Design Thinking in Startups

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II

IV

Abstract

Recognizing the knowledge and opportunities that customers and users can provide, a shift toward user-centered approaches to innovation has been gaining a large interest.

Design thinking has been introduced as an innovation approach that brings creativity and user-centeredness to businesses. Despite this, little attention has been given to design thinking in startups. Though design thinking has gained considerable interest, there is still a lack of empirical research and literature on how design thinking is implemented and how it actually works. Furthermore the research has mainly been focused on large organization, leaving a gap where empirical research of design thinking in startups is needed. In this study, I attempt a more systematic exploration of how startups use design thinking. An explorative study was conducted with qualitative interviews with key informants from startups with design thinking profiles. The three themes that emerged from the analysis are how design thinking is perceived, what applications design thinking were used for and how it was implemented in the startups. This study contributes to an increased growing body of empirical research, which can be used for future research and adds a practical view to connect design thinking and entrepreneurship.

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Motivation

Inspiration for this study was mainly influenced by my background and interest in user-centered design. In particular, I derived motivation from:

- My personal interest in user-centered design and new ventures.
- Experience from working in startups
- Observing the similarity in the focus on customers in entrepreneurship and the user in interaction design
- Curiosity in how methods from interaction design could be applied to the startups.

Table of Contents

1 Introduction

1.1 The need for innovation

Companies are facing increasing pressure to differentiate their services and products to adapt to a rapidly changing economy, in addition to other challenges like low wages due to globalization, decreasing resource availability, and a growing focus on environmental issues that require businesses to maintain growth sustainably

The digital age has not only changed the way we do business but it has also changed the role of customers, who are transitioning from passive consumers to active influencers and trendsetters, emerging as makers and innovators themselves (Prahalad & Ramaswamy, 2004; Von Hippel, 2005). Internet, with inexpensive means and global reach, has given consumers opportunities and the knowledge to identify their needs and create their own services and products that challenge established players, opening spaces for disruptive innovation to grow.

Due to advancements in technology, the barriers to start new ventures are now lower than ever before. However, increasing global competition and changing customer behavior brings new challenges to startups. Such competition, in addition to the fact that most startups fail (Kirchhoff, 1994), is already a great concern for entrepreneurs. Studies show that one of the reasons that startups perform worse is because they fail to use enough time on customer development (Blank, 2012).

Businesses have begun to recognize the need for innovation as the key strategy that can help them gain and sustain a competitive advantage over their competitors. Due to the knowledge and opportunities that customers and users can provide, businesses have begun to show a great interest in user-centered approaches to innovation. In their search for user-centered approaches to innovation, business have shown an increasing interest in the design thinking (Carlgren, Elmquist, & Rauth, 2014), which has gained much popularity as an innovation approach.

Customer understanding is critical to the success of startups because it helps businesses create improved and more compelling services and products that lead to competitive advantages and increased innovation capability.

1.2 Design Thinking as a Tool for Innovation

1.2.1 Improved capability

Design thinking is promoted as a user-centered approach to innovation. It has been introduced as an management approach that brings creativity and user-centeredness to organizations, as a new way of working (Brown,2008). It has been increasingly associated with problem solving of complex and ill-defined problems, also called "wicked problems(Carlgren, 2013). Another defining aspect with design thinking is that it is thought to provide value through customer that allows the businesses to interact and involve their customers in a different way and gain insight from them in ways that can be meaningful and rewarding. Liedtka argues that the process of derive and use these insight results in competitive advantages:

> *"Translating these needs into design criteria provides the underpinning for the ideation stage and its belief that users' unarticulated needs and desires are the foundation of differentiated value propositions. "*

(Liedtka, 2014, p. 5)

Design thinking's ability to solve complex problems and its human-centered focus can give startups the customer understanding that is critical for their success. However Acklin(Acklin, 2013) states small firms have yet realize design thinking's value.

1.2.2 Startup and large organizations

An important aspect of design thinking is the notion that everyone can learn how to use it for innovation purposes (Brown, 2008; Martin, 2004). However, in the design thinking literature, the focus is on larger organizations (Acklin, 2013). Results from my literature review indicated that there is also lack of empirical research on the use of design activities related to user-centered approaches in startups.

There are considerable differences between large organizations and startups (Blank, 2014) The differences between startups and large organizations means that the uses and challenges

of design thinking applied to startups will be different too. They might face barriers such as limited capital and human resources and less formal product development and innovation processes that characterize small- and medium-sized firms (Acklin, 2013).

Thus, research on how startups use design thinking will provide insight into a new venture context that will complement the existing findings on large companies and give a more nuanced picture of the concept.

1.2.3 Understanding design thinking

One of the greatest issues with the design thinking literature is the ambiguity of the concept. It leads to various interpretations of the notion. As a result, it is confusing for design thinking novices and lay people to enter into the discussion. This might be a hindrance to adoption and successful implementation of design thinking in companies. Furthermore, the different interpretations open up the possibility that uses of design thinking are mislabeled as something else.

1.3   Research question

Some claims that design thinking is applicable as an innovation approach that non-designers can use (Brown, 2008; Martin, 2004). But the research on design thinking has mainly been reserved for large and established companies and is scant on small companies and startups. When considering the importance of a startup's role in driving innovation and economic growth, it is paramount that we also understand how startups use design thinking.

Based on this problem, I propose the following research question:
How do startups use design thinking?

The rationale behind this explorative study is to provide a descriptive overview of what organizations do and experience when startups engage in design thinking. It puts particular emphasis on how the concept is understood, and used as it relates to existing innovation efforts. In addition, an agenda for future research is proposed.

Moreover, this study aims to contribute to developing a better understanding of design thinking.

1.4   Thesis outline

The structure in this paper follows the proposed structure suggested by Wilson (Wilson, 2010).

Introduction covers the background of this study, research questions and thesis structure. Literature Review, in the first part, will present literature and theory to describe what design thinking in practice is, through the role of design, a definition of design thinking, and then present a framework of design thinking in practice of characteristics and conceptual models of design thinking. The second part talks about the findings of how design thinking is used in a recent study. and its potential role in the startup context. Methodology describes the research approach and documentation of data collection method .Findings present the results from the research, how design thinking has been used, in three aspects, how was design thinking perceived, the applications of design thinking and how design thinking was implemented in the startups. At last I present my reflections on the study and further research. Conclusions provides a summary

2 Literature Review

2.1 What is design thinking

2.1.1 Design and Design Thinking

The term 'design' has traditionally been associated with a product's aesthetics and visual expression and, in industries where the products 'consist of design' – such as fashion, interior and architectural design - it is has becoming increasingly common to relate design to the ability to solve complex issues, also commonly referred to as "wicked problems" (Buchanan, 1992). The literature on design thinking is often described as related to this notion of design.

The expanding uses of design have resulted in a need for a way to categorize the different types of design applications. The Design Ladder, developed by Danish Design Centre, is a scale developed to measure the level of design activities in businesses.
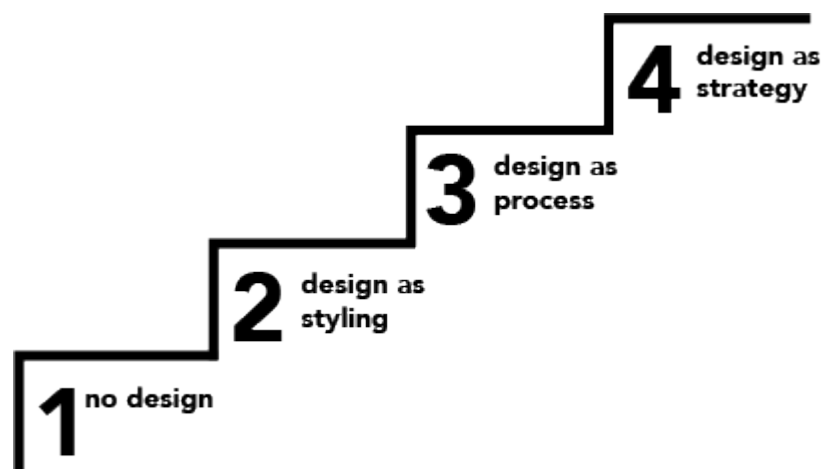
Figure 1: The Design Ladder that measure how the design is used in organizations. Recreated from (**("Design Ladder," n.d.)**).

At the first level, there are non-design companies, which rarely use design or design has no role in the organization at all. On the next level, design is used purely for styling and other aesthetic purposes in the organization. Another characteristic is that design is often applied as an add-on. These companies are typically product oriented companies. Level three categorizes companies where design is integrated in the organization's processes, and

includes design and designers from the start in new processes. On the highest level, design is a strategy and part of the management. ("Design Ladder," n.d.). The discussion of design thinking has been mostly associated with the design activities on the top, at level 3, design as a process and level 4, design as a strategy. Carlgren (2013)points out that some might object to leaving out design aesthetics because it can be a driver for innovation, as well as design as processes and strategy. The design ladder model is useful for understanding the distinctions between the different conceptions of design and showing how design thinking is related to design.

