary – Challenges in three contexts

To recap the main characteristics of challenges identified in each of the three organizational contexts present in this thesis, all the insights were gathered in Table 13. Comparing findings from main theme 1, context 1 needed to work their way through alone to establish individual design activities, its position and connections within processes when context 2 needed to struggle with underestimation of the whole design agenda within the organization. In contrast, context 3 reported more high-level and cultural challenges restricting the nature of designers' work. Examining main theme 2, context 1 needed to convince individuals for redesigning their product, on context 2 any changes were restricted by overload of work when on context 3 designers worked on changing attitude toward design and processes involving it in the whole units of the company. Combining main theme 3, context 1 struggled with issues restricting work of individuals, context 2 wished for more support for management and strengthening the position of design within the company in general, when context 3 had high-level views of siloed organization with volatile habits and terms used leading to low impact of their work.

In general, interviewees from context 1 faced challenges related to getting through individual designers' actions and convincing others of their value. To combine the 49 findings from context 1, UX designers working alone in the region faced difficulties to establish interest and desire towards their own work among non-designers working on implementation of ideas. Their potential was limited to the lack of collaboration possibilities, as well as limited access to users. They had hard time convincing individuals to redesign their products, especially when they were strongly restricted by old habits and those with long careers in the company. Designers needed to deal with limited organizational resources to conduct their work according to design thinking-principles and get it implemented. The organizational structure did not fully support teamwork with separate reporting structure causing organizational barriers for sharing and collaborating. Additionally, their work was narrowed by uncertainty caused by continuous organizational changes.

The 14 challenges faced by design team managers (Context 2) concentrated on finding the place for design within organizational structure and its processes. They experienced that their work was restricted by underestimation of its value, resource shortage for visiting end users and getting the work implemented, as well as strong opinions of various stakeholders originating from old habits and manners. Additionally, they

struggled with bureaucratic processes wasting their time, and wished for more management support to strengthen the position of design.

The 32 challenges identified on context 3 originated mainly from indefinite implementation of design within different parts of organization, thus, resisting from seeing things as a "holistic picture", as well as disturbing efficiency of design in organization culture and processes. The context 3 represented designers working on global level, who complained about lack of collaboration with others and freedom to conduct own work fully. Similar as in context 1 and 2, the work of interviewees was restricted by old habits opposing positive attitude towards design and limited access to users, in this case as the corporate culture did not allow showing something unfinished to the clients. They also recognized siloed organization and high-level differences among them in attitude towards design i.e. KPIs, design terms used, maturity of design. Interviewees also reported the examples of challenges originating from continuous organizational changes.

Table 13. Challenge patterns across three organizational contexts (Summary of 3 main themes)

Main theme of challenges	**Context 1 - UX designer alone**	**Context 2 - Design team**	**Context 3 – Group level manager**
Designers' work	• No team to collaborate with • Difficulties to establish others' interest and desire towards own work • Limited access to users restricting designers' potential	• Underestimation of designers' work • Limited access to users due to budget constrains	• Lack of collaboration between teams • Not enough freedom for designers to conduct own work fully • Limited access to users as cultural barrier
Other people	• Individuals need to be convinced for redesigning their products • Old habits restricting positive attitude towards design	• Insufficient amount of people opens to design • Old habits restricting positive attitude towards design	• Various attitude towards design across different parts of the company • Old habits restricting positive attitude towards design
Organization	• Individual working habits within organization disregarding principles of design thinking • Separate reporting structures for teams • Continuous organizational changes • Limited resources for conducting designers' work and later implementing it	• Bureaucratic processes wasting resources • Lack of management support to strengthen position of design	• Varying terms, KPIs and maturity of design level across organization • Continuous organizational changes • Siloed organization with low impact for changes

4.3 Research question 3: Enhancers in implementation of design thinking

To answer Research Question 3, bottom-up thematic analysis was conducted from 74 quotes identified from all nine interviews. The quotes were recognized as enhancers and good experiences meaning that interviewees presented them as something that worked well or had positive impact on design activities within the company. Based on the findings, the quotes were divided into themes and, more precisely, concluded into actions that should be taken in order to strengthen the position of design thinking across the organization and its various contexts. The number of quotes were divided among contexts: 26 quotes in context 1, 13 quotes in context 2 and 35 quotes in context 3. Similarly, as in the analysis of Research Question 2, the findings were divided into three main themes: supportive actions that can be taken by designers themselves, by other people (non-designers) inside the organizations, or by organization itself from more structure and resource perspective. The main themes are explained one at the time in sections 4.3.1., 4.3.2 and 4.3.3, where in each of them supportive actions are explained context by context and then concluded into main characteristics of the theme. Finally, the section 4.3.4, recap all three contexts and compare them against each other.

4.3.1 Main theme 1 – Designers' work

Main theme 1 included a total of 34 supportive actions that the designers themselves reported doing. The detailed results are presented in Table 14. In total, there were 11 quotes in context 1 explaining how the lone designer strengthen the position of design with own actions. The most frequent supportive action, with five mentions, was related to strengthening the method of design thinking within the organizations and convincing about its importance through good and concrete examples of how design brought some positive impact to the projects, such as concrete improvement (1), opened eyes of developers (2), positive feedback from client (1) or change in habits into doing things better (1). As exemplified in *Quote 30* inviting developers to testing sessions at the clients helped to identify spare features and convinced developers that some changes need to be conducted. Then, there were three examples mentioned that indicated implementation of design to be done incrementally through "baby steps" (3) e.g. starting from smaller number of teams (1), or from UI instead of UX (1) (*Quote 31*) or to propose changes with a lower threshold for implementation (1). Then, interviewees experienced good outcomes from workshops and brainstorming sessions that brought together various stakeholders: designers, clients and developers (3).

Quote 30 (interviewee 2): "I think that they need to understand the use of design. And on some occasions, I think it might be helpful for developers to see users actually interacting with their software. And talking to them because we did bring a developer once to a client and he said 'Oh, why do you want this list this way? I thought it was supposed to be that way and they said no, we don't really use these types of alarms.' And he was surprised because he just didn't understand the user, he didn't, he thought he did and he didn't."

Quote 31 (interviewee 1): "There are other groups that are using it a lot more minding from a UI design point of view, not really proper UX. But they are starting to see the value, so as I said, things have been changing. It's a journey."

Table 14. Supportive actions in implementation of design thinking conducted by designers themselves (Main theme 1)

Context #	**Theme**	**Insights**	**# of quotes**	**# of inter.**
Context 1	Showcasing value of design via concrete successful examples	• Prove value of design through positive experiences (eye-opener when developer at the client) • Show concrete improvements, the bigger the better • Assert implementing concrete features with the positive feedback from user testing • Make people realize the value of proper testing with users (not in-house) • Take developers to the users, eye-opener	5	2
	Incremental implementation of design	• Start implementation e.g. from 2 small development teams • Work first on UI (not UX) and prove its value, journey of implementing design • Implement first practices or features with low threshold (baby steps towards better interface)	3	2
	Workshops/brainstorming sessions together	• Organize brainstorming sessions together • Conduct workshops with users at customer collaboration center • Involve users in development process continuously	3	2
	Total		11	3
Context 2	Various stakeholders working together	• Work with people on-site instead of meeting via Skype • Team up with customers and other workers from development teams • Make manager for (non-design team) see need for involving designers	3	2
	"Simple" communication of design within organization	• Bring success stories about UX and design form manager's initiative • Communicate own work in very simple and understandable day (manager's initiative) • Show good and bad cases to learn how to work with design	3	2

	Showcasing value of design via concrete successful examples	• Bring good examples of testing as eye-opener for development team • Show the good feedback received from own work • Make developers understand the value designers bring	3	1
	Total		*9*	*3*
Context 3	Collaboration with customers	• Identify empirically, and then solve real problems of users • Ask users themselves how to solve the problems • Make easy and rapid prototypes to avoid expensive problems later • Possess courage to work with right customers, be open and go to have conversation with them in time • Combine software and hardware in agile practices, and release MVP quickly for testing • Simulate the results as early as possible to the customers	6	3
	Step-by-step change in attitude towards design	• Involve designers from the beginning and show the value they bring; as it is more as only visuals • Implement small changes at the time as they are internalized more easily and lead to "snowball"-effect • Define development process and some concrete steps in it so it becomes a habit and you drive change further	3	2
	More free hands for designers	• Give designers a lot of space so they can take responsibility by themselves • Provide designers with a playground • Give very open tasks for young recruiters and let them come up with new ideas	3	2
	Showcasing value of design via concrete successful examples	• Break organizational silos to connect people with the value of design (lighthouse-projects) • Raise motivation for future work by success stories that exceeded expectations	2	2
	Total		*14*	*3*
Total			**34**	**3**

In context 2, interviewees mentioned 9 examples of actions designers took to strengthen the role of design thinking within organizational processes. First, interviewees perceived sessions that brought various stakeholders to work together as useful and impactful (3), such as, teaming up designers, customers and other organization together (2) or working on-site instead via Skype (1). Then, designers perceived that the more simply and concretely design is communicated, the easier it was for non-designers in the organization to understand its value. As exemplified in Quote 32, when asked by

managers to show in "simple way" what the product is doing, designers decided to visualize a power plant with the help of Lego-blocks, which later turned to be a great eye-catcher successfully raising interest around the organization. Also, one interviewee brought up 3 examples how they successfully managed to show value of design to non-designers by providing them with a positive design experience, for example, as shown in Quote 33, designers managed to find a list of design mistakes through user testing that was not uncovered over a period of two years in the project.

> *Quote 32 (interviewee 5): "I mean, we had the brainstorming with the team, with the UX team, because our manager asked us what we can do to show other people in a very simple way what our software is doing. I mean, to show in five minutes where our products are used on a daily basis, and that's how we came up with Lego. And it's really easy to show that in a power plant, we are using this and that, because we need to measure this and that, and it was a really good idea."*

> *Quote 33 (interviewee 4): "The project was ongoing already for 2 years and during that time no one tested design-concept nor software with actual users. So, at the beginning we just took some people that works with the product and conducted some tests. As the result, we prepared a list what need to be improved. The list was some kind of eye-opener for the team, and they understood some of those changes should have been done already 1,5 years ago. We managed to reveal some design mistakes, which were very expensive to correct now and for some of them it was even impossible. We managed to show what we could have avoid if design had included from the beginning."*

To create deeper understanding of how global-level designers (context 3) managed to strengthen the role of design thinking, 14 examples were identified and examined. All of the interviewees mentioned that the more possibility they had to collaborate with users, the better result they managed to get, for example, to solve users' real problems (3) and to mitigate risk of failure or expensive corrections later (3). As exemplified in Quote 34, designers met the users in their natural environment and asked them directly about the changes they wish for because they assumed that people who are using the product on a daily basis know the answers best. Then, they minimized resistance toward design thinking through implementing its activities in baby steps (3) as small and easy-to-implement things become later a habit (1), even little positive experiences open the attitude for following bigger changes (1) and provide access for designers earlier in the project (1). Thinking about the designers' own work, the more freedom and open tasks they were given, the more creative and successful solutions they managed to come up with. Similarly, as in the context 2, concrete success stories with high visibility were proved as the easiest way to show value of design within organization (2), for example, as shown in Quote 35 the interviewee gave an example of high-visibility lighthouse-project which gained a lot of attention and broke silos by involving people from different business units.

