Design Integration in University-based Accelerators

A case study on how to embed design into the service offering of Aalto Startup Center
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I Abstract

Besides providing higher education and granting academic degrees, universities are institutions that enable research and innovation. It is here that students have favorable conditions to adopt an entrepreneurial mindset, and often make their first steps towards creating new ventures – founding startups. In respect to that, it is the role of university-based incubators and accelerators to support the development of entrepreneurial skills and provide support for early-stage, high-growth businesses originating from university research. Design is increasingly seen as a beneficial method for developing new business ideas as well as novel approaches. Hence, it has been recognized and acknowledged across popular and academic publications as a resource that brings value and competitive advantage to businesses of all sizes - startups included.

However, in order for startups to fully benefit from design, investment in design outsourcing alone is not enough. It is crucial to grow the internal competence of a company to use design. An early integration of design with core company functions appears to be critical, as it becomes later on more difficult and the impact lowers. Thus, it is crucial that organizations such as university-based incubators and accelerators provide a structure which is primarily focused on the educational component, and only secondarily on big financial returns. To the author’s best knowledge, little investigation has been done on how business incubators and accelerators support early stage startups in fostering design competence. ‘Design Integration in University-based Accelerators’ thus explores how startups can benefit from design and learn to foster design competence. The objective of this work is to investigate the service offering of an accelerator for design integration opportunities. In addition, this study aims to shed light on effective use of resources available from the networks of university ecosystem to support early stage startups originating from research.

To meet the objective of this thesis three sets of empirical data were collected. Action research through workshops with advisors from the university-based accelerator Aalto Startup Center was carried out to inform the background of the case study, and to provide a framework for solution finding within the topic of design integration. Semi-structured, in-depth interviews with the executives of five technology-driven startups comprised the second dataset for this thesis. The goal of the interviews was to gain a detailed understanding of the development process each startup endured up until the point of the interview. Included was a hands-on task which resulted in journeys to pinpoint the most important steps along the path towards successful growth, perceived through the lens of design. The third set of empirical data was collected through in-depth, unstructured interviews with ten design and entrepreneurship experts. The main goal of these interviews was to provide additional support to the primary data set collected through the startup journey mapping. Details of teaching practices and beliefs rooted in their domain expertise were demonstrated, to add the perspective of a crucial expert stakeholder group, educators and serial entrepreneurs from the ecosystem. All interviewees were from the Aalto University ecosystem.

Business Generator Model – a visualisation of themes in the studied acceleration program, was utilised as a framework to ensure a point of reference and help structure the findings of this research. The analysis of the collected data resulted in the following findings. Themes traditionally tackled in early stage startup development, such as Team, IPR, Funding or Partnering can be supported by design through the use of methods of collaboration and co-creation. More significantly, design can be beneficial for early stage startup development by offering capabilities for the purpose of User Research, Design Strategy, Concepting, Communication & Marketing, and lastly Product & Service Development. Respectively, the teams can utilize the help of design to humanize technology through needfinding, bridge the gap between design and business, give shape and function to ideas, raise finances and communicate with stakeholders, and lastly develop products and services through iterative prototyping.

A user-centric accelerator program for startups is holistic, with an open and flexible system of services. Due to a variety of customer needs, the program works best when tailored to specific needs determined through an in-depth examination upon acceptance into the program. Unless a startup team has a designer integrated on the core team early on, the goal is to first educate the startups on the role and value of design. According to the stage of each given startup team, trainings, mentors and design outsourcing options should be suggested in order to enable the growth of design competency. This can ideally be achieved with a design manager in the role of an advisor, or executive leader. A design manager can determine the level of design competency, and set the strategy for design integration and design implementation, while utilizing the intangible resources such as know-how available from the university ecosystem.