Although design thinking has been discussed in the design discourse for the last decade (Hassi & Laakso, 2011; Johansson-Skoldberg, Woodilla, & Cetinkaya, 2013), it first gained widespread popularity outside the design discourse when it entered the management discourse. This is mainly credited to the work of Tim Brown (Brown, 2008), the former CEO of IDEO, one of the most well-known design consultant firms in the US and Roger Martin, former Dean of the Rotterdam Business School. Earlier discussions on design thinking was earlier academic design research and has mainly focused on professional designer's competence and their work (Buchanan, 1992; Cross, 2001; Lawson, 1980).

Design thinking is claimed to be a novel and creative approach for organizations to achieve a competitive advantage through improved offerings and customer experiences, or transforming a firm into a dynamic and flexible entity (Acklin, 2010).

But, growing concerns about design thinking have emerged, from both practitioners and scholars. In discussions of design thinking, the term has been claimed to be fuzzy and too abstract. Others have suggested that the term is simply used for marketing purposes by well-known design consultancies

2.1.2 Defining design thinking

In one of the most known articles about design thinking, Brown presents design thinking as a human-centered approach to innovation inspired designer's way of working and thinking, which people with non-design backgrounds can use (2009). However, there exist a great number of different variations to the definition of design thinking. One of most important

issues around research of design thinking is the difficulty to pinpoint the concept, due to the existence of the many different interpretations and views. Interpretations of design thinking takes inspiration from "the classical design research, to the more recent managerial debate, to what goes on in the name of design in innovation, or a mix of these" (Carlgren, 2013).

Johansson-Sköldberg et al. (2013) suggest that attempting to create a definition might not yield value or further use. This is a good point as a too narrow definition might limit the concept of design thinking and thereby not fully embrace its variety and breadth of use. But, if the researchers and practitioners of design thinking are to be able to work with design thinking, some kind of agreement of the phenomenon is necessary. Like Carlgren, Rauth and Elmquist puts it "there is a need for some kind of shared understanding to enable systematic research on the phenomenon" (Carlgren, Elmquist, & Rauth, 2012).

One of the most notable works on design thinking that tries to clarify the confusion and differentiate the many concepts around design thinking is that of Johansson –Skoldberg et al (2013). They define two concepts: "designerly thinking" and "design thinking". Designerly thinking belongs to the design discourse, describing the practice and reflections of professional designer. Design thinking, on the other hand, refers the design practices and competence that include uses beyond design context and used by and for people with non-professional design backgrounds.

This description corroborates the definition provided by Brown (2008), but also contributes to developing a clearer concept of design thinking by highlighting the distinction of the use of design thinking and the design carried out by professional designers. Such a definition of design thinking applies to this study, as used by startups in an entrepreneurial context.

The definition provides a valuable starting point, yet lacks elaboration of what actually design thinking in practice entails. As a common meaning of design thinking is an often discussed topic in discussion around the notion, the literature seems to have more consensus of the features of design thinking. The following section will go more in detail on these elements and the research on the use of design thinking in practice. This will be the basis for the framework of the findings.

6

2.2 Using design thinking

To address the issue of the ambiguous definition of design thinking, the literature has shifted from prescriptive studies to more descriptive, with more focus on investigating how design thinking is used in practice (Carlgren, Rauth and Elmquist, 2014, Schmiedgen, Rhinow, Köppen and Meinel, 2015). Though the concept of design thinking is difficult to pinpoint, there is a general agreement on the features of design thinking ()

One of the academic works that provides a overview of concepts related to design thinking is by Hassi and Laksso (2011). Building on a literature review, they attempt to identify characteristics of design thinking in management discourse. They propose a framework where the identified elements of design thinking are categorized in three dimensions: practices, thinking styles, and mindsets.

Table 1: The framework for design thinking by Hassi and laksso, (2011) , as shown at ThisIsDesignThinking.net, with added self-suggested titles for each column. ()

Dimension	Description	Characteristics
Practices	Refers to concrete activities, ways of working and the use of specific tools	• Visualizing • Thinking by doing – e.g. prototyping • Human centered approach – putting people first • Collaborative work-style • Combination of divergent and convergent approaches
Thinking style	Refers to mentality, cognitive processes and thinking style	• Abductive reasoning – „the logic of what might be" • Reflective reframing • Holistic view – 360° understanding of the problem • Integrative thinking – bringing competing constraints into harmonious balance
Mindsets	Refers to mental orientations towards the work	• Experimental and explorative – willingness to risk failure • Ambiguity tolerant – acceptance of a „liquid and open" problem-solving process • Optimistic – unwillingness to give in to constraints and obstacles

While the framework of Hassi and Laksso identify the elements, it does not account for how the elements interact. Based on empirical findings, Carlgren, Emerson and Rauth developed a conceptual model (Carlgren, Rauth, & Elmquist, 2016)attempting to conceptualise how design thinking was applied. It describes design thinking as a dynamic process with multiple aspects and illustrates how they interact with each other. These are principles, practices and mindset and techniques:

- **Principles:** The model describes 5 different principles related to using design thinking. Focus on the user, challenging the problem, include diverse viewpoints, make it tangible and experimenting. These principles were related to the practices and mindset.
- **Practices** and **mindset** are supported by techniques, tools and methods.
- **Techniques** are the tools which supports the mindset.

Figure content: Principles are linked to practices and embodies mindset; Principles; Ways of working; Practices; Mindset; Ways of thinking, attitude; Techniques; Methods and tools supporting practices and mindset.
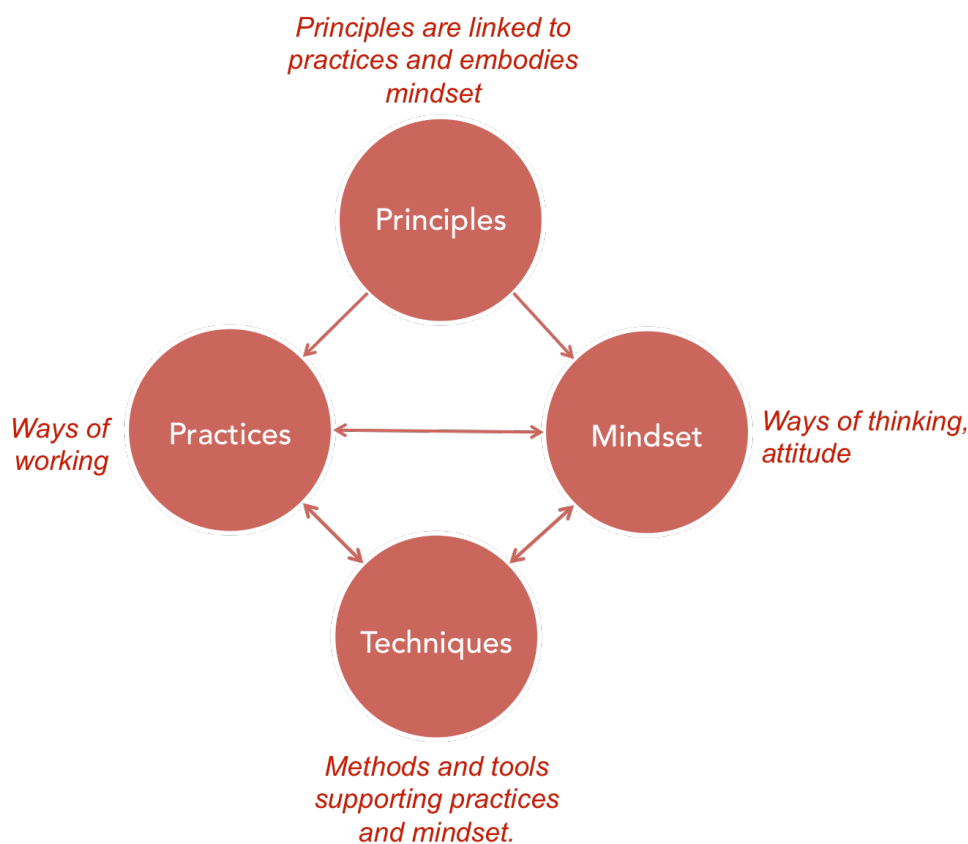
Figure 2: The conceptual model of design thinking adapted from Carlgren, Rauth and Elmquist (Carlgren et al., 2016)**,**

8

This conceptual model aims to build an understanding of design thinking in practice and theory (Carlgren et al., 2016). to identify use of design thinking in the startups, empirical studies are needed.

But how is design used in practice? The report "Parts Without A Whole" attempts to answer this question. It is one of most recent and comprehensive empirical study of design thinking, published by researchers associated with the Hasso Plattner Institute. The Hasso Plattner Institute is an educational institution known for design thinking.

The study used data from a survey of companies about the use design thinking and experts interviews, across multiple industries and different organizations. It gives a picture of the current state of use of design thinking by looking at aspects of design thinking in practice.

Though the study included small companies, it did not address the differences between large and small companies in the findings. However, it did uncover several interesting findings on how design thinking is used in general, particularly about the different applications of design thinking used in organization and their perceptions of the concept as well as the use of synonyms related to the concept design thinking. Use of synonyms suggests that there might be other terms than 'design thinking' that can describe the concept of design thinking.

This is an issue as there is a "trend"[1] of using the label 'design thinking' in empirical studies of design thinking in practice (Carlgren et al., 2014; Carlgren, 2013). Conversely, there is a danger of excluding the term design thinking because it was not labeled as such by the participants. Thus, it is possible that there is a gap on this area.