Quote 34 (interviewee 7): "So, we really go there on spot to the users and then ask them 'What would you change in that product to make it safer or more efficient?' And then we open the whole thing from the beginning."

Quote 35 (interviewee 9): "We have those kind of "lighthouse" projects that are funded half from Group-level and half from business unit. They are fast 9-month long projects. Business Units apply for them and some are selected, but the idea is that UX design need to be included, then, users and agile, lean and MVP. In this round there is one very good project that involves people from different divisions and business unit. It is very good as normally business units works as own companies, so this company is kind of group of companies, but in this project, we go over silos and it is a huge thing."

In total, there were 11 quotes from context 1, 9 from context 2 and 14 from context 3 categorized to main theme 1 – designers' own work. The representatives from all 3 contexts agreed that collaboration with different stakeholders and communication through good and concrete examples of successful stories helped to strengthen the role of design thinking within the organization. More specifically, context 1 highlighted individual practices of workshops or brainstorming together with various stakeholders, context 2 emphasized teaming up with different stakeholders as useful and then work with them on-site instead of remotely, when context 3 experienced that customers needed to be involved as much and as early as possible to identify and solve their real problems, thus, decreasing the risk of future corrections or failure of the product. Then, the interviewees from all three contexts agreed that communicating through concrete examples of successful implementation stories worked, in most cases, as eye-openers for non-designers. More specifically, context 1 and 2 communicated success of individual practices of e.g. user testing with developers, when interviewees from context 3 emphasized more motivational stories e.g. to break organizational silos. Then, both context 1 and context 3 experienced that change towards design-driven organizations was conducted incrementally through small-steps that then became later a habit simultaneously preparing organizational attitude for bigger changes, for example starting from UI, not UX, or being involved in one team and later in others. Additionally, context 2 brought up the need for communicating design in a simple way, e.g. one interviewee mentioned how they successfully utilized Lego-blocks in describing customers' systems. Instead, context 3 highlighted the positive correlation between freedom given to designers and success of the outcome of their work. In conclusion, the most efficient ways for designers themselves to strengthen the role of design thinking was to implement their work incrementally, through showcasing concrete examples of successful stories and collaborating with different stakeholders.

4.3.2 Main theme 2 – Non-designers' work

The supportive actions categorized into second main theme, other organization, consists of all the good experiences and enhancers originating from non-designers' actions. In total, there were 21 examples identified (Table 15): 15 in context 1 and 6 in context 3. Interviewees from context 2 did not bring up any supportive actions to be conducted by non-designers. Similarly, the quotes were transferred into actionable supportive actions to learn, and then, apply them in similar situations.

Table 15. Supportive actions for strengthening role of design thinking within organization for non-designers (Main theme 2)

Context #	**Theme**	**Insights**	**# of quotes**	**# of inter-viewees**
Context 1	Manager understanding design	• Push to modernize and involve designers • Have manager open for designers' ideas and discussion • Manager boost collaboration • Get more access as reporting to someone higher up • Good relationship with manager who wants to involve UX • Success example (style guide) as it had support from senior executives	6	3
	Change in attitude, involve designers more	• Drive the change through raising enthusiasm • Involve others in new initiatives instead questioning • Embrace user-center design to prove its value • Possess open mindset for design • Use design terms in the daily language • Understanding the role of design and what value it brings	6	2
	Personal interest in having better products (salesman)	• Go to meetings with clients and be prepared for comparison to competitors • Show how design thinking help to retain clients and sell it to new clients • Provide sales people and project managers with "wow-factor" first	3	2
	Total		*15*	*3*
Context 3	Good and skilled recruits	• Designers having troubleshooting in mind • Skilled designers • New recruits coming to help with work overload • Recruit experienced designers • Hire good recruits for replacements • Hire good recruits who are ready to take even very responsible tasks	6	2
	Supportive manager and team	• Managers understanding design (design-thinker) • Managers trusting designers and their ideas • Manager understanding the need of design • Managers encouraging and give freedom to team members	4	2

	Total	*10*	*3*
Total		**25**	**6**

As presented in Table 15, all the interviewees from context 1 highlighted the importance of supportive management who understands design in strengthening the role of design within organization (6), e.g. through pushing to modernize and involve designers (3), being open for discussion (1), boosting collaboration between different parts of companies (1) and supporting individual projects (1). As exemplified in *Quote 36,* designers sometime needed to be careful with managers at their higher position, however, after discussing openly it was easy for them to see the value of design and let designers conduct their work. Then, interviewees provided some examples on how the position of design thinking is strengthened more easily when the company employees (non-designers) are more open towards new practices and are willing to involve them in daily-life (6), e.g. through realizing its value (3), driving the change with it (2) and involving terms in daily-language (1) (*Quote 37*). Furthermore, interviewees experienced that employees (non-designers) were more open to involve design when they had personal interest in good and modern products (3), for example, when sales team having interest to retain clients and selling the products to new ones (1), not feeling embarrassed when client compared products with competitors- (1) and being able to present "wow"-factor (1).

> *Quote 36 (interviewee 3): "He's the head of the development, for the product, so he has a say in everything and sometimes his decision are based on what's quickly doable and not necessarily on what's best for the customer, but at the end of the day we are able to talk and say well, if it's not that much more work, it would be preferable to do it this way and after, he often says no, no, no, right away, and after, this is, thinking about it a little bit he comes around and say, do it [laughs], doesn't want to really admit it, but it has to be his decision, normally."*

> *Quote 37 (interviewee 1): "I hear the term UX, I hear the term usability used a lot in meetings now. I hear a lot of people (..) At least it's started to become part of the language. I think now they're talking about usability and saying that's bit more forefront."*

Interviewees from context 2 did not mention any supportive actions regarding main theme 2, non-designers' work. In context 3, all the identified examples originated from good and skillful team members around or new recruits (6), or then from supportive management (4). More precisely, the designers wished for skilled, experienced team members ready to take responsibility (4), help with overwork (1) and approach each challenge with a troubleshooting attitude (1), as exemplified through *Quote 38*. Then,

interviewees highlighted the importance of managers' support, especially, when managers see the value of design (2) or give freedom to designers to conduct their work (2). As show in *Quote 39,* the manager explained his own way to lead by example and thus, create an open atmosphere of trust and encourage designer to succeed in their work.

> *Quote 38 (interviewee 7): "Designers need to have trouble shooting in their mind and notice when the situation in not normal and requires the users to see the product immediately. And then get to the root-cause as soon as possible."*

> *Quote 39 (interviewee 8): "That healthy environment, I mean, there are lot of things in the corporation that probably designers should be shielded from. So, all types of bad processes, bad software, full-blown processes that don't make sense, starting from ordering a pen ending to performer's development and appraisal. So, I try to understand the designer's mentality, which is quite easy, because I was one. And somehow, override corporate processes, when it does make sense. Instead of setting goals for one year, and then, checking the next year, if they are met. We're having regular sessions, which is not prescribed by the company, by any means, but this is how I understand leadership, assisting people and responding to problems as they emerge. Second is very open communication and transparency. And my feeling is that it needs to be nurtured. I mean, it isn't something that you can write on your rules board, that we write our team rules. It's something that needs to be nurtured, and it's the full transparency, the good, open communication is born together with trust. So, the more trust, I as a manager… the more I trust my employees, and they feel it, the more open and transparent they are. My task, my responsibility is to show the maximum level of trust I can have, because I know that this nurtures a transparency and openness in the team. Then, I rather don't punish. That's typically not my style. And I also encourage people to transfer that transparency also to projects, because when they join projects, they are all of a sudden out of their comfort zone, because they join a project team with probably unknown people, with business representatives from places they never collaborated before. And this is challenging. So, encouraging them, hey, guys, you joined project, so please spread our culture there, OK? If we are transparent, sometimes perhaps the transparency level is overwhelming for newcomers, but here's how it is, but let's take it and spread it also to projects, because we are sure that the design value that we bring, it's not only beautiful deliverables, but also who we are as a team, and the culture that we have. Because we strongly believe that if we spread the culture that we have internally in our UX team to projects, eventually, the software products will benefit. Because, again, we strongly believe that if people love the products, they work hard, the products will be good. It's like with food. Unless you love food and treat it with love, you can't cook tasty dishes."*

In summary, interviewees from context 1 (15 quotes) suggested more than twice as much supportive actions for non-designers as context 3 (6 quotes). However, both contexts experienced as helpful when the management team was supportive and willing to understand design. On context 1, managers' help had a positive impact, especially, when they pushed for modernizing, were open for discussion with various stakeholders, as well as showed support for designers' work. In contrast, on context 3, supportive managers understood design and gave free hands for designers to conduct their work. Additionally,

context 1 wished for a more open attitude toward design thinking of non-designers, which was visible when e.g. UX was involved as part of the language. The change in attitude happened faster when non-designers had a personal interest in having better products, e.g. sales people continuously showing products to clients and comparing them with competitors. Interviewees from context 3 experienced recruiting skillful people as very beneficial when it comes to implementing design thinking, mostly due to their "troubleshooting"-attitude and readiness to take responsible tasks. All in all, context 1 mentioned managers' support, change in attitude and personal interest as support activities non-designers can take when context 3 emphasized managers' support and skillful recruits.

4.3.3 Main theme 3 – Organization

In total, the interviewees expressed 15 quotes that were categorized to main theme 3 – organizational and structural support. The results are presented in Table 16. Context 1 did not report any examples of enhancers they experienced from organizational side. There were 4 quotes identified on context 2 and 11 on context 3. In context 2, there were two design team managers who exemplified the organizational processes and principles that support design (2), e.g. procedure to always send the products to customer for testing before final release (1) or own budget for designers, so they can provide business units design services "for free" (1) (*Quote 40*). As exemplified in *Quote 41*, one interviewee explained how they committed different parts of organization to design projects by involving their representatives to steering committees of design projects (2) so they altogether chose the design projects the organization wanted to go for.