The literature review has until now focused on identifying design thinking in practice. In the next section I will shift toward presenting the theories surrounding the implementation of design thinking in startups.

2.3   Design thinking and entrepreneurship

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[1] "Recent "

Earlier in the literature review, I investigated what design thinking is, its constituent elements and how they interact when used, and its actual applications. However, these theories are based on research of large organizations, despite the fact that design thinking is perceived as an all-embracing approach that can be used and applied in organizations of all sizes (Schmiedgen, Rhinow, Köppen, & Meinel, 2015).

Ample evidence shows that startups are inherently different from large organizations, which leads to a different impact of design thinking. An extensive literature review yielded scant academic research on this topic. However, there has been a discussion that relates to design thinking in startups and its uses in an entrepreneurial context. Nielsen and Christensen(2014)suggest that design associated with "wicked problems" are closely related to entrepreneurship, due to the similarities between reasoning used in both and design and entrepreneurship. Research of entrepreneurship used to conceive entrepreneurship as a causal process. But recently, a new body of research suggests that entrepreneurship uses a logic that can be described as a creative problem-solving approach (Sarasvathy & Forster, 2012). This perspective aligns with design thinking, which is explorative, rather than predetermined; as opposed to causal logic, the focus is on the creation of opportunities. Entrepreneurs thus become designers (Sarasvathy & Forster, 2012).

Nielsen & Christensen points out that there are distinctive differences too (2014) Design has strong focus the front end where ideas are explored and created whereas entrepreneurship are mainly interested processes that transforms ideas into opportunities. The paper offers an approach to combine design thinking to entrepreneurship in startups. However, the lack of empirical research on design thinking in startup is needed to shed some light on this.
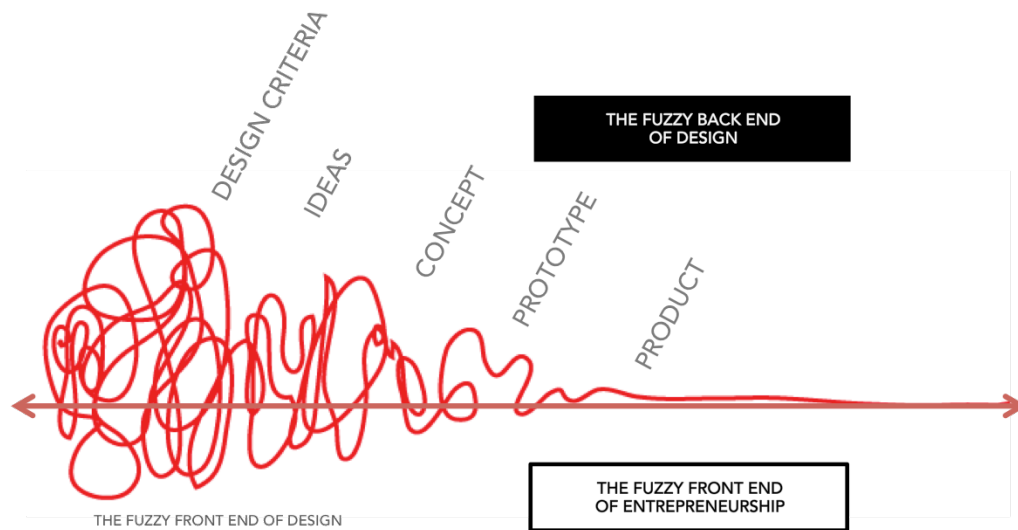
Figure 3: The fuzzy front end of entrepreneurship and the fuzzy back end of design. Redrawn based on Nielsen and Christensen's depiction **(2014)**

2.4 Brief summary of the literature review

In the literature review, I have explored the concept of design thinking by examining how design thinking is associated with design. I have also described it as a problem-solving approach for "wicked problems" and considered the use of design as a process and strategy in organizations.

There are many various interpretations of design thinking, thus making it difficult to pinpoint. However, for this study, Johansson-Skoldberg et.al's interpretation is used – i.e., design thinking is a set of design practices and competencies that can be used by non-professionals beyond the traditional design context. In addition, several conceptual models of design thinking are provided to identify design thinking in practice. These models describe the use of design thinking as a dynamic process of elements that can be categorized into practices, principles, mindsets and techniques.

2.4.1 Design thinking in this study

Design thinking in this paper is therefore design activities that have a human-centered approach, used beyond a design context, and exhibit characteristics and features related to the practices, mindsets and conceptions of design thinking. Consequently, these activities might

be labeled with synonyms associated with design thinking, like strategic design, design driven innovation, user-centered design and other terms that share the same criteria.

3 Methodology

3.1 Research design

3.1.1 Qualitative and explorative research approach

The research question is:

How do startups use design thinking?

The aim of this paper is to provide an empirical, exploratory and descriptive study of how startups use design thinking. To answer this research question, a qualitative case study method and explorative approach to the research process was chosen due to the nascent nature of the topic, as explorative research approach is suitable for topics with little or no existing research yet conducted about them (Yin, 2009)For this topic, this approach was an appropriate choice because of the lack of empirical studies on the application of design to smaller firms in existing literature, especially for startups.

Using a qualitative approach instead of quantitative allows for a flexible and less structured research, in order to explore the contexts around how startups use design thinking. This allows the generation of meaning from the gathered data, deriving a set of themes, and making interpretations to identify shared patterns of behavior (Yin, 2009).

3.1.2 Case study design

The qualitative approach is why case study design was used in this paper. The case study design is also preferred for answering "how"-questions, because it allows the researcher to focus on a qualitative and in-depth research (Yin, 2009).

Thus, the key advantages to case studies are that they are flexible, by allowing use of multiple methods in combination, and have an emphasis on context, which allows us to gain holistic and meaningful understanding. This is often needed to understand complex social phenomena in their natural context, when there is a focus on contemporary events like in this paper (Yin, 2009).

Because single-case study can be vulnerable due to a given case's uniqueness., multiple case study were chosen with each startup as a unit. It is also suggested when the aim is to understand a phenomenon in various contexts(Wilson, 2010). While a single case study can be vulnerable due to its uniqueness, the evidence from a multiple-case study is often perceived as more compelling, according to Yin, because a multiple-case study allows one to look at the phenomenon both within each setting and across different settings. It is therefore a suitable strategy for finding similarities and differences across cases (Yin, 2009).

3.1.3 Research process

Phase 1 – Pilot Study: A pilot study was conducted in the Spring of 2014, in the initial research process before main enquiry in phase 2. The purpose was to refine the selected interview questions and select concepts that would be used in the main enquiry.

Phase 2 – Main Enquiry: The second phase was focused on identify relevant startups that used design thinking and provide findings of how it was used. In the following sections a brief description of the pilot study is provided before moving on to a more detailed description of the data collection in the selection of cases and data collection in the main enquiry.
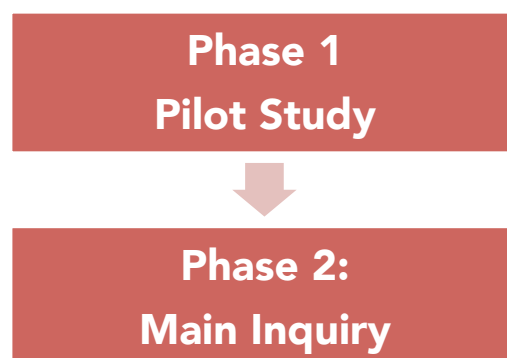

Figure 4: Phases of the empircal research. The pilot study was mainly to explore and identify the questions and concepts around design thinking, while the data from main enquiry is what presented in these findings.

14

3.2 Pilot Study

The initial phase of this research was first and foremost a preliminary study to understand the process of establishing a business and identify possible uses of design thinking in this process. I set out to investigate what the current situation was, what concepts of design did the companies use, and how mature and wide spread was the implementation and use of design thinking as an innovation approach. In the pilot study, I also attempted to identify concepts and methods related to design driven innovation in different industries that were already in use in companies that were not formally using design thinking. The selection of the participants of the pilot study was selected with the purpose of representing different industries and different types of organizations but with focus on new venture-process. Based on the findings from research about government design program initiatives, interviews of a recently established food export company, several startups and a consultant specializing in helping Nordic companies to venture in foreign countries, I found that:

- Companies from high-income countries are in great need of re-inventing themselves constantly and need to show greater competitive advantage to not lose to companies from low-cost countries. There seems to be a widespread notion among governmental bodies that design approaches to innovation can help solve this problem.
- Very few companies claim to use specific design approaches or management approaches though they might use user-centered practices and inhabit mindset and culture that are associated with design thinking.
- This led me to the conclusion that in order investigate further I needed to find other ways to identify companies that used design thinking.

Findings and reflections from the pilot study were later used in phase 2, which is addressed in the following sections.

3.3 Data collection

3.3.1 Selection

One of the criteria for the cases selected for main study, was that they were startups. The startups in this study, had the characterization of being "human institution designed to create a new product or service under conditions of extreme uncertainty", as Blank defines startups (Lean startup, p. 27). Furthermore they were small businesses according to the accepted definition for small businesses in Norway (Iversen (2003) with less than 20 employees.

Previous design studies (eg. Carlgren, Elmquist, & Rauth, 2014) investigated organizations that claim to use design thinking. In contrast it is a challenge to find startups with an established way of working at all, least claiming to adopt design thinking. Hence greater considerations were taken when selecting cases for the main enquiry, since the experiences from the pilot study indicated that it would be difficult to find startups that claimed to use design thinking. Thus, the selections of the companies were in the first round selected based on design contexts that applied design thinking. For this study three different design thinking contexts were identified:

1. Startups in design thinking innovation programs
2. Startups with founders from formal design thinking education
3. Startups using services from design thinking consultants

The choice of startups with these requirements was not always great, especially regarding the cases in design thinking innovation programs, as programs are mainly aimed for participants and projects with established firms. In order to find relevant startups that fit these criteria, snowball method was used for sampling. I researched and used my own personal network of central actors like Innovation Norway, the Startup Lab, Centre of Entrepreneurship and others in the Norwegian startup scene. Using this method ensured that the cases were relevant to the study. Contacting the relevant interviewees through peers made the subjects more receptive towards the topic and interview process.

Table 2: Overview of selected cases with background info and which design thinking context they had.

Startup	Founded	Industry	Team	Design context
Startup A	2008	Business software	3 founders	Design thinking innovation program
Startup B	2015	Recruiting and HR	2 founders, 2 employees	Design thinking innovation program
Startup C	2014	Tourism	1 founder	In-house designer
Startup D	2013	Business software	2 founders, 1 employee	In-house designer
Startup E	2014	Social media	3 founders	External designer

3.3.2 Interviewees

When it was possible, interviewees with different positions from each case were interviewed. The following positions that were targeted from each case were:

- The founder
- The designers
- Managers of the design thinking innovation program or school

From each company, the founder was interviewed. The founders were targeted as the key stakeholders in the design thinking since it was important to understand how their products and services had developed and evolved from the early days. When there were more than one founder, the founder with the most involvement and active responsibility with design thinking that was selected.

When available, the designers that were involved in the process were also interviewed. The designer or design team was important because the designer was also the one leading the sessions and had in some cases a major role in the influence of the design thinking context. Each respondent's knowledge was considered as appropriate and relevant to the research objectives.

In addition to the designers that were involved in the process, other important stakeholders were managers of the design thinking innovation programs. The managers were not necessarily included in the day-to-day-design thinking activities, but was responsible for following up, measure outcome and results and not at least defining the requirements in the projects. Thus, their perspective was important to validate the projects' relevance to design thinking.

3.3.3 Information and technology companies

With one exception, all the cases in this study is IT-related. However the over-representation of IT and communication-related companies is similar with prior research on the use of design thinking. It is suggested that the reason might be because design thinking complements other iterative methodology that is favored by companies in the IT and communications that face greater need to innovate due to the increase of internet startups (Parts without a Whole, 2015).

3.3.4 Semi-structured interviews

Using a qualitative approach instead of quantitative allows for a flexible and less structured research in order to explore the contexts around how startups use design thinking. This paper builds on the semi-structured interviews with 5 startups and other stakeholders that was involved in use of design thinking in the startups.

There were in total 11 interviews. All interviews and follow-ups in this phase were conducted during 2014 and 2015. Six interviews conducted face-to-face, and five were done with Skype or telephone. Each interview lasted between 1 to 2 hours. The interviews were conducted using the native language of the respondent, because the made the flow of the conversation easier. 3 interviews were conducted in English; the rest of the interviews was in Norwegian. Translations of the interviews were kept as close to the original meaning as possible. All interviews were recorded with permission. Interview guide were used and if

needed, the interview guide was revised to make the interview questions clearer. The recordings and notes were later transcribed, or summarized, and then translated and coded for analysis.

Quotes may have grammatical errors due to the oral language, but edited if it helped make them more readable.

3.3.5 Documents and reports

The findings from the interviews were complemented with written material as data sources. These sources included from company documents, the companies' websites and news articles. For the cases in the design thinking innovation programs additional secondary sources existed, as final and working reports and presentations of the projects with description of the product development, methods and processes. The extra material provided better grounds to support the findings, as it helped with data triangulation.

3.4 Data Analysis

To analyze the qualitative data of the study, a hybrid approach was adopted. The data was first analyzed using an inductive approach. The purpose of the inductive analysis was to discover patterns and themes, grounded in the data.

The results of the inductive analysis were compared to the findings from the study "Parts without a whole". This approach allowed the study to keep its exploratory nature while considering findings from previous work.

3.5 Quality of research

It is important to note that because of the exploratory nature of the research the purpose of

this study is not to provide any kind of generalization or definitive conclusions that are applicable to other settings. The emphasis is instead on exploration and description of how startups understand the concept and how they apply it. The output of this work may then be used to produce suggestions and direction of future related research. According to Edmondson and McManus (2007) such contribution is important when there is a lack of prior research.

Although to the reliability and validity has been taken into consideration in order to increase reliability and validity of the study.

3.5.1 Reliability

Reliability is important because it ensures that anyone who follows the same procedure will be able to produce the same findings. The following practices for increasing reliability suggested by Wilson () was carried out:

- **Using multiple sources of evidence:** Multiple sources of evidence are essential to corroborate the findings. I attempted to collect data from multiple sources, by using informants with different roles were when this was available and using secondary data from article in the press and reports. In addition the cases with three different design thinking context were included to provide data from multiple perspectives.
- **Case study database:** a case study database was maintained during the research for retrieval of data used in this study in case of later investigations.
- **Establishing a chain of evidence:** To reduce the risk of leaving unknown gaps and biases in the study care was taken to record data from both the pilot study and the main enquiry, including recordings of the interviews, project reports and other documents. To ensure anonymity and privacy of the startups the transcripts and the project reports are not included.

3.5.2 Validity

In addition to data reliability it is important to ensure validity. Validity is "the relationship between a construct and its indicators"(Wilson, p.119).

In this paper construct validity is of particular interest. The concept of design thinking is difficult to describe and it can be discussed if the research design used supports the ability to study the phenomenon. The informants might have different perceptions on what the different concepts used in this study and the different design context I have investigated use different labels. I have attempted to increase comparability by matching the informants' descriptions to the description of design thinking and other findings in previous works on the use of design thinking in the literature. In addition, I compiled a list of synonyms of design thinking found through an extensive review of popular press and academic works. I found this list to correspond with the findings from the report "Parts without a Whole". (Schmiedgen et al., 2015), a study of the current status of design thinking conducted by one of the leading institution on design thinking, Hassner Platt institute.

In addition, following methods to increase validity in qualitative research as suggested by Mays and Pope (Mays & Pope, 2000)were carried out:

- **Methodological triangulation:** The study attempted to achieve triangulation by combining the methods interviews and analysis of secondary data sources.
- **Clear exposition of data collection and analysis:** Detailed description of data collection and analysis is provided in later sections in this paper.
- **Reflexivity:** To reduce the researcher and research process' influence on the findings, interview were open and avoided framed questions. Moreover I have addressed personal biases to the best of my knowledge.
- **Fair Dealing:** Different viewpoints have been obtained through including different stakeholders as informants. Furthermore the study is using cases with three different design thinking context, which represents additional aspects to situations design thinking is used in.

Considering these measures, additional actions could have been done to increase the research quality if not for practical issues like limited availability of people and lack of resources. The study could have included more stakeholders, like customer and potential users, and

combining interviews with findings from observation and survey data, as it could have provided more nuanced findings too.

3.6 Ethical issues

As Wilson (2013, p.79) states it is the researcher's responsibility to ensure that the research has been carried out in honesty and accuracy. It is therefore important to consider the ethical consideration related to business, concerning issues like such as respecting the participant's wishes and the privacy and confidentiality (Wilson, 2013, p.82). I address these issues by providing anonymity to the informants and acquiring consent for sharing the results. In this study I have attempted to consider the repercussion of the research for each participant and also asked for permissions to approach others in the same case.

4 Findings

The focus in this chapter will be on the understanding of design thinking in startups, to what purposes design thinking is used for and how design thinking was implemented.

4.1   Perceptions of design thinking

How is design thinking perceived in a startup context? One of the most frequent perceptions of design thinking is that design thinking is a toolbox. When asked this question, the entrepreneur of startup C said, *"As an entrepreneur, even a business person, you always want a toolbox with lots of tools in it, so design thinking its just one tool, appropriate for some jobs, not all, nor only tool you should have and for everything"*. In other words, an umbrella concept for a range of methods and tools to achieve other goals. Like all tools, design thinking suits some purposes better than others.

Design thinking could be used independently as a stand-alone process. However, findings show that the startups were more likely to adapt it the existing processes and context. For instance, the team from startup A's case compromised the original idea phase to include implantation into their design thinking project. Likewise, Startup B, did also adapt design thinking to their needs. They used a flexible team structure instead of a having team with fixed roles and people. With a flexible team, roles and people would be pulled into the project when needed.

The toolbox view could be perceived as a tool for general purposes that could be used in all kind of applications and areas. Similar to a toolbox, design thinking can used for different purposes that are appropriate. It was also often described as a tool with just one specific purpose. Examples of some of these specific purposes were creativity and to understand the customers and users. When asked about what design thinking was, the co-founder of startup D believed that   *"Design thinking is about understanding users and empathy for the user. The rest of the stuff, like prototyping and testing, is just tools to achieve this"*. In other words, design thinking was the approach that supported user and customer understanding; by providing frameworks, skills and methods to accomplish this purpose. However, there was a

strong pattern towards the view that design thinking is the most suitable for discovering ideas.