> *Quote 40 (interviewee 6): "I was surprised when I started here, how easy it was to convince the business units that we need to go to the customers. Because that was not, by that time I was working product development, and then I really learned that really something that we can utilize is pushing on the word research. And also, since we hold the money and the business units get it for free, then we can also tell them, you won't get any money before, we won't be able to do anything if we don't go there. So, compared to when (--) recruiting some consult, internal, that we work as internal consultancies, there it's the business unit that pay. It makes it a little bit more difficult to put demands on what is required, that they need to get the money in. But when we hold the money, then it's much easier to put demand on them and that was surprising for me. Very happy surprise."*

> *Quote 41 (interviewee 4): "When I started I had no idea how to organize this UX-team, if I have any steering committee or so and how this job would be done. Then, I organized myself that I got steering committee of product management and technology managers, and I have been presenting all the plans to them and they have assigned budget for me. I was the one that came up with that process, and I am satisfied and no one told me to do so, so even more because of that. So, I have a steering committee, and I am no doing decisions by myself instead I*

commit this organization to the decisions with the wish that there will be more desire in getting them done."

Table 16. Supportive actions for implementation of design from organizational and structural perspective (Main theme 3)

Context #	**Theme**	**Insights**	**# of quotes**	**# of interviewees**
Context 2	Supportive process and principles for design	• Always send the new products to the customer for testing before closing it • Let designers hold their money as it supports "right involvement of design" when BU do not need to pay for involving designers	2	2
	Steering committee	• Commit other part of organization through steering committee • Appoint steering committee for own work	2	1
	Total		*4*	*2*
Context 3	External consequences of successful innovation	• Partner with other companies to get bigger changes through • Work on possibilities to attend research projects • Find good external partnering companies • Apply for external funding for high visibility projects • Boost regulation changes with new innovation	5	1
	Customizable and modularizable products	• Combine all the products used by customers for "One system" • Set different guidelines for different products • Modularize products to "any shape" so they can be customized according to users' needs • Gather insights from all over organization to adjust company-wide guidelines accordingly	4	1
	Clear organization structure for design	• Bring design responsibility to own place, ownership of it to Finland • Renew whole design organization (emphasize inspiration at work)	2	1
	Total		*11*	*1*
Total			**15**	**3**

In context 3, interviewees mentioned, in total, 11 examples which were characterized into 3 themes regarding the consequences of successful innovative projects (5), product set-up (4) and organizational structure (2). It is important to note that each theme included an example given only by one interviewee. One interviewee explained that successful innovation projects that were brought to the market boosted various connections to

externals, such as partners for regulation changes (3), research (1), and external funding (1). In contrast, one interviewee explained that deviant environments can be served in the best way when the products are customizable and modularizable (4), for example, as shown in *Quote 42*, the interviewee's team started to produce modularized "any shape" – solutions that can be customized to exact situations to serve the customers' needs in the best way. Then, as exemplified in *Quote 43,* one interviewee experienced as good and well-working solution to bring the ownership and responsibility of design to one place in organization (2).

> *Quote 42 (interviewee 7): "We came up with new way, we made something called "any shape". basically, we make every possible feature to the module and then the engineer in the specific project can just choose what is needed and activate those features, e.g. does it show alarms."*

> *Quote 43 (interviewee 7): "We started the program to bring the responsibility of design to Finland. It was clear organizational change that now the ownership changes and goes to Finland. Of course, we involved everyone interested to the change. It did not take a long for everyone to notice that it was a good solution."*

To sum up, it is important to note that there were no examples of supportive actions from organizational and structural perspective in context 1 but context 3 highlighted almost triple the number of examples (11 quotes) compared to context 2 (4 quotes). Context 2 gathered examples of initiatives that strengthened involvement of design in organizational processes, such as, always sending new products to customers for testing before release or the designer team holding their own budget, thus, being available for development teams without any additional budget requirements. Additionally, one interviewee presented an example of involving a steering committee drawn from various parts of the organization to his own work, and thus creating a larger commitment within the organization. Moreover, context 3 provided examples on how successful innovation projects increased the company's external visibility leading to benefits, such as new partners to drive regulation change, new research possibilities or external funding for new projects. Context 3 emphasized the importance of clear location for design within the organizational structure, as well as, the modularity of the products to be able to serve customers' real needs in the best and most efficient way. In conclusion, context 2 suggested examples how to change processes and organizational principles to strengthen the role of design thinking within them, while context 3 highlighted the importance of clear organizational structure for design, modularity of the products and external benefits as consequences of successful innovation projects.

4.3.4 Summary – Support efforts in three contexts

First, this section recaps main findings within each of the main theme of supportive actions and concludes the key characteristics of supportive actions mentioned in each of the organizational context. The number of quotes categorized into themes were decreasing from main theme 1 – 34 quotes, to main theme 2 and 3, with 25 and 15 quotes respectively. All the insights are summarized in Table 17. The findings from main theme 1 represented the supportive actions designers can take by themselves and highlighted on each of the contexts the importance of showcasing through concrete successful examples, collaborating with various stakeholders and implementing work incrementally. Interviewees recognized managers' support as the most powerful action from non-designers' side to strengthen the role of design in the organization. Insights from main theme 3 suggested some concrete examples of organizational policies and processes that revealed to have supportive impact in strengthening the role of design thinking. Additionally, interviewees highlighted that the customer can be served in the best way when the product offering is modular and customizable.

There were significant differences between the number of quotes mentioned in context 1 and 3 vs. context 2 as context 1 mentioned 26 examples, context 3 identified 35 supportive actions but context 2 only 13. To conclude, the supportive activities mentioned on context 1 aimed for convincing others of design thinking's value and changing the overall mindset towards the method. More precisely, the most efficient action of designers to change non-designers' attitude was to implement the design thinking practices incrementally, showcase the value through concrete examples and boost collaboration among different stakeholders, such as designers, non-designers, clients and other external parts. In terms of support from other people in the organization (non-designers), designers working in context 1 felt that it was easier to implement own work when they had proper support from higher management, others had open attitude towards design and personal interest in having good products, e.g. salesman. There were no examples of supportive action originating from organizational structure identified from interviews on context 1.

Unit-embedded design team managers (Context 2) tried to strengthen the position of design thinking in the organization and make its utilization as efficient as possible. They worked on the ways to communicate design within organization in as "simple" way as possible, e.g. using Lego blocks for visualizing systems. Also, they experienced as beneficial to showcase design through concrete examples of successful projects and organize collaborative sessions for various stakeholders. Interviewees from context 2

provided some examples of certain changes in company's processes and principles that, from their experience, fastened the implementation for design and organizational commitment, e.g. own budget for design teams or steering committee for new innovation projects.

Designers working on a global level (Context 3) aimed with their supportive actions for change in corporate culture that is open for new innovative solutions, thus, providing better offerings for the users. On context 3, interviewees experienced as beneficial to implement their work incrementally, collaborate with different stakeholders and showcase through concrete successful examples. They felt that they reached better results in their own work when they had free hands to make own decisions, managers' support and skillful team to collaborate with. Also, they highlighted that it was easier to conduct their work properly when there was clear place for design in organizational structure, as well as when the products were easily customizable. Additionally, one interviewee explained several examples how their previous successful innovation projects boosted later collaboration with external parts, such as partners to drive regulation change, research projects or external funding.

Table 17. Supportive actions' patterns across three organizational contexts

Main theme of supportive actions	**Context 1 - UX designer alone**	**Context 2 - Design team**	**Context 3 – Group level manager**
Designers' own work	• Collaboration with different stakeholders • Showcase through concrete successful examples • Implement design incrementally	• Collaboration with different stakeholders • Showcase through concrete successful examples • Communication in "simple way"	• Collaboration with different stakeholders • Showcase through concrete successful examples • Implement design incrementally • Free hands to conduct own work
Non-designers	• Managers' support • Change in attitude • Personal interest	• No examples	• Managers' support • Good recruits
Organization	• No examples	• Changes in company's principles and processes, e.g. steering committees and own budget for design team	• Clear organization for design • Modularity of the products • Collaboration with external partnerships

5 Discussion and conclusions

This thesis examined the process of a large organization attempting to become more design-driven through implementing design thinking. More particularly, this study explored the differences in perceptions of design thinking within pre-defined organizational contexts, restrictions faced during implementation process and enhancers perceived as beneficial in strengthening the role of design thinking. The research was conducted through thematic analysis of nine semi-structured interviews with UX and industrial designers in a multinational Fortune 500 case company with a presence in around 100 countries and over 100 000 employees. In total, the interviewees represented four regions (Asia-Pacific, Central Europe, North Europe and North America) and three organizational contexts that were defined based on the interviewees positions within organizational structure: designers working alone in a region (1), designer teams within a business unit (2) and designers leading on a global level (3).

This thesis investigated three research questions, aimed at identifying best-practices for large organization on how to become more design-driven through implementing design thinking. First, this study investigated differences in designers' perceptions of design thinking across organizational contexts through comparing four themes by Carlgren et al. (2016): P*erception of the term design thinking, Use of design thinking, Design thinking in relation to product development efforts, Who uses design thinking* (Research Question 1). Second, this thesis gathered and categorized the set of challenges interviewees reported facing while implementing the method of design thinking into their processes, creating an understanding which factors can restrict or slow down the implementation process (Research Question 2). Third, this thesis investigated the supportive actions that were experienced as beneficial to overcome challenges and strengthen the role of design thinking within the organization (Research Question 3). The detailed results from each of the research question are presented separately in the previous Chapter 4.

This Chapter presents the key contributions from the results of this thesis. Section 5.1 explains the main findings from Research Question 1 focusing on differing emphases on practices, processes and mindsets within organizational contexts; and proposing design thinking to be considered as continuous scale of various dimensions. Section 5.2 emphasizes the links between findings from Research Question 2 and 3 highlighting issues, such as, the differences in concreteness-level of examples identified from the data or three pathways for conducting the organizational change from designers' perspective. Section 5.3 examines limitations of this thesis originating either from scope or research

design, as well as directions for extensions in the future research. Section 5.4 describes practical implications of the learnings from this study for designers, managers and change agents. Finally, section 5.5 concludes the main findings of the thesis discussed in this chapter and highlight the answers to initial research questions.