4.2 Applications of design thinking

Applications describe the purposes that design thinking is used for (Schmiedgen et al., 2015). I found three major themes. These were:

1. Exploring opportunities
2. To gain understanding and insight about customers and users
3. Testing assumptions

4.2.1 Exploring new opportunities

Design thinking was applied to various contexts where the purpose was to explore opportunities. But the two most mentioned were discovering business models and new product development. However, new product development is the most usual. Particular for the design thinking program cases, which entailed design thinking projects with innovation in a new product development context. For example in the design thinking project to Startup A, their objective was to develop a product for a potential target group in a market that the team was unfamiliar with. Because they lacked knowledge about the market and the group they chose an explorative approach in order to discover possibilities they could utilize.

4.2.2 Understanding customers and users

As a human-centered approach design thinking was used to understand the problems that you are trying to solve and the stakeholders that are involved. But in this case it was mainly used towards the stakeholders, end-users and customers. The purpose of using design thinking to understand users was often to get deep insight about the way they worked, what their needs was and their context. To acquire this insight, the startups had to get input from the users, which could be gathered by seeking out potential users, organize workshops where users were invited to participate or observe them. For instance, Startup D had close relations with a number of their customers so to be able to get to know their user group and get a deep understanding of how they worked and what their needs was. Several methods were used

based on the different contexts, but one singled out. Just "Talk to your users" was according to several of the informants the best way.

4.2.3 Testing assumptions

One of the most important applications of design thinking in startup was testing of assumptions. It was often prototyping that was used for testing assumptions and hypothesis that were defined beforehand.

Testing of assumptions was found to be highly useful for the startups. Tts importance was attributed to the potential effect on a more efficient development process and reduces the risks. As an example, I quote one of the statements of one of the entrepreneurs: *"Design thinking is a way moving through that evidence gathering, quickly and hopefully cheap too. First-time entrepreneurs often get stuck on release, stuck on thinking they need investment. It seems like a huge hurdle, and you think 'I can't do it'. But when you think about testing your assumptions it becomes much more accessible and easy."*

4.3 Implementing design thinking

Implementations of design thinking will be described through processes and methods used in the startups. The cases are structured in the three different design thinking contexts, startups in design thinking programs, startups with design founders and startups with external designers.

Table 3: Overview of case companies and summary of their findings. 'Process' describes the process and summarize how it was implemented.

Startup	Design Thinking Process	Design activities	Characteristics
A	Process model based on design thinking processes.	User-interviews, observation, brainstorming sessions, role-playing, user-journey, scenarios, real-life testing	Independent, structured and formal
B	GV5-sprint developed by Google. Focus on implementation.	Observation, brainstorming sessions, role-playing, user-journey, scenarios, real-life testing	Independent, structured and
C	Stanford's d.school design thinking process.	User-interviews, customer feedback	Embedded,
D	Own process	User-interviews, real-life testing, usability testing	Embedded,
E	Own process	User-interviews, usability testing, customer feedback	Embedded and independent

4.3.1 Startups in design thinking programs

The findings from startups A and B were from projects that were a part of design innovation programs that was funded by the government. The funding to the program are grants and this support is given to the participating programs to fund hiring design competence to a project that aims to develop a new idea to a product or service that does not yet exist.

There were two separate programs and each project had different frameworks. The aim of these programs was to introduce companies to a more systematic and methodological process to the discovery and innovation process and connect professional design competence from start of the process.

The purpose of the programs is to test out design driven and design thinking approaches in practice and use the experience from the projects to inspire other to also start using it. Additionally the aim is to develop better tools and methods for other programs and services that support businesses. Furthermore the projects aim to contribute to increasing the number

of innovative and competitive products and services. Both design-thinking processes were designed as projects, with a set beginning and end date.

Startup A Design Process

Startup A was founded in 2008 by four engineers just graduated from university to develop tools for conferences and fairs and later pivoted to the consumer market. In 2013 they were accepted to the design innovation program and awarded funding to develop new and innovative solutions. The program that startup A participated in was to introduce a systematic and user-centered approach to the idea phase in companies that could increase companies' competitive advantage. The initial design process proposed by the program therefore focused on the idea phase.
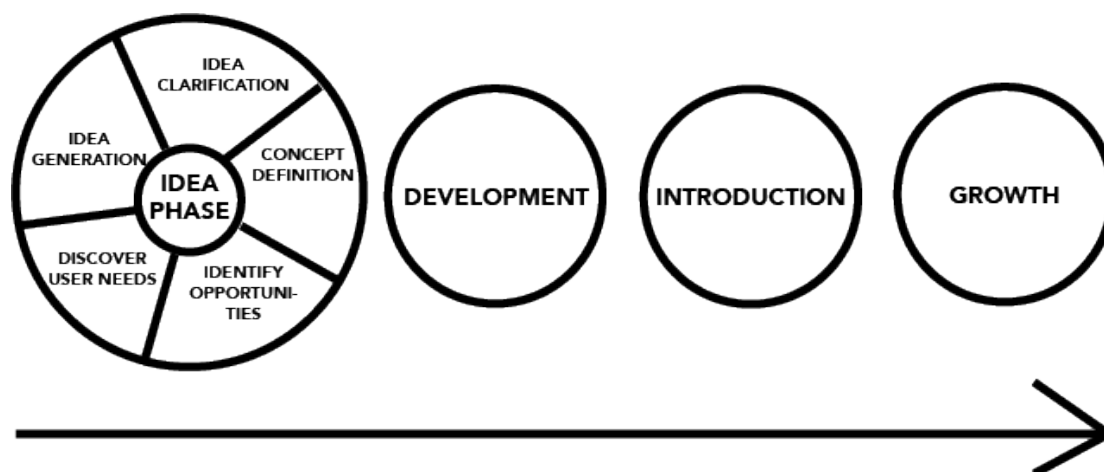

Figure 5: Illustration of a new product development according to the program. The project's scope was the idea phase.

In this project they aimed to pivot again by exploring a new market focusing on their competence in presentation and showcase tools. The aim of the project in the design program was to develop a new product and it was toward an unknown and new market for the startup. The startup is a unique case, as they are one of the few small companies, and the only startup, that were accepted into the design driven program.

The project was planned to be carried out as an iterative ideation process, leaving the rest of product development phases outside the scope. However, due to the product and being a

startup, implementation naturally integrated into the scope. The team acknowledged that the focus on the idea stage in new product development processes, which often only deals with the mapping of insights and conceptualization, was needed, but realized that a startup would have more value of a more agile approach. Their designer remarked that *"As a small startup, it is clear that they must work fast and reach something that they can launch and sell, not within five years, but within a year preferably. So they can't remain for too long at the idea stage."* Therefore the process in practice was more like a pre-prototype stage and after.

- **Insights:** For insights the focus was identifying the relevant user groups and their needs and understanding the way they worked.
- **Ideas:** For ideas the aim was to generate varied and interesting ideas for possible solutions.
- **Concept:** Select ideas and refine them into concepts.
- **Test:** Test and validate.

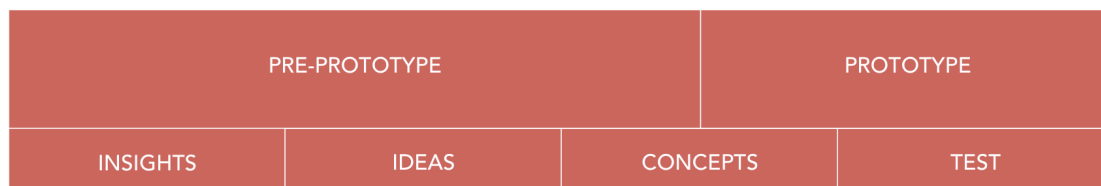| PRE-PROTOTYPE		PROTOTYPE	
INSIGHTS	IDEAS	CONCEPTS	TEST

Figure 6: Model of the process, showcasing the four phases and at what stage they were applied in. As the model shows, the concept phase happened during pre-prototype stage as well as the prototype stage.

Insights and ideas

Due to unfamiliarity to the new market that was chosen for the project, the initial stage of the project was explorative. As the designers put it: "We started in the dark because it was so unknown". So effort was made to keep the project's objectives broad and open.

To gain insights, user interviews and observation was conducted in the beginning of the process, where representatives of potential users and customers were included. The interviewees were from the primary user group and two different secondary user groups, with different backgrounds and age.

To gain an overview and insight into the existing tools and understand needs, of the users were observed in their environment, interviews with other stakeholders and research into

similar projects and trends in the industry was conducted. The data and results from these activities were organized and analyzed using personas, user scenarios, user journey, and visualization of touch points and timelines of the users with user context. These tools were used for communication within the team and to others. They were also used in the brainstorming workshop with the different users and stakeholders.

Concept and test

After the initial mapping of insight and idea the team's objective changed from a divergent approach to a convergent one. Later in the process, they narrowed the number of involved users into two groups. They also narrowed the scope of the product that they wanted to develop further. The goal of the core concept was to improve and simplify communication between the two user groups.