5.1 The differences in perception of design thinking across three organizational contexts

The results of the thesis suggested that the higher position interviewees possessed in the organizational structure, the more design thinking activities they were able to identify from their working environment. This thesis separated three organizational contexts that were pre-defined based on the interviewees' position and impact in the organization. Individual UX designers working alone in their regions (context 1), with the lowest organizational position, discussed less than half of examples of design thinking activities and their applications in product development processes compared to global-level designers (context 3), with the broadest impact on several units and locations within the organization. The amount of activities mentioned by designers working in unit-embedded design teams (context 2) were positioned somehow in the middle in between lone and global-level designers. On the other hand, when the interviewees were asked who used design thinking in their organization, lone designers highlighted that they work alone, unit-embedded design teams provided examples of some collaboration with non-designers, such as product owners, and global-level designers were not able to specify anyone using design thinking. The results suggested that the global-level designers were positioned high enough to know what kind of practices are implemented but assumed them as the duty of everyone in the department instead of specific persons.

The variant descriptions of design thinking by the designers working in the three different contexts echoes previous literature that there is no consensus on the definition of design thinking (Hassi & Laakso, 2011). Designers working alone in their region reported not being completely familiar with the term of design thinking but associated it with "making [the] users' life easier". Additionally, they highlighted certain individual activities of design thinking that they applied alone in the product development process. Overall, the efforts of lone designers reflected closely to the theory of bricolage where they needed to combine available resources to push the change through (Baker & Nelson, 2005). Designers working in unit-embedded design teams perceived design thinking as "involving users' needs", manifesting in concrete and actionable actions that drove bigger parts of the development processes. For example, they aimed to create continuous

feedback loops to improve the offerings for customers, possibly customize the products according to their real needs, and simultaneously, create better users' experiences. When designers leading global teams were asked to define the term 'design thinking', their answers focused more on the mindset of involving users always when possible and approaching every situation with the "big picture" in mind. For them, design thinking was a tool to drive the whole development process and connect together the siloed parts of organization, e.g. launch minimum viable products for feedback every time when possible or boost knowledge sharing processes. In addition, they highlighted examples of design thinking activities that aimed for cultural change, such as, promoting experimentation, creating open culture of trust, or setting high and visionary goals.

Furthermore, interviewees from each context underlined different dimensions of design thinking activities grouped by Hassi and Laakso (2011): practices, cognitive approach and mindset. Designers working alone associated design thinking more as a perception of certain practices instead of a thinking style or mentality, for example, they highlighted individual one-to-one examples where they tried to encourage non-designers to ask customer for a feedback. Designers working in teams perceived design thinking more broadly as they utilized aspects of design thinking from all three dimensions. They implemented individual practices solidly in the organizational processes, however, kept continuously cognitive approaches of design thinking in mind, such as abductive reasoning based on users' feedback and reflective reframing of the problem. Additionally, they mentioned some of the examples categorized in the mindset dimension, for example, future orientation to set future visions for products. Instead, most of the examples provided by designers working on a global level emphasized cognitive approaches and mindsets, with only some individual mentions of practices. As a conclusion, the lone designers perceived design thinking mostly as set of practices, designers in unit-embedded design teams utilized approaches from each dimension, and designers working in global-teams described design thinking mostly as mindset.

The findings illustrate that design thinking can represent very different approaches and roles, even within a single company. In terms of the frameworks presented in section 2.4 and, especially, Danish Design Ladder (Danish Design Centre, 2001), lone designers in their regions mainly utilized design thinking activities on the first and second steps, non-design and design as form-giving. In this framework, step one does not express a systematic way to use design, e.g. decisions are made based on own assumptions instead of users' insights. In this thesis, interviewees working alone complained about scarce access to users when it comes to decision-making. On the other hand, step two, design as form-giving, includes activities such as finishing touches in product development or

graphic design, which manifested in the data as a focus on UI instead of UX, or limited involvement of designers inside the development projects. Designers working in unit-embedded design teams, on the other hand, clearly aimed to position design on the third step on the Design Ladder framework (Danish Design Centre, 2001), design as process, where it is an integrated element of the development process. According to Doherty et al. (2014), there are three cultural stones between second and third step of the Design Ladder that add strategic perspective to the original framework. The activities identified in the unit-embedded design team, such as experience creation, improvements based on users' feedback or definition of future visions, indicate that this context locate on the second stone, design as value creation, where design thinking is perceived not only as a tool for problem solving but as a way to create value for stakeholders, both short-term and long-term. However, the third context of designers working in the global level did not seem to fulfill completely the definition of the fourth step of Design Ladder-framework, design as strategy, as there were no mentions or examples where design already had a key strategic role in business model of the case company. Even though that might be the goal of the context, these designers still acted on the third step, design as process, however, with successful implementation of all three cultural stones towards fourth step in Design Ladder (Doherty et al., 2014). The next section combines the findings from Research Question 1 and emphasize how the perception of design thinking can be described as a continuous scale.

5.1.1 Continuous scale of perception of design thinking

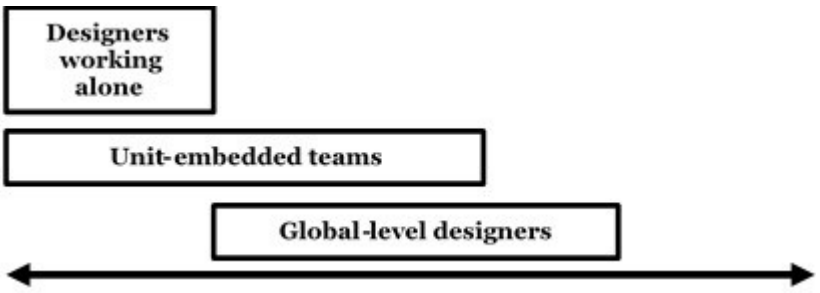
The role of design thinking, from the perspective of this thesis, can be comprehended as a continuous scale of activities, all aiming for the same high-level ambition – a stronger role of design thinking in organization. The suggestion is based on the variance in the results across different organizational contexts related to the definition of design thinking, its impact and its connection to the strategy of the whole company. Also, previous literature proposed various definitions of design thinking with different aspects emphasized, for example, design thinking can be defined as certain set of set of skills (Dym et al., 2005), a way to find solutions for ill-defined and continuously changing wicked problems (Coyne, 2005) or more in general as a method to change existing set-ups into more preferred one (Simon, 1969). To avoid further confusion, Hassi & Laakso (2011) conducted extensive literature review and supplemented it with expert interviews to define the framework that see design thinking as a set of skills from categories: practices, cognitive approach and mindset. In this section, this framework is used to highlight and clarify the differences in definition of design thinking provided by designers from all three organizational contexts.

Different parts of the same organization associated activities of design thinking with varying approaches. In terms of the framework proposed by Hassi & Laakso (2011), each context highlighted different categories more than others, suggesting that the scale is continuous and that design thinking can be perceived by a set of skills also from between the categories. Designers working alone, as an exception, highlighted the activities that fit almost entirely into category 'Practices'. Instead, unit-embedded design teams and global-level designers identified examples that were categorized in all three categories. Unit-embedded design teams tried to establish design-driven processes through implementing individual practices into their daily work habits and stimulating cognitive approaches, such as improvement on feedback, integrative thinking or a holistic view on the problem. They also mentioned some individual examples of activities categorized in 'Mindset', such as aiming high. Instead, designers working in global teams presented design thinking from the perspective of organizational culture and highlighted the importance of skills categorized in the 'Cognitive approach' but also in the 'Mindset', such as optimistic view, future-orientation and experimental approach.

Designers in each of the organizational contexts saw the impact of design thinking on a different scale. Designers working alone in the region influenced only individual practices with the principles of design thinking, while design team managers drove the whole established processes with the method and designer managers on the global level emphasized organizational culture and mindset. The lone designers had limited impact on the organization, thus, the design thinking activities they utilized influenced mostly individual situations or one-to-one interactions, such as, conducting user research, prototyping or testing. Instead, team managers in unit-embedded teams saw the method of design thinking as a driver for the whole development processes, such as continuous improvement or experience creation. Their aim was to mesh the activities of design thinking into company's processes and establish its strong position within them. Then, designers leading global teams had the largest view and impact on the organization as they were working on global level. For them, design thinking represented a mindset and organizational culture that drove not only the development processes, as in the unit-embedded design teams, but also how people approached every situation they faced. In other words, designers working alone implemented the set of individual practices from 5-step iterative process of Stanford d.school (2018) into their daily work, such as, empathizing with users, defining the challenge, ideating broad range of possibilities, prototyping them and testing, when unit-embedded design teams included the process generally in product development efforts and global-level designers emphasized its presence in people's mind regardless of their role.

The company becomes design-driven when the activities of design thinking are tightly connected to its strategic organizational change. Bucolo and colleagues (2012) highlighted three iterative key phases where design thinking interacts systematically with a company's strategy. The first key phase helps to understand the hidden needs of the stakeholders and their insights through e.g. narratives or scenarios. The second key phase converts the insights into future oriented solutions with a clear value statement for stakeholders. In the third key phase the strategy is adjusted accordingly to the propositions from the second key phase and is then validated with users. The results of this thesis suggest that the activities of lone designers located in key phase one but activities implemented by unit-embedded teams and global-level designers worked on converting insights into future solutions (key phase two). Unit-embedded teams tried to drive the development processes with the insights from the method of design thinking, when global-level designers implanted the principles into people's mind so they were visible in their thinking and in general in everything they were doing. There was no evidence reported that global-level designers, with highest position in the organization, used design thinking in defining and then adjusting the strategy of the whole company. Thus, the results suggested that their work can be still seen as middle-step giving room for further and better implementation of the method in company's strategic efforts.

All the insights discussed previously are gathered in Figure 7, below. The table presents how different theories define the perception of design thinking into one continuous scale and how each of organizational contexts of this thesis locates within it. The theories tend to possess a slightly different perspective of design thinking in the way of dividing its perception and activities. However, according to results from contexts' definitions in this thesis, it is almost impossible to find ones that will match exactly to reality. Instead, they all combine the idea that utilizations of the method start from implementing individual practices to later link it to the organizational culture and strategy.