To assess the features and different ideas, user scenarios were mapped out and discussed. The idea selection was based on the feasibility considering the resources that the project had available and the strategy of the startup. This selection process resulted in three basic features.

While in the concept and test phase, prototypes where created. Prototypes were developed through small iterations, where designers and developers, which were the founders, worked closely together. The interface design of the product was developed in parallel with the development of technical features. This way of working, led to constant feedback between the two roles. Despite that the project encountered practical challenges and reservation by the some of the users regarding using new solutions, the team managed to test in real-life setting. Results from the real-life testing gave valuable feedback and insight to the team, but also created engagement among the tested users, because the users could see the potential in the product. After the project the founders team continued the development and released a full version shortly after. But the startup did not engage in more design thinking activities and the process became more linear later on.

Startup B Design Process

The design thinking project to Startup B was part of a different program than Startup A. Like the other program, the aim of this program was to apply design thinking processes into

different types of organizations across different industries to draw knowledge on how design thinking could be used to create value could possibly make the businesses innovative. Startup B is a company that separated from a larger organization. They established during the design program to pursue a new venture.

This startup's design process was based on the 5-day product design sprint process, developed by Google venture to test out new ideas in the market. It is a rapid development process with the aim to help companies to ship fast services and products, tested and validated through user-centered research. The GV5 sprints include the implementation phase of product development process. Each sprint is 1 day, but the sprints repeat in the next week. The project had 5 sprints, 25 days in total.

Table 4: GV5-sprint process is one-weeks sprints. Each sprint consists of five days, hence making it iterative. This model is recreated based on the process model from the case project report.

M	T	W	T	F
Understand the problem	Sketch ideas	Decide ideas for testing	Build	Test with customers

The model depicts the main activities for each day for a one-week sprint. The main activity for each sprint needs to be achieved. In addition the team have deliverables for each sprint. There are also preparations before the sprint that involve finding hypothesis, gather the right team, and invite users to testing and additional facilities and practical issues. The preparation is important because it allowed the team to work efficiently.

The first week was dedicated to do research on the business and its competitors. Ideas are the focus for the second week. The next week there is selections of ideas. On the fourth day they built a minimal viable product (MVP), which was tested directly with the customer in a real context and situation. The number of iterations of the product hit 12, before the final version.

4.3.2 Design thinking founded companies

Startups C and D had founders with education that educated in design thinking and user-centered design.

Startup C

This startup was established in 2013 when the founder was still studying, like the co-founder in startup C. The founder studied business that included two courses about design thinking. At the end of his courses the idea to the business came to him after talking to a friend about the idea and realizing that he could test out the idea easy.

The design thinking-approach that was taught in his education and that he took inspiration from is largely influenced by the design thinking- dschool, from Hasso Plattner School of Design, which is one of the major advocates of design thinking.

EMPATHIZE	DEFINE	IDEATE	PROTOTYPE	TEST

Figure 7: Design thinking process recreated based on the design thing process by Stanford d.school. Redrawn from Stanford d.school's 'Redesign Theaters' –project's homepage("The Design Thinking Process," n.d.).

When the company was founded, the user-research started immediately, which he called empathy, followed by a longer ideation stage prototype development of the product and website. The company had its first paying customers already after 3 months. The overall concept of the service was still under development and evolving in the beta phase, going through big iterations.

Startup D -

The company came alive at a startup bootcamp where the three founders met. Their product was a social media app. At the time of the interview the startup was in process of working on

a new major release of their product. They learned from their experience with the first version that they needed to prioritize user-testing more.

The startup was very focused on being as efficient as possible so the process and activities were applied thereafter. It was paramount for the team that this process took as little time as possible, or "alfa and omega" as the founder put it. When ideas took form, the process moved quickly from concept to development and testing. Sometimes the whole process from idea to implementation to beta-testing-users could take less than two hours.
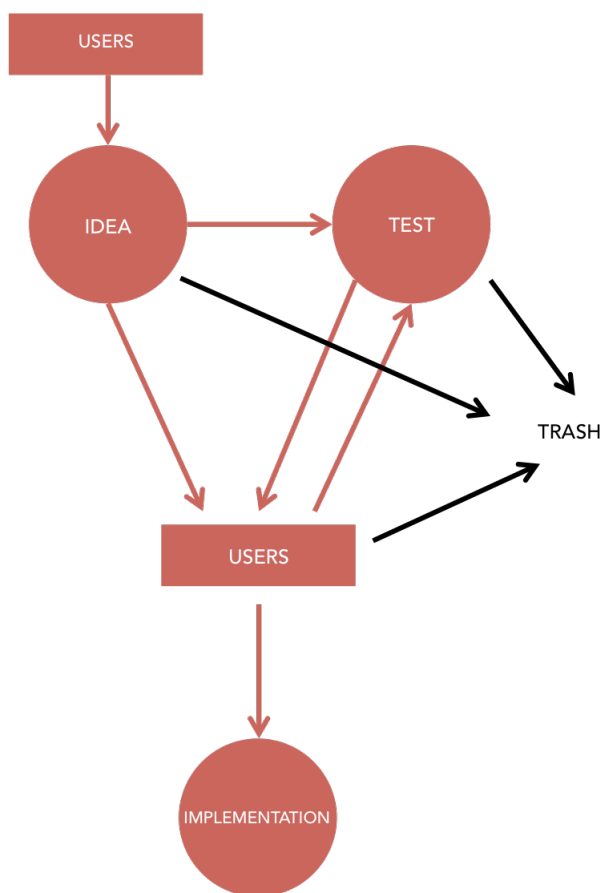

Figure 8: The design thinking process, recreated based on sketch provided by the founder. The process consists of stop points. Activities within each stop point may be iterative. Due to the fast-paced and agile focus in the startup the process was quite dynamic that changed process often, for example by skipping over a stop point or do them in parallel. With that in mind, the illustration is merely a suggestion to how it could happen.

The process usually starts with an idea or suggestion that comes from either a thought or input from users. An evaluation of the idea is done right away, resulting in that it either goes for discussion or testing within the team or the idea is discarded. Then, at the step 'Test' , the

idea is processed internally in the team. For testing they are using the simplest way they know, usually by drawing sketches on paper or on whiteboard. Alternatively they may program the feature straight into a version of the product, since their developing process is simple and fast that it is possible to do.

They may show the product with newly implemented features to either friends or strangers. If the result from the testing with the users was not satisfying or they got input on improvement, it was either discarded or back to testing internally. The amount of iterative cycles of testing depended on the feedback they got. If it passes with the users, then they may push it to the pool of beta-testing-users. In case the changes are incremental, they might instead do AB-testing, where one and one feature is tested.

The entrepreneurs were focused on keeping the design thinking process efficient. Their strategy for approaching users was to choose the channels and approaches that were easiest available. Thus, most of the team's interaction with the users was often unplanned, informal encounters rather than formal meetings set beforehand. Granted, they would sometimes carry out planned testing and exploring, like they would actively go and seek out users in their environments like bars and social events. However, usually the user-interaction was unplanned and unstructured, like talking to the closest person, like people in the same office or was nearby when opportunities allowed it.

To sum up, startup D's design thinking process was unstructured and dynamic, as it changed depending on the availability. As the founder said, *"It is not a process that is written down, it is just a way we have found and that that worked for us"*.

4.3.3 Startups who use external designers

Startup E is a startup that hire external designer for their design processes. The startup use external designers to cover design competence and services that the company lacks internally.

Startup E

Two former IT-consultants founded the startup. Development is a major part of the design thinking process. However, usability is an important feature of their product and services, even a competitive advantage. Consequently, a great deal of the firm's effort is toward creating and maintaining user-centered design.

One of the most important sources of customer feedback is through their contact with the customers. Open dialogue and regular feedback have major impact on the development. It took a little more than one year before the first version was finished and they received a paying customer.

The design thinking process has changed gradually from an experimental and explorative direction to a more specific and linear process. In addition they involved external designers to complement the design competence in the team. When they needed feedback and input on issues that required different design competence, external designers were hired. Services could be advisory services or for carrying out design activities, like user testing, which is testing in a controlled environment. The designer's involvement was dependent on a need basis of the startup, so the engagements were often related to solving concrete issues or specific areas.

4.4 Reflections

4.4.1 Design thinking and entrepreneurship

Implementation of design thinking in the cases varied between open and explorative approaches to specific ones. In this study there was a tendency for the processes and activities to lean toward the fuzzy front of entrepreneurship/back end of design. The urge to build and other activities related seem to be prevalent with all of the entrepreneurs, even in startup A, the only case where the focus was in the fuzzy front end of design. The project, where startup A used design thinking, involved a pre-prototype process that was divergent direction created frustration for the entrepreneurs, as divergent approaches contained much more activities. This observation is interesting as this concern design assimilation in companies and diffusion of design thinking into apartments.

34

Figure 9: *illustration of the case company's position scale between which degree they main activities were focused on. My work.*

4.4.2 Understanding of design thinking

For this paper, I decided that the study should not be limited to the label 'design thinking'. Many may question this expansion, since it is too easy to claim that everything is design thinking, due to its ambiguity. The studies that use expanded definitions might result in more confusion in the literature. In addition the understanding of the labels may be context-dependent. For instance, the concept "design driven innovation" is related to literature by Verganti, which defines design driven innovation as "meaning of meaning"(Janhke, 2013) and is not user-centered. But in the design program projects, design driven innovation was associated with human-centered approaches. Though I concede that an expansion of the concept is likely to complicate design thinking further, I still insist that it should be considered to achieve a more multifaceted picture of design thinking.

More research on government-supported design thinking

The increasing popularity and interest in design thinking will likely cause more startups to adopt the concept and also help to increase the growing body of research literature. In that context our study is a snapshot of the current situation. Because it is a snapshot our findings of the design thinking project cases is highly likely to be influenced by their time-limited engagement with established project frames. This context is itself interesting to investigate, the program initiative is largely motivated by the wish to study how to support businesses to grow and increase innovation capability.

5 Conclusion

This thesis has sought to explore how design thinking is used in startups. Key findings from the case study revealed three themes that emerged from the analysis, which was how design thinking is perceived, what applications design thinking were used for and how it was implemented in the startups.

5.1   Contribution to the research

The existing literature that is focused on design thinking and startups is sparse. This paper contributes to this research and highlights this through an entrepreneurship point a view. Some of the discussions of design thinking revolve around the issue regarding ambiguity of the concept design thinking. This paper adds new aspects to this discussion, by showing how design thinking relates to entrepreneurship. My contribution in this regard is towards a better understanding of design thinking by providing an empirical descriptive study to complement the theoretical aspects of the discussion.

5.2   Limitations

Case study research that is its limitations and biases, especially in the way data is collected and analyzed. The danger of researcher's bias is present, particular concerning qualitative data. Our study is a snapshot of the current situation so that the existing circumstances at the time of the study may skew the picture of the findings. The findings may be stronger if supported by a longitudinal study.

The cases selected are companies are from Norway and Denmark. The company culture in these countries might have impact on the results and how design thinking is perceived. This implication of culture is an issue that could be explored in further research.

6 Appendix

6.1 Interview Guide

Question topics for the startups

Introduction:

Short introduction of me and that I am writing a thesis for a master's in Innovation and Entrepreneurship.

About the company: Basic information about the company and what they do.

What interaction do the company have with user and customers?
-   How have users/customers been involved?
-   How have you tested the service/product?

Why and how do you use user-centered design?
-   How did you learn about what was the motivation for introducing user-centered design/hire designer to the company?
-   What methods, practices, purposes and process do you use and what roles do you have?
-   How do the startup collaborate and use the designers?
-   What and how much resources do you use for design activities, both user-centered non-user-centered?

What is your personal understanding of design and user-centered design?
-   What is your experience/know about design thinking?

About design thinking: I explain in more detail about the thesis's topic on design that are used for solving complex problems like business development and innovation, using a user-centered approach.

What is your opinion of using user-centered approaches like design thinking in startup?

- What has the best practices been in your company?

- What challenges have you had?

- Will you continue to use design thinking forward and if, how?

- How can other startups utilize design thinking?

Question topics to the design team

About the company and how it came in touch with the startup.

What is your personal understanding of design thinking?

How do you work with design and user-centered design?

- Experience with design thinking in startups and other companies

- How do you and the startups team work together?

How do startups/your startup use design thinking and other user-centered approaches?

- Most common issues startups have with design thinking

- How do you work with the startup?

- What differences and similarities are there on how startups use design thinking?

- What are the best practices?

Managers for the design thinking programs:

About the program

What is design according to the program and how is this applied to the projects?

Why and for what purposes do the startups use the projects in the program for?

What is your opinion of how design thinking has been used in the startup?

6.2 Case study protocol

The case study protocol structure is based on the template from "Using a protocol template for case study planning" by Brereton, Kitchenham, Budgen and Li, 2008.

Background

The research question is how startups use design thinking in startup. Additional research questions that will be addressed is:

- How is design thinking used in innovation processes in startups
- How do startups implement design thinking?

Overview of previous research:

Topic	Who	Discussion
Design thinking i the design discourse	Simon[2], Buchanan[3], Cross[4], Shcön[5]	Design as a problem solving approach for complex problems
Design thinking in management discourse	Brown[6], Martin[7], Liedtka[8], Dorst[9],	Theoretical works on how and why design thinking is an approach to innovation, etc.
Design thinking under scrutiny and exploration of the concept design thinking	Verganti et.al[10], Kimbell[11], Johansson-Sköldberg et.al.[12], Hassi & Laksso[13]	Critical analysis of the design thinking literature and overview and analysis of how design thinking is described in the literature.
Empirical, descriptive studies in organizations	Carlgren et.al[14], Jahnke[15], Schmiedgen et.al.[16]	Studies of design thinking in organizations.
Design thinking and startups	Nielsen and Christensen[17]	Differences and similarities of design and entrepreneurship

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[2] Simon, H. A. (1996). *Sciences of the Artificial* (3rd ed.). Cambridge, MA: The MIT Press.

[3] Buchanan, R. (1992) *Wicked Problems in Design Thinking*. Design Issues 8(2), 5–21

[44] Cross, N. (2001) *Designerly ways of knowing: Design discipline versus design science*. Design Issues, 17(3) PP. 49-55.

[5] Schon, D., (1983) *The Reflective Practitioner. How Professionals Think in Action*. Aldershot, Surrey: Ashgate Press.

[6] Brown, T. (2008). *Design thinking*. Harvard Business Review, 86(5), pp. 84-92.

[7] Martin, R. L. (2009). *Design of Business: Why Design Thinking Is the Next Competitive Advantage*. Mcgraw-Hill Professional.

[8] Liedtka, J., King, A., & Bennett, D. (2013) *Solving Problems with Design Thinking: Ten Stories of What Works*. Columbia

[9] Dorst, K. (2010). *The nature of design thinking*. Proceedings of the 8th Design Thinking Research Symposium (131-139). Sydney University of Technology, Sydney, New South Wales

[10] Norman, D., & Verganti, B. (2012). *Incremental and Radical Innovation: Design research versus technology and meaning change*. Design Issues, 30(1), 78-96

[11] Kimbell, L. (2012). *ReThinking Design Thinking*: Part II. Design and Culture, 4(2), 129- 148

[12] Johansson-Sköldberg, U., Woodilla, J., Cetinkaya, M. (2013). *Design Thinking: Past, Present and Possible Futures*. Creativity and Innovation Management, 22(2), pp. 121–146.

[13] Hassi, L., & Laakso, M. S. (2011). Conceptions of design thinking in the management discourse.Proceedings of the 9 Th European Academy of Design (EAD), Lisbon.

[14] Carlgren, L., Elmquist, M., Rauth, I. (2014b). *Exploring the Use of Design Thinking in Large Organiza- tions: Towards a Research Agenda*. Swedish Design Research Journal, 1(14),

[15] Jahnke, M. (2013) *Meaning in the Making: Introducing a hermeneutic perspective on the contribution of design practice to innovation*. PhD Thesis, University of Gothenburg.

[16] Schmiedgen, J., Rhinow, H., Köppen, E., & Meinel, C. (2015). *Parts Without a Whole? - The Current State of Design Thinking Practice in Organizations* (Study Report No. 97) (p. 144). Potsdam: Hasso-Plattner-Institut für Softwaresystemtechnik an der Universität Potsdam.

[17] Nielsen, S.L. & Christensen, P.R. (2014) *The Wicked Problem of Design Management: Perspectives from the Field of Entrepreneurship*, The Design Journal, 17:4, 560-582

Design

Multiple holistic-case study design for explorative qualitative study.

3. Case Selection

Criteria for case selection

- company with less than 10 employees
- company that define themselves as a startup
- Company with design thinking program project
- Company with a founder with a design thinking background
- Company working with design thinking consultants

The report "Design diagnose" by the Norwegian Design Council has been used to find other sources and studies on design thinking/design driven programs.

4. Case Study Procedures and Roles

Procedures:

- Agree in email beforehand on duration and topic of the interview session
- Request approval of recording of the conversation and inform the informants of their rights and that the data will not be shared to others
- Use interview guide and end interview with asking for follow up

5. Data Collection

Semi-structured interviews will be used for data in addition to available written material of the startup and the projects.

6. Analysis

A two-step analysis will be used. In the first step an inductive approach will be used, using an affinity mapping method where excerpts of the transcripts is taken out and then grouped into similar themes and topic. Then each group will be named. The second step is to compare if the grouping and categorization to the findings from other studies on design thinking.

Plan validity

For validity, multiple sources will be used, and to establish chain of evidence. In addition the multiple-case study design will increase external validity. Researchers reflexivity will be informed of.

Study limitations

Limitations to the study is the short frame of research, the "use" is a wide concept and can include of a lot.

Reporting

Target audiences for this study is entrepreneurs that are looking for
In addition the results will be interesting for governmental support programs for startups and companies.

7 References

Acklin, C. (2010). Design-Driven Innovation Process Model. *Design Management Journal*, *5*(1), 50–60. http://doi.org/10.1111/j.1948-7177.2010.00013.x

Acklin, C. (2013). Model : A Framework to Describe and Measure the Absorption Process of Design Knowledge by SMEs with Little or no Prior Design Experience, *22*(2), 147–160.