Three-dimensional design thinking-definition for management discourse (Hassi & Laakso, 2011)	Practices	Cognitive Approach	Mindset
d.school 5-step iterative process of putting design thinking in practice (d.school, 2018)	Utilizing the practices of the process	Implementing the process within organizational structure and its processes	Planting the process into people's mindset to drive their actions accordingly
Design-led innovation framework (Bucolo et al., 2012)	Understanding the hidden needs of the stakeholders	Converting the insights into future oriented solutions	Adjusting the strategy and validating it with users

Figure 7. Continuous scale of perception of design thinking

5.2 Restrictions and enhancers in implementing design thinking

As described in the Chapter 3, Methodology, the goal of that thesis was to combine the findings from all three research questions emphasizing differences in perception of design thinking, as well as challenges and supportive actions faced in its implementation into one summary. Therefore, it is easy to compare the learnings, reflect the differences in perception of design thinking and seek out the relationships between challenges and supportive actions. Table 18 gathers all the insights presented initially in the Chapter 4, Results. This section aims to provide some examples how the findings of restrictions and supportive actions can be linked together, discovering that same supportive actions can be used to overcome different challenges, as well as that there is no one "correct" supportive action for one specific challenge. At the same time, Table 18 suggests that there are links across main themes as well, e.g. supportive actions conducted by designers' themselves help to overcome challenges originated from non-designers. Some of the challenges, such as limited access to users, were identified in all the contexts and thus emphasized as a crucial element to address in enhancing design at least in this particular organization. Detailed analysis is not included in the scope of that thesis; however, the summary provides a base for further research, as later explained in section

5.8. This section, first, reflects detected challenges and supportive actions in implementation of design thinking towards the literature and, then, emphasize the main points that came to the fore.

The results strengthened the importance of investigating the different organizational setups before making any assumptions as, seemingly, there are different emphasis in the answers dependently on the organizational position of the interviewed designer. The results of this thesis revealed that the higher were the position of the designers in organizational contexts, the more activities of design thinking they were able to recognize, the less challenges they faced and the more supportive actions they knew. For example, when investigating differences in perception of design thinking, global-level designers mentioned more than double as much design thinking activities as lone designers. Instead, when inspecting the restrictions faced in implementation of design thinking, it was lone designers that mentioned a third more challenges compared to designers working on global-level.

Table 18: The final summary of results from all three Research Questions per context

Organizational context	**Research Question**	**Designers' work**	**Non-designers**	**Organization**
#1 – Lone UX designer in the region: Designers not completely familiar with the term but associating it with making users' life better, set of practices to solve challenges	RQ2: Perceived challenges in implementing design thinking	• No team to collaborate with • Difficulties to establish other's interest and desire towards own work • Limited access to users restricting designers' potential	• Individuals need to be convinced for redesigning their products • Old habits restricting positive attitude towards design	• Individual working habits within organization disregarding principles of design thinking • Separate reporting structures for teams • Continuous organizational changes • Limited resources for conducting designers' work and later implementing it
	RQ3: Perceived enhancers in implementing design thinking	• Collaboration with different stakeholders • Showcase through concrete successful examples • Implement design incrementally	• Mangers' support • Change in attitude • Personal interest	No examples reported by interviewees
#2 – Unit-embedded design team manager:	RQ2: Perceived challenges in	• Underestimation of designers' work	• Insufficient amount of people open to design	• Bureaucratic processes wasting resources

Involving user needs, combination of practices, cognitive approaches and mindset to drive small parts of development process	implementing design thinking	• Limited access to users due to budget constrains	• Old habits restricting positive attitude towards design	• Lack of management support to strengthen position of design
	RQ3: Perceived enhancers in implementing design thinking	• Collaboration with different stakeholders • Showcase through concrete successful examples • Communication in a "simple way"	No examples reported by interviewees	• Changes in company's principles and processes, e.g. steering committees and own budget for design team
#3 – Global-level design manager: Involving users always as possible, organizational culture to always keep "big picture" in mind	RQ2: Perceived challenges in implementing design thinking	• Lack of collaboration between teams • Not enough freedom for designers to conduct own work fully • Limited access to users as cultural barrier	• Attitudes vary towards design across different parts of the company • Old habits restricting positive attitude towards design	• Varying terms, KPIs and maturity of design level across organization • Continuous organizational changes • Siloed organization with low impact for changes
	RQ3: Perceived enhancers in implementing design thinking	• Collaboration with different stakeholders • Showcase through concrete successful examples • Implement design incrementally • Free hands to conduct own work	• Managers' support • Experienced recruits willing to take responsibility as change agents	• Clear organization for design • Modularity of the products • Collaboration with external partnerships

Challenges faced during implementing a new method into existing organizational dynamics were presented as detailed and context-specific examples, which were the representations of widely known challenge origins in these exact setups. The challenge groups recognized from previous literature are very high-level, whereas the interviewees in this thesis provided concrete and tangible examples of the challenges they faced during their career in the case company. For example, the challenge group 'Difficulties to prove value and benefits of design thinking' was represented in the data in examples where interviewee complained about being forgotten from the important meetings as other stakeholders did not see any benefit for involving designer's perspective. Instead, challenge group one 'Conflict with existing organizational processes and structures' were represented in the data in examples such as inadequate KPIs for design to measure performance of the project or requirements for reporting every step in the project seen as resource waste. Thus, it required further interpretation to identify the challenge group

behind each detailed example from the data and map them against previous literature. Table 19 combines the challenge groups identified from previous literature and position results of this thesis among them.

Table 19: The representation of challenges known from literature in the data set

Challenge group identified in literature	**Data representation**
1. Conflict with existing organizational processes and structures (Carlgren et al., 2016; Liedtka et al., 2017; Walters, 2011)	• Separate reporting structures for teams • Varying terms, KPIs and maturity of design level across organization • Siloed organization with low impact for changes • Individual working habits within organization disregarding principles of design thinking • Bureaucratic processes wasting resources
2. Adversity to integrate resulting ideas and concepts (Carlgren et al., 2016; Dunne & Martin, 2006; Rauth et al., 2014)	• Limited resources for conducting designers' work and later implementing it • Insufficient amount of people open to design • Siloed organization with low impact for changes
3. Design thinking is context-dependent; skills are difficult to acquire (Brereton & McGarry, 2000; Carlgren,et al., 2016; Rekonen & Hassi, 2018)	• Attitudes varying towards design across different parts of the company
4. Difficulties to prove value and benefits of design thinking (Carlgren et al., 2016; Rauth et al., 2014)	• Underestimation of designers' work • Difficulties to establish other's interest and desire towards own work • Individuals need to be convinced for redesigning their products
5. Design thinking principles' misfit with organizational culture (Carlgren et al., 2016; Rekonen & Hassi, 2018)	• Not enough freedom for designers to conduct own work fully • Limited access to users restricting designers' potential
6. Threatened existing power dynamics (Carlgren et al., 2016; Rauth et al., 2014)	• No team to collaborate with • Old habits restricting positive attitude towards design
7. Varying communication style (Carlgren et al., 2016)	-
8. Lack of recognition of design and support from higher management (Mozota, 2010)	• Lack of management support to strengthen position of design
	• Lack of collaboration between teams • Continuous organizational changes

The challenge groups and its data representation corroborate the statement presented by Walters (2011) that design thinking drifts into conflict with both non-flexible organizational process and non-adaptive organizational culture and mindset. For example, the challenge groups one and two, 'Conflict with existing organizational processes and structures' (group 1) and 'Adversity to integrate resulting ideas and concepts' (group 2), gathered the challenges regarding processes, and were most frequently represented in both literature and data of this thesis. These two groups are highly-dependent on each other's as adversity to integrate of new ideas might be restricted by non-flexible processes that do not permit employees to take additional and unusual work. Then, in addition to straightforward cultural challenge 'Design thinking principles' misfit with organizational culture' (group 5), there were several challenge groups recognized that indirectly originated from non-adaptive organizational culture, such as, 'Threatened existing power dynamics' (group 6) and 'Lack of recognition of design and support from higher management' (group 8). It is important to note that 'Difficulties to prove value and benefits of design thinking' (group 4) were represented in this thesis by decent number of examples and, simultaneously, only in the literature conducted in the most similar setup to this thesis – large organizations. Thus, it can be assumed that high visibility of benefits while introducing new methods into pre-defined processes is typical and very important for large organizations. One of the challenge group identified in previous research 'Varying communication style' (group 7) was not represented in the data. However, as this challenge group has only been reported in one previous study (Carlgren et al. 2016), thus, it is not surprising not to find it in data set of this thesis. On the other hand, two new challenges – 'Lack of collaboration between teams' and 'Continuous organizational changes' – emerged in the current data did not fit any of the challenge groups identified in previous studies.

Even if interviewees from all of the contexts experienced challenges originating from non-flexible organizational processes and non-adaptive organizational culture, the perspective of challenges originating from non-flexible organizational processes varied more across contexts than of challenges related to non-adaptive organizational mindset. The differences in perspective across the contexts verified the need for characterization of organizational environment as a first step in the methods. All of the organizational contexts included complementary examples of the challenges identified by Carlgren et al. (2016), which is not surprising as their research was conducted in very similar setting of five different large companies with minimum five years of experience with design thinking, however, without further investigation of various organizational contexts. Lone designers seemed to be unsecure of own position and tasks as they reported challenges mostly from small-range and individual perspective and proprietary one-to-one

situations. They mostly sampled with the largest challenge group identified by Carlgren et al. (2016) 'Conflict with existing organizational processes and structures' including complementary examples, such as lack of prioritization of design thinking when there is too much work, challenges to collaborate with people sitting in different locations and separate reporting structure for the projects and design. Unit-embedded interviewees aimed for organizational change and were the only organizational context that did not report continuous organizational changes as a challenge. Instead, they experienced underestimation of their work by non-designers, as well as highlighted the complicated bureaucratic processes that wasted their time. Designers working on global level expressed their organizational concerns more as drawback for conducting own project till the end with high impact. They were placed high enough within organizational structure to concentrate their concerns on siloed organization and varying design terms, KPIs and maturity of design within different parts of organization. The siloed organizational structure reflected in designers' work as limited freedom and impact of own work, as well as poor collaboration and knowledge sharing. The interviewed designers corroborated with the challenge identified by Carlgren et al. (2016) that it is difficult to see designs' impact in any of KPIs, and in general to set the measurable KPIs for design. Additionally, it is important to note that lone designers faced the largest amount of challenges than any other organizational context. Unit-embedded design team managers mentioned significantly smaller amount of challenges, at least two times less than interviewees from any other contexts, thus all the deduction need to be examined with reserve.

As the same supportive actions were repeating across varying organizational setups, the enhancers for implementation of new method are less context-specific and can be reused as such in various setups. Table 20 presents the representation of the data for the groups of supportive actions identified from the previous literature. In contrast to similar comparison for challenges, supportive actions presented in the literature and in the results of this thesis were more similar to each other and did not possess a gap in the level of concreteness. For example, the most frequent supportive action identified from the literature 'Support from managers and ambassadors' networks' where represented in the data by example describing the importance of managers involving design in their communication style, or the benefits of managers being open for discussion about future directions. Additionally, interviewees pointed out that the design thinking mindset were meshed with organizational culture (challenge group five) through high-level incremental implementation, such as working with one team at the beginning or concentrating on UI first instead UX. In overall, this observation goes hand in hand with the theories presented in the previous literature, such as legitimizing (Suchman, 1995)

that suggest a clear high-level processes of conforming and manipulating the environment when implementing something new.

Table 20: Reflection of identified supportive actions towards the ones known from previous literature

Supportive action groups from the literature	**Data representation**
1. Support from managers and ambassadors' networks (Liedtka, 2011; Liedtka et al., 2017; Mickahail, 2015; Rauth et al., 2014; Westcott et al., 2013)	• Mangers' support • Experienced recruits willing to take responsibility as change agents
2. Better physical facilitates and artifacts for DT activities such as prototyping and brainstorming (Brereton & McGarry, 2000; Rauth et al., 2014; Seidel & Fixson, 2012)	• Modularity of the products
3. Focus on user-centered experience innovation (Mickahail, 2015; Seidel & Fixson, 2012; Westcott et al., 2013)	• Free hands to conduct own work
4. Educating about design thinking and demonstrating its usefulness through e.g. successful examples (Liedtka et al., 2017; Mickahail, 2015; Rauth et al., 2014; Westcott et al., 2013)	• Showcase through concrete successful examples
5. Meshing DT mindset with organizational culture (Rauth et al., 2014; Rekonen & Hassi, 2018)	• Communication in a "simple way" • Implement design incrementally
6. Build a learning community who sees innovation as a journey (Liedtka, 2011; Liedtka et al., 2017; Westcott et al., 2013)	• Personal interest
7. More general interest and investment in design within industry (Westcott et al., 2013)	• Change in attitude (others)
8. Establish clear organizational processes for design project and new innovation initiatives (Liedtka et al., 2017; Rauth et al., 2014)	• Clear organization for design • Changes in company's principles and processes, e.g. steering committees and own budget for design team
9. Cultivate variance and multidisciplinary project teams to get new perspectives (Liedtka et al., 2017)	• Collaboration with different stakeholders • Collaboration with external partnerships

Similarly to the challenge groups explained earlier, the groups of supportive actions identified from the previous literature represented two different change intentions at the same time – change of organizational processes and mindset. For example, supportive action of 'Establishing clear organizational processes for design project and new innovation initiatives' (group 8) clearly concentrate on the organizational processes when group three 'Focus on user-centered experience innovation' aim to create the right mindset for employees while approaching any situation. In contrast to the challenges, all the supportive action groups recognized from the previous literature were represented with some examples from the data of this thesis. As the data examples of supportive actions were more straightforward matches with the ones identified by previous literature than in the case of challenges, the full representation of the groups strengthens the observation that supportive actions are less context-specific than challenges. As explained earlier, the results from this study, as well as previous literature, suggest that it is important to show clearly benefits of new methods especially when changing large organizations. The supportive action of 'Educating about design thinking and demonstrating its usefulness through e.g. successful examples' (group 4) gathered uniform answers from all the organizational contexts present in this study about the importance of showcasing benefits of design thinking. Finally, the most comprehensively represented supportive action group in the literature, 'Support from managers and ambassadors' networks' (group 1), was widely performed in the data of this thesis, thus, emphasized separately later in this section.

Even if the same supportive actions were recognized across different organizational contexts, each organizational context had various goals differing they tried to reach with them. Lone designers worked on implementing individual design thinking practices to one-to-one situations, e.g. convincing non-designer for defining the user groups at the beginning of each project. Unit-embedded design team managers aimed for a change in structural changes in company's principles and processes, such as having own budget to distribute and serve other projects without additional costs for them or involving steering committee around organization to involve their input to the projects. Global-level designers were placed high enough to have an overview on 'big picture' of organizational processes, and e.g. recognize the need for clear organizational structure or modularity of the products to be able to customize and serve each customer according to their needs. None other organizational context mentioned any supportive actions relating to such big organizational decision, regarding both structures or strategies. According to insights from the research of Seidel & Fixson (2012), implementing even individual design thinking practices further in the processes of organization, such as better utilization of user research, brainstorming and prototyping practices increase the performance of

project teams. For further reflection, Westcott et al. (2013) agree with the unit-embedded design team managers and suggests that the companies should create own center of excellence that guide design terms, practices and education efforts. Additionally, Westcott et al. (2013) identified a pattern that the more design utilized in the industry, the more pressure to adapt design quicker also inside the own company, for example modularity of own products as mentioned by global-level designers.

When implementing a new method into existing organizational setup, managers possess the key role in creating psychological comfort zone for their employees, so they feel safe when changing existing work habits and dynamics. Managerial support was the most commonly repeated issue, in both supportive actions and challenges, as well as in both the results of this thesis and previous literature. Mickahail (2015) and Westcott et al. (2013) agreed that corporate innovation efforts become an organization's core focus only if there is advocacy and support from top management. Designers working alone experienced the support especially beneficial when managers spread the message about design and modernization in their communication, were open for ideas and discussion with designers and boosted collaboration between different parts of organization. Furthermore, global-level designers expected managers to understand and communicate the need for design across the organization, as well as to give them enough trust and freedom to conduct own work without micromanaging. The expectations for managers represented in the data, are in line with Liedtka (2011) who proposed that in order to successfully implement design thinking, managers should focus on growth and innovation, see life as journey of learning, accept uncertainty, seek for new experiences and broad repertoire, and understand customers. Unit-embedded teams did not mention managerial support as enhancer, however, the number of examples provided in this context was significantly smaller, thus, no conclusion can be determined accordingly. Instead, unit-embedded teams agreed with Mozota (2010) who stated that challenges in implementation a new method of design thinking originate from lack of recognition of the method from managers' side and designers' weak understanding of managerial activities and reported directly that lack of management support is visible in their environment through absence of clear responsibility of design in upper management consequent in varying strategies and lack of standards for design practices.

The key role of managers in successful implementation of design thinking is also visible through indirect actions. Large organizations possess well-defined organizational structures divided by hierarchical status and driven by pre-defined processes. In large organizations the special role of managers in initiating the change is visible, especially, through their mandate to drive change, impact others, as well as the credibility to get

accepted by individuals lower within the organizational structure. Moreover, Rauth et al. (2014) suggested convincing through experiences and establishing ambassador networks as indirect supportive actions that managers can take to reach better results quicker. The indirect supportive actions of managers could help to solve challenges that the interviewed designers highlighted in their own work, non-designers' attitude or organization structure. For example, designers were facing a hard time in convincing non-designers placed in the same organizational level to implement design into their work. They also struggled with not enough budget to travel to users and examine their needs in situ in their natural environment. Then, product teams did not have a clear future plan and vision for their products and were unwilling to create one.

5.2.1 Best-practice paths for successful organizational change

While looking from larger perspective, the combined findings of challenges and supportive actions in this thesis suggest that the interviewed designers recognized three pathways for successful organizational change in the simultaneous incorporating of the new method of design thinking into existing organizational processes and people's mindsets. The pathways were repetitive across all the organizational contexts examined in this thesis, thus, interpreted in this thesis as general enough to be presented as best-practices. The pathways are concluded as general high-level advices that can be later easily adjusted to any specific organizational setup, as done also in previous literature. Additionally, the pathways linked the challenges and supportive actions from the perspective of designers' work, non-designers' and organizational work, for example, designers convinced non-designers about the value of design thinking by providing them hands-on education about the method.

First, successful implementation of design thinking to the context of large organization requires, simultaneously, change in both organizational processes and people's mindset. As stated earlier, Walters (2011) claims that design thinking drifts easily into conflict not only with pre-defined organizational processes, but also with non-adaptive organizational culture. The sustained change in the organizational structure and processes originates from changes in people's mindset as they need to be, first, convinced of the value of design thinking (Rauth et al., 2014) and then, open for change and iterations (Rekonen & Hassi, 2018). Furthermore, Westcott et al. (2013) suggests that companies can fasten both, the change in organizational processes and non-designers' attitude, when they guide design terms, practices and education efforts from one centralized center of excellence. He emphasizes that it is easier to strengthen the role of new method when acting as a larger facet. The interviewees experienced as beneficial some smaller structural change efforts of company's principles and processes towards

the proposition of Westcott et al. (2013), such as, own budget for design teams to distribute and serve other projects without additional costs for them or steering committee around the organization providing input to the projects.

A second emphasized pathway for successfully becoming more design-driven and changing both organizational processes and non-designer's resistive mindset seems to be to implement changes incrementally, let them become a habit, and then, showcase their benefits to prepare for next changes. This method was suggested throughout whole case company, however, different organizational contexts sought for different changes, e.g. designers working alone tried to convince individuals to implement single design thinking activities, such as, defining user groups, when designers on global-level aimed for creating design mindset among organization so all initiatives originate from users. One lone designer in the region experienced that it is better to start only with visuals and UI, and then, once it become a habit, to continue with UX and larger perspective. Utilizing incremental implementation of new practices encourage simple communication of one change effort at the time, thus, being easy to grasp for non-designers and overcome another origins of challenges typically repetitive in large organizations – difficulties to prove value of design thinking (Carlgren, Elmquist, et al., 2016; Rauth et al., 2014) and context-dependability of the method (Brereton & McGarry, 2000; Rekonen & Hassi, 2018).

Finally, the value of design thinking is internalized quicker when resistive non-designers are exposed to design thinking hands-on experience showing its results immediately. To overcome resistance towards design thinking, interviewees tried to involve various stakeholders in the brainstorming sessions, and then, showcase clearly the value added when implementing design thinking activities. They experienced that non-designers are more open for a change if they see the personal interest in having the better outcome, e.g. salesman presenting their products to the customer and benchmarking own ones with competitors'. Those actions represented in the data were closely in line with previous literature that emphasized the importance of building a learning community and the culture of continuous improvement when trying to take the change further (Liedtka, 2011; Liedtka et al., 2017; Westcott et al., 2013). Also, the interviewees experienced that there was more hands-on collaboration within the organization, as well as with external parts when there were more facilitates to conduct hands-on brainstorming sessions or workshops. For example, Seidel & Fixson (2012) found out that increased utilization of user research, brainstorming and prototyping practices had positive impact on the performance of the teams. Thus, organizations should not disregard the importance of physical facilities, as well.