Blank, S. (2014). Why companies are not startups. *Forbes*. Retrieved from https://steveblank.com/2014/03/04/why-companies-are-not-startups/

Brown, T. (2008). Design Thinking. *Harward Business Review*, (June).

Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, *8*(2), 5–21. http://doi.org/10.2307/1511637

Carlgren, L. (2013). Design Thinking as an Enabler of Innovation. Retrieved from http://publications.lib.chalmers.se/records/fulltext/185362/185362.pdf

Carlgren, L., Elmquist, M., & Rauth, I. (2012). Implementing Design Thinking in Large Organizations. *Proceedings of the IPDM Conference, Manchaster*, 1–19. Retrieved from http://publications.lib.chalmers.se/publication/173078

Carlgren, L., Elmquist, M., & Rauth, I. (2014). EXPLORING THE USE OF DESIGN THINKING IN LARGE ORGANIZATIONS : Towards a research agenda. *Swedish Design Research Journal*. Retrieved from http://www.svid.se/upload/Forskning/Design_Research_Journal/Design_Research_Journal_nr1_2014/Exploring_the_use_of_design_thinking_in_large_organizations_Towards_a_research_agenda.pdf

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

Cross, N. (2001). Designerly Ways of Knowing : Design Discipline Versus Design Science, *17*(3), 49–55.

Design Ladder. (n.d.). Retrieved May 10, 2016, from http://www.seeplatform.eu/casestudies/Design Ladder

Edmondson, A. C., & McManus, S. E. (2007). Methological fit in management field research. *Academy of Management Review*, *32*(4), 1155–1179. http://doi.org/10.5465/AMR.2007.26586086

Hassi, L., & Laakso, M. (2011). Conceptions of Design Thinking in the Design and

Management Discourse. *Proceedings of IASDR2011*, 1–10.

Janhke, M. (2013). *The Meaning In The Making*. Retrieved from https://gupea.ub.gu.se/bitstream/2077/33428/1/gupea_2077_33428_1.pdf

Johansson-Skoldberg, U., Woodilla, J., & Cetinkaya, M. (2013). Design thinking: Past, present and possible futures. *Creativity and Innovation Management*, *22*(2), 121–146. http://doi.org/10.1111/caim.12023

Lawson, B. (1980). *How Designers Think, The Design Process Demystified. First published* (4th Editio). Architectural Press, Elsevier. Retrieved from http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:How+Designers+Think#3

Liedtka, J. (2014). Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction. *Journal of Product Innovation Management*, n/a–n/a. http://doi.org/10.1111/jpim.12163

Martin, R. (2004). *The Design of Business. Rotman Managment, Winter 2004*. Retrieved from http://www.rotman.utoronto.ca/rogermartin/designofbusiness.pdf

Mays, N., & Pope, C. (2000). Qualitative research in health care: Assessing quality in qualitative research. *British Medical Journal*, *320*(7226), 50–52. http://doi.org/10.1136/bmj.320.7226.50

Nielsen, S. L., & Christensen, P. R. (2014). The wicked problem of design management: Perspectives from the field of entrepreneurship. *Design Journal*, *17*(4), 560–582. http://doi.org/10.2752/175630614X14056185480113

Prahalad, C. K., & Ramaswamy, V. (2004). Co-creating unique value with customers. *Strategy & Leadership*, *32*(3), 4–9. http://doi.org/10.1108/10878570410699249

Sarasvathy, S. D., & Forster, W. R. (2012). REFLECTIONS ON THE 2010 AMR DECADE AWARD : WHITHER THE PROMISE ? MOVING FORWARD WITH ENTREPRENEURSHIP AS A SCIENCE OF THE ARTIFICIAL, *37*(1), 21–33.

Schmiedgen, J., Rhinow, H., Köppen, E., & Meinel, C. (2015). *Parts without a whole? - The current state of Design Thinking practice in organizations*.

The Design Thinking Process. (n.d.). Retrieved May 15, 2016, from http://dschool.stanford.edu/redesigningtheater/the-design-thinking-process/

Von Hippel, E. (2005). Democratizing innovation. *Journal Für Betriebswirtschaft*. http://doi.org/10.1111/j.1540-5885.2006.00192_2.x

Wilson, J. (2010). *Essentials of Business Research: A Guide to Doing Your Research Project*.

Yin, R. K. (2009). *Case Study Research: Design and Methods. Essential guide to qualitative*

methods in organizational research (Vol. 5). http://doi.org/10.1097/FCH.0b013e31822dda9e

Acklin, C. (2010). Design-Driven Innovation Process Model. *Design Management Journal*, *5*(1), 50–60. http://doi.org/10.1111/j.1948-7177.2010.00013.x

Acklin, C. (2013). Model : A Framework to Describe and Measure the Absorption Process of Design Knowledge by SMEs with Little or no Prior Design Experience, *22*(2), 147–160.

Blank, S. (2014). Why companies are not startups. *Forbes*. Retrieved from https://steveblank.com/2014/03/04/why-companies-are-not-startups/

Brown, T. (2008). Design Thinking. *Harward Business Review*, (June).

Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, *8*(2), 5–21. http://doi.org/10.2307/1511637

Carlgren, L. (2013). Design Thinking as an Enabler of Innovation. Retrieved from http://publications.lib.chalmers.se/records/fulltext/185362/185362.pdf

Carlgren, L., Elmquist, M., & Rauth, I. (2012). Implementing Design Thinking in Large Organizations. *Proceedings of the IPDM Conference, Manchaster*, 1–19. Retrieved from http://publications.lib.chalmers.se/publication/173078

Carlgren, L., Elmquist, M., & Rauth, I. (2014). EXPLORING THE USE OF DESIGN THINKING IN LARGE ORGANIZATIONS : Towards a research agenda. *Swedish Design Research Journal*. Retrieved from http://www.svid.se/upload/Forskning/Design_Research_Journal/Design_Research_Jour nal_nr1_2014/Exploring_the_use_of_design_thinking_in_large_organizations_Towards _a_research_agenda.pdf

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

Cross, N. (2001). Designerly Ways of Knowing : Design Discipline Versus Design Science, *17*(3), 49–55.

Design Ladder. (n.d.). Retrieved May 10, 2016, from http://www.seeplatform.eu/casestudies/Design Ladder

Edmondson, A. C., & McManus, S. E. (2007). Methological fit in management field research. *Academy of Management Review*, *32*(4), 1155–1179. http://doi.org/10.5465/AMR.2007.26586086

Hassi, L., & Laakso, M. (2011). Conceptions of Design Thinking in the Design and Management Discourse. *Proceedings of IASDR2011*, 1–10.

Janhke, M. (2013). *The Meaning In The Making*. Retrieved from https://gupea.ub.gu.se/bitstream/2077/33428/1/gupea_2077_33428_1.pdf

Johansson-Skoldberg, U., Woodilla, J., & Cetinkaya, M. (2013). Design thinking: Past, present and possible futures. *Creativity and Innovation Management*, *22*(2), 121–146. http://doi.org/10.1111/caim.12023

Lawson, B. (1980). *How Designers Think, The Design Process Demystified. First published* (4th Editio). Architectural Press, Elsevier. Retrieved from http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:How+Designers+Think#3

Liedtka, J. (2014). Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction. *Journal of Product Innovation Management*, n/a–n/a. http://doi.org/10.1111/jpim.12163

Martin, R. (2004). *The Design of Business. Rotman Managment, Winter 2004*. Retrieved from http://www.rotman.utoronto.ca/rogermartin/designofbusiness.pdf

Mays, N., & Pope, C. (2000). Qualitative research in health care: Assessing quality in qualitative research. *British Medical Journal*, *320*(7226), 50–52. http://doi.org/10.1136/bmj.320.7226.50

Nielsen, S. L., & Christensen, P. R. (2014). The wicked problem of design management: Perspectives from the field of entrepreneurship. *Design Journal*, *17*(4), 560–582. http://doi.org/10.2752/175630614X14056185480113

Prahalad, C. K., & Ramaswamy, V. (2004). Co-creating unique value with customers. *Strategy & Leadership*, *32*(3), 4–9. http://doi.org/10.1108/10878570410699249

Sarasvathy, S. D., & Forster, W. R. (2012). REFLECTIONS ON THE 2010 AMR DECADE AWARD : WHITHER THE PROMISE ? MOVING FORWARD WITH ENTREPRENEURSHIP AS A SCIENCE OF THE ARTIFICIAL, *37*(1), 21–33.

Schmiedgen, J., Rhinow, H., Köppen, E., & Meinel, C. (2015). *Parts without a whole? - The current state of Design Thinking practice in organizations*.

The Design Thinking Process. (n.d.). Retrieved May 15, 2016, from http://dschool.stanford.edu/redesigningtheater/the-design-thinking-process/

Von Hippel, E. (2005). Democratizing innovation. *Journal Für Betriebswirtschaft*. http://doi.org/10.1111/j.1540-5885.2006.00192_2.x

Wilson, J. (2010). *Essentials of Business Research: A Guide to Doing Your Research Project*.

Yin, R. K. (2009). *Case Study Research: Design and Methods. Essential guide to qualitative methods in organizational research* (Vol. 5). http://doi.org/10.1097/FCH.0b013e31822dda9e

Appendix