All in all, the results of this thesis suggested three general best-practices to drive change in large organizations, such as implementing the method of design thinking to become more design-driven. According to the opinion of designers interviewed in this research setup, organizations should work on the change in the processes and mindset simultaneously, implement changes incrementally step-by-step and educate non-designers hands-on emphasizing clearly benefits from the method.

5.3 Limitations and future research

The results of this thesis provide a solid base for potential future research; however, the future researchers should be aware of the limitations in the methodology to be able to repeat as well as improve the study. This thesis characterized design activities in pre-defined organizational contexts, collected their challenges in implementation of design thinking and investigated supportive actions proved as beneficial. There are two types of limitations in the work: limitations due to the scope of the thesis, that could be addressed with further analysis of the existing data, and those limitations that arise from the research design of the thesis, which would require further data collection.

The most obvious limitation due to the current scope of the work is a top-down interrater reliability analysis of theme categorization. Thus, without assessing coding and theme categorization, the results cannot be fully verified and suggested for repetition. On the other hand, as 'managerial support' revealed to be the most frequent supportive action mentioned in both existing literature (Liedtka, 2011; Mickahail, 2015; Westcott et al., 2013) and results of this thesis, the current data on the challenges and supportive actions could be examined also from the perspective of division to managerial and non-managerial actions. The research could categorize supportive actions in the ones to be conducted by managers and the ones to be applied by non-managers. Then, those supportive actions could be connected to the challenges to find out the ones that can be overcome by managers and the ones by non-managers. Therefore, the proposed extension of the research would bring clarification of the perceived role of managers in the implementation of new method and organizational change, as well as define the tasks and responsibilities of non-managers.

From a research design perspective, the clearest limitation of the present study is the limited amount and narrow variety of data. First, all of the interviewees represented the same case company. As stated earlier in Section 3.1, the case company is a large organization hiring over 100 000 employees with multinational presence in over 100 countries and several product groups. Regardless its broad subsistence, the insights were

affected with the same company policy, high-level strategy and brand. Second, all the interviewees were working as user experience or industrial designers, thus, the pathways for successful implementation were defined only by one group involved in the change. To get more objective results in the future research, it is important to specify groups involved in the change and interview representatives from each of them to validate the reality of change initiators' opinion. Finally, this thesis is based on the limited number of interviews, nine. As the interviews accompanies three various organizational contexts, each context is represented only by three interviewees. Thus, the deviant opinions of one interviewee affect the characterization of its context rather significantly, e.g. unit-embedded design team managers suggested only, in total, 14 challenges and 13 supportive actions, which is significantly less than lone designers and global-level design managers, as one of the interview were relatively shorter (Interview 5) and others not that rich in examples.

The findings from this thesis advocate for further analysis of the data to deeper understanding of root-cause connections between challenges and supportive actions. As this thesis concentrated on challenges and supportive actions proved as beneficial in the process of implementation of design thinking, there is a possibility to analyze them one layer deeper and understand whether some of the supportive actions led to overcome any specific challenges, or on the other hand whether some of the challenges originate from lack of certain supportive actions through extending data collection to longitudinal studies. Additionally, the future research might consider concentrating on the connections of challenge-supportive actions strengthening the maturity of design in that specific context. For example, the research could utilize the existing frameworks of maturity of design (Danish Design Centre, 2001; Westcott et al., 2013) and associate certain challenges with the steps of maturity of design, and then propose supportive actions to overcome them and progress to next step in the framework.

This thesis suggests future research to extend their data sample to more than only three pre-defined organizational contexts. The interviews chosen for the purpose of that thesis were selected from the larger pool based on the expert opinion of project team members who participated in data gathering process. All the three organizational contexts were identified based on the only repetitive organizational positions with similar authorities and responsibilities. Then, the choice of interviews aimed to maximize diversity regarding region and part of the organization within each context. However, defining the contexts based on similarities in the results from framework proposed by Carlgren, and colleagues (2016) or applying any changes in the assumptions and selection of other interviews to data sample might have led to different results. To sum up, for the future

research, I suggest to extend data set and define the contexts based on their similar results from the characterization framework (Carlgren et al. 2016) instead of similar position in the organizational structure, thus, understanding whether it is organizational position that determines the perceptions of design thinking or is it dependable on some other factors.

This thesis investigates the method of design thinking as was it conducted as part of the larger 2-year-long research project 'Design Plus' investigating various aspects of design thinking in large organizations. However, as mentioned earlier in this thesis, there are other theories known that help large organizations to improve their innovation capabilities, such as effectuation (Sarasvathy, 2001) and bricolage (Baker & Nelson, 2005). In the future research, the setup and research questions of this thesis could be repeated to investigate the differences in perception, as well as challenges and supportive efforts in implementation process of other innovation theories applicable in large organizations.

5.4 Practical implications

The learnings of this study propose some implications to the practical work of designers, managers and change agents. This thesis suggested that the most successful way for designers to implement their work in non-adaptive organizational culture (Walters, 2011) is to do it incrementally and step-by-step, and then communicate broadly benefits reached. In practice, it is important for designers to implement individual design thinking practices, e.g. iterative feedback loop, into product development processes one at the time, so it minimizes the resistance barrier and more easily becomes a habit. If the implementation goes successfully, the results proposed that designers should make a concrete successful story out of it and communicate it further in the organization. Thus, it acts as concrete example of benefits encouraging non-designers to apply more design thinking practices into their own work. The more activities implemented the better showcase examples can be communicated.

The findings of this thesis highlight the key role of managers in implementation of anything new that misfit with the current organizational dynamics. Managers and their support are the most important stimulant in creating the psychological comfort zone necessary for employees to feel safe and accepted in applying new methods. The managerial support can be, naturally, seen as enhancer, as reported by designers working alone (Context 1) and global-level designers (Context 3) but its lack, also, as a restriction for successful implementation, as reported by unit-embedded design teams (Context 2).

Thus, when implementing something new, the education should be started from managers, so they are prepared to take responsibility of spreading the belief in the new method within their own team, or even conducting hands-on training session to understand how the new method can be positioned within their own processes.

The results of this thesis indicated that before starting the implementation process of new method, change agents should put an effort in understanding the organizational contexts and existing dynamics within it. The combined results from each Research Questions presented clear differences between examined organizational contexts and suggested examples as that implementation of design thinking from mindset-perspective would most likely end as failure when conducted for designers working alone in the region. To conclude the successful implementation process, the change agent should start by understanding current dynamics and organizational setup, then, teach managers how to support implementation of design, minimize resistance barrier through incremental implementation of activities and communicate clearly all success stories for broader visibility.

5.5 Conclusions

This thesis studied how a large organization can become more design-driven, investigating similarities and differences in designers' perception of design thinking across different parts of an organization, as well as the restrictions and enhancers they perceived for strengthening the position of design thinking within the organization. The data sample consisted of nine semi-structured interviews with designers from a multinational Fortune 500 company. The interviewees represented three organizational contexts defined according to their position within the organizational structure: designers working alone in the region, design teams embedded in a unit, and design managers working at the global level.

The thesis, in addition to echoing the results of previous literature in that there is no consensus in the definition of design thinking (Hassi & Laakso, 2011), presents the finding that design thinking can be perceived very differently even within a single company. The higher the position of the interviewees in the organizational structure, the greater the number of design-thinking activities they implemented in their work. Additionally, interviewees from different organizational levels emphasized different dimensions of design-thinking activities, such as, practices, cognitive approaches and mindsets. The thesis suggests that the perception of design thinking can be

comprehended as a continuous scale, where whatever one's position is, all aim for a stronger role for design thinking in the organization.

In terms of the previous literature, this thesis suggest that the challenges faced in the process of implementing a new method, such as design thinking, are much more context-specific than are the needed supportive actions. The group of challenges known in the previous literature were presented at a high-level of definition, whereas the data of this thesis represented such broadly applicable definitions through very specific examples with such variation between the different organizational contexts. In contrast, the supportive actions known in the previous literature strongly corroborated with the findings in the thesis data and found to apply to all of the organizational contexts.

As design thinking easily drifts into conflict with pre-existing organizational processes and structures, the successful implementation of design thinking in a large organizational setting requires a change in the organizational processes, as well as in people's mindsets. The thesis suggests that the easiest and the most efficient way for changing both organizational processes and resistive mindsets among non-designers is to implement design-thinking activities incrementally. Incremental changes become habits more easily, and then provide success stories to be communicated around the organization, preparing non-designers for bigger changes to come. Additionally, the value of design thinking is internalized quicker when non-designers have hands-on design thinking experiences, even in small range, and see the concrete results of the method immediately. However, as the current study was based on interviews of only designers working in the organization, these strategies should not be taken as validated.

Managers play a key role in creating a necessary comfort zone for their employees to assimilate the change in their existing working habits. The results of this thesis highlighted that their support is visible directly, e.g. through open communication about the method, but also indirectly, through silently accepting the change. As the previous literature suggests design thinking is very context-dependent (Brereton & McGarry, 2000), this thesis proposes that most efficient way of educating non-designers about the method is to start with managers and then let them apply hands-on learnings with their own teams.

This thesis acts as a solid base for potential future research, however, it possesses some limitations in the methodology that need to be taken into considerations, such as lack of inter-rater reliability test and limited amount of data of only nine designer interviews in a single case company. Nevertheless, the results highlight the context-dependent perceptions of what constitutes design thinking and what are key challenges in

implementing it into organizations. While combining the answers from all nine interviewees, the perception of design thinking was seen as continuous scale of activities for strengthening the role of design in organization. The challenges faced during implementation process were much more situation and context-specific that the supportive actions needed, which were presented on more general level easily applicable to any situation. The nature of interviewees' answers was dependent on their position within organizational structure as the higher position they possessed, the more design thinking activities they identified, the less challenges faced and more supportive actions implemented. As such, the thesis advocates adopting a more nuanced approach in both the study and practice of advancing design thinking in large organizations.

6 References:

Baker, T., & Nelson, R. E. (2005). Creating Something from Nothing: Resource Construction through Entrepreneurial Bricolage. *Administrative Science Quarterly*, *50*(3), 329–366. https://doi.org/10.2189/asqu.2005.50.3.329

Bezos, J. P. (2016). Amazon 2016 Report.pdf.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Brereton, M., & McGarry, B. (2000). An observational study of how objects support engineering design thinking and communication: implications for the design of tangible media (pp. 217–224). ACM Press. https://doi.org/10.1145/332040.332434

Brown, T. (2008). Design Thinking. Harvard Busines Review.

Brown, T. (2009). Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation.

Brown, T., & Katz, B. (2011). Change by Design. Journal of Product Innovation Management.

Brown, T., & Wyatt, J. (2010). Design Thinking for Social Innovation. Stanford Social Innovation Review.

Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, *8*(2), 5. https://doi.org/10.2307/1511637

Bucolo, S., Wrigley, C., & Matthews, J. (2012). Gaps in Organizational Leadership: Linking Strategic and Operational Activities through Design-Led Propositions: Gaps in Organizational Leadership. *Design Management Journal*, *7*(1), 18–28. https://doi.org/10.1111/j.1948-7177.2012.00030.x

Carlgren, L., Elmquist, M., & Rauth, I. (2014). Design Thinking: Exploring Values and Effects from an Innovation Capability Perspective. *The Design Journal*, *17*(3), 403–423. https://doi.org/10.2752/175630614X13982745783000

Carlgren, L., Elmquist, M., & Rauth, I. (2016). The Challenges of Using Design Thinking in Industry - Experiences from Five Large Firms: THE CHALLENGES OF USING DT IN INDUSTRY CREATIVITY AND INNOVATION MANAGEMENT. *Creativity and Innovation Management*, *25*(3), 344–362. https://doi.org/10.1111/caim.12176

Carlgren, L., Elmqvist, M., & Rauth, I. (2016). Exploring the use of design thinking in large organizations: Towards a research agenda. *Swedish Design Research Journal*, *11*(1), 55. https://doi.org/10.3384/svid.2000-964X.14155

Carlgren, L., Rauth, I., & Elmquist, M. (2016). Framing Design Thinking: The Concept in Idea and Enactment: Creativity and Innovation Management. *Creativity and Innovation Management*, *25*(1), 38–57. https://doi.org/10.1111/caim.12153

Christensen, C. M., Raynor, M. E., & McDonald, R. (2015). What Is Disruptive Innovation?, 19.

Clark, K., & Smith, R. (2010). Unleashing the Power of Design Thinking. *Design Management Review*, *19*(3), 8–15. https://doi.org/10.1111/j.1948-7169.2008.tb00123.x

Commission of the European Communities. (2009, July 4). Design as a driver of user-centred innovation.

Coyne, R. (2005). Wicked problems revisited. *Design Studies*, *26*(1), 5–17. https://doi.org/10.1016/j.destud.2004.06.005

Danish Design Centre. (2001). Design Ladder.

Doherty, R., Wrigley, C., & Matthews, J. (2014). From Valuing Design to Designing Value, 10.

Dorst, K. (2011). The core of 'design thinking' and its application. *Design Studies*, *32*(6), 521–532. https://doi.org/10.1016/j.destud.2011.07.006

d.school. (2018). An Introduction to Design Thinking Process Guide.

Dunne, D., & Martin, R. (2006). Design Thinking and How It Will Change Management Education: An Interview and Discussion, 13.

Dym, C. L., Agogino, A. M., Eris, O., Frey, D. D., & Leifer, L. J. (2005). Engineering Design Thinking, Teaching, and Learning. *Journal of Engineering Education*, *94*(1), 103–120. https://doi.org/10.1002/j.2168-9830.2005.tb00832.x

Elsbach, K. D., & Stigliani, I. (2018). Design Thinking and Organizational Culture: A Review and Framework for Future Research. *Journal of Management*, *44*(6), 2274–2306. https://doi.org/10.1177/0149206317744252

Fayard, A.-L., Stigliani, I., & Bechky, B. A. (2017). How Nascent Occupations Construct a Mandate: The Case of Service Designers' Ethos. *Administrative Science Quarterly*, *62*(2), 270–303. https://doi.org/10.1177/0001839216665805

Gill, P., Stewart, K., Treasure, E., & Chadwick, B. (2008). Methods of data collection in qualitative research: interviews and focus groups. *British Dental Journal*, *204*(6), 291–295. https://doi.org/10.1038/bdj.2008.192

Girling, R. (2015). Design Maturity Survey: From Self-Assessment to Action. Retrieved from https://www.artefactgroup.com/articles/design-maturity-survey/

Gruber, M., de Leon, N., George, G., & Thompson, P. (2015). Managing by Design. *Academy of Management Journal*, *58*(1), 1–7. https://doi.org/10.5465/amj.2015.4001

Guttentag, D. A., & Smith, S. L. J. (2017). Assessing Airbnb as a disruptive innovation relative to hotels: Substitution and comparative performance expectations. *International Journal of Hospitality Management*, *64*, 1–10. https://doi.org/10.1016/j.ijhm.2017.02.003

Hassi, L., & Laakso, M. (2011). CONCEPTIONS OF DESIGN THINKING IN THE DESIGN AND MANAGEMENT DISCOURSES, 10.

Kidder, D., & Geraci, J. (2018). To Innovate Like a Startup, Make Decisions Like VCs Do, 6.

Kimbell, L. (2011). Designing for Service as One Way of Designing Services, 13.

Kolko, J. (2015). Design Thinking Comes of Age.

Kretzschmar, A. (2003). The Economic Effects of Design.

Laurell, C., & SandströM, C. (2016). ANALYSING UBER IN SOCIAL MEDIA — DISRUPTIVE TECHNOLOGY OR INSTITUTIONAL DISRUPTION? *International Journal of Innovation Management*, *20*(05), 1640013. https://doi.org/10.1142/S1363919616400132

Li, T. (2016, June 7). How Startups Can Overtake Corporates in the Innovation Race.pdf. Retrieved from https://www.entrepreneur.com/article/275759

Liedtka, J. (2011). Learning to use design thinking tools for successful innovation. *Strategy & Leadership*, *39*(5), 13–19. https://doi.org/10.1108/10878571111161480

Liedtka, J. (2015). Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction: Design Thinking. *Journal of Product Innovation Management*, *32*(6), 925–938. https://doi.org/10.1111/jpim.12163

Liedtka, J., Salzman, R., & Azer, D. (2017). Democratizing Innovation in Organizations: Teaching Design Thinking to Non-Designers. DMI.

Mickahail, B. (2015). Corporate Implementation of Design Thinking for Innovation and Economic Growth, 14.

Mozota, B. B. (2010). The Four Powers of Design: A Value Model in Design Management. *Design Management Review*, *17*(2), 44–53. https://doi.org/10.1111/j.1948-7169.2006.tb00038.x

Neren, U. (2011). The Number One Key to Innovation: Scarcity, 4.

Rae, J. (2016). Design value index exemplars outperform the S&P 500 index (again) and a new crop of design leaders emerge. Design Management Review.

Rauth, I., Carlgren, L., & Elmquist, M. (2014). Making It Happen: Legitimizing Design Thinking in Large Organizations. *Design Management Journal*, *9*(1), 47–60. https://doi.org/10.1111/dmj.12015

Rekonen, S., & Hassi, L. (2018). Impediments for experimentation in novice design teams. *International Journal of Design Creativity and Innovation*, *6*(3–4), 235–255. https://doi.org/10.1080/21650349.2018.1448723

Sarasvathy, S. D. (2001). Causation and Effectuation: Toward a Theoretical Shift from Economic Inevitability to Entrepreneurial Contingency. *The Academy of Management Review*, *26*(2), 243. https://doi.org/10.2307/259121

Seidel, V. P., & Fixson, S. K. (2012). Adopting "design thinking" in novice multidisciplinary teams: The application and limits of design methods and reflexive practices, 39.

Simon, H. (1969). *The Sciences of the Artificial*. Cambridge, MA: MIT Press.

Suchman, M. C. (1995). Managing Legitimacy: Strategic and Institutional Approaches. *The Academy of Management Review*, *20*(3), 571. https://doi.org/10.2307/258788

Thompson, V. A. (1965). Bureaucracy and Innovation. *Administrative Science Quarterly*, *10*(1), 1. https://doi.org/10.2307/2391646

Walters, H. (2011). "Design Thinking" Isn't a Miracle Cure, but Here's How It Helps. Retrieved from https://www.fastcodesign.com/1663480/design-thinking-isnt-a-miracle-cure-but-heres-how-it-helps

Westcott, M., Sato, S., Mrazek, D., Wallace, R., Vanka, S., Bilson, C., & Hardin, D. (2013). The DMI Design Value Scorecard: A New Design Measurement and Management Model. *Design Management Review*, *24*(4), 10–16. https://doi.org/10.1111/drev.10257

7 Appendices

7.1 Appendix 1: Interview guidelines

Setup:

1. Explain the purpose of the study: understanding and identifying good practices & support needs for advancing the use of design approaches
2. Personal data record law
3. Mention confidentiality. Ask for permission to audio-record the interview.

Role and experiences:

4. Can you tell me a bit about your current role?
5. What are the key activities and things you do as a designer?
6. How would you describe the current culture and development efforts at your company?
7. What are designers expected to do?
8. Is design thinking something your familiar with?
    - If yes, what's it about in your opinion?
    - Does company currently operate this manner? Where can this be seen in?

Concrete examples:

- We're trying to understand how design can be advanced at your company. Could you describe an example where you've tried something new or pushed for something and it went really well?
    - What helped, hindered, and surprised in this, needed support?
- How about a frustrating example where you tried out or pushed for something and things didn't go as you hoped?
    - What hindered and surprised in this, what could have helped, needed support?

Change agency:

- Are there things you want to influence or change through design?
- If you could keep one thing and change one thing, what would those be?
- Do you see yourself as a change agent?
- What would you like to see changed?

Themes for probing within questions: collaboration, demonstrating impact of design

Future:

- Looking at a more general picture, what do you see as the future of design (thinking)?
- What are the next steps you think your company should take?
- Coming back to your personal experience, what constitutes an exciting project for you?
- Thinking about your work and experience at the company in general, what would be your top 3 and bottom 3 moments so far?

- Going forward, what is that you are personally interested in, or looking forward to? Where would you like to see yourself in 6 months?

Concluding:

- Anything to add, has something important still been left undiscussed? Any questions for me regarding this study?

7.2 Appendix 2: Pre-defined code scheme for Design Plus – research project

1. Current culture of developing
2. Current role of design, incl. expectations for design
3. Definition of design thinking
4. Future of design
5. Good experience - examples
6. Bad experience - examples
7. Change agency, change efforts
8. Top 3 moments
9. Bottom 3 moments
10. Challenges, constraints, impediments
11. Enhancers, existing support & help
12. Suggestions, support needs, what would like to change
13. Next steps
14. Personal interest, exciting tasks