Implications for design practitioners could be drawn in that the practitioners should be encouraged to find opportunities within the accelerator environment, to introduce Design Thinking to early stage startups. Such opportunities may take the form of mentorship or hosted lectures and workshops. In this way, the practitioner would expand his or her professional network while strengthening the business ecosystem. In turn, this should create an expanded demand for Design related skills and services, nurturing the symbiotic relationship between design and business. Lastly, students possessing the advertised design capabilities should be made available for outsourcing to the Business Accelerator and Startup community. This way design needs can be successfully connected with talents.
If you’re trying to create a company, it’s like baking a cake. You have to have all the ingredients in the right proportion.

– Elon Musk

II Acknowledgements

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Introduction

The following chapter introduces the reader to the research question and objectives. Herein, the Background provides general context and the Thesis Structure acquaints the reader with the formatting of this research piece.
1.1 Research objectives

Prior studies show that design has a positive impact on business growth, as well as that it holds a positive role in gaining competitive advantage over non design-driven businesses. As Storvang et al. note, “Design is increasingly seen as a strategic key factor in the processes of innovation and business development.” Moreover, design thinking is seen as a contributor of creative value to companies (Storvang et al., 2015, p.9). Despite this common notion, only limited description has been provided on how organizations such as incubators and accelerators help foster design competence in startups.

For the purpose of this thesis, an explorative case study and qualitative research were conducted in collaboration with the university-based accelerator Aalto Startup Center. The author of this study joined the team in late Autumn 2018 and remained until early 2019. Hired as a visual and service designer to the organization, over the duration of three months, the author examined the use of design and its integration in the specific context of five early stage startups. Thus, she was enabled to collect data through a multimethod, multicase inductive research study.

The research was organized to answer the following question:

“How can design support the service offering of a university-based startup accelerator?”

The objectives of this study are:

1. To use design for service approach to investigate the acceleration program components for design integration opportunities.

2. To examine how Design was used during the startup business development process, in order to clarify the value and role of design, as well as to make recommendations on how specified design capabilities could be best fostered by the accelerator.

3. To visualize a service offering for startups by expanding the currently existing Business Generator Model.

The author was enabled to explore ways of making a practical contribution through her thesis and an attempt was made to provide an academic contribution to the field of design management. This study aims to inspire the creation of new pathways that would enable multidisciplinary collaboration of practitioners within an existing entrepreneurial ecosystem. Furthermore, through this study the author aims to help propel the establishment of a systemic strategy that includes design methods and tools integrated in different stages of the startup acceleration program. Lastly, the study aims to provide insight to both practitioners and institutions on design education by giving evidence on how the design capabilities within startups are managed. As an outcome, this research aims to support the creation of a more design-driven acceleration program.

1.2 Background

1.2.1 University – An ideal platform for innovation-driven startups

Besides providing higher education and granting academic degrees, universities are institutions that create value through collaboration with industry and long-term partnerships with other universities. High-achieving individuals from multi-disciplinary backgrounds and with a diversity of skills can here conduct academic research and interact with each other. As a result, previously unconnected bodies of knowledge get connected, which provides a vehicle for radical innovation (Houser, 2014). Being backed up by the university naturally means a higher risk tolerance and so the students have room to experiment and to navigate both successes and failures. As a result, they have favourable conditions to adopt an entrepreneurial mindset and make their first steps towards creating new ventures. Thus, a university represents an ideal platform for the rise of innovation-driven startups.

From the university’s perspective, in order to capitalize on helping students create impact through innovation, an ideal climate for entrepreneurship needs to be in place and the students need to have access to its resources. This means that there is a need for cross campus collaboration, hands-on programs, dedicated work space and mentorship programs (Houser, 2014). Organizations such as university-based business incubators and accelerators become highly relevant in this regard, as it is their aim to support innovation commercialization, as well as to help speed up venture creation by providing specific services focused on education and mentoring through a personalized program.

1.2.2 Incubation and Acceleration through Aalto entrepreneurial ecosystem

According to Aalto University’s current ‘Strategy 2016–2020: Shaping the future’ “…promoting an entrepreneurial spirit and culture is an intrinsic part of the institutions approach to research and education”. Furthermore, maintaining novel, knowledge-intensive businesses and supporting startups is a way of contributing to society (“Aalto Entrepreneurial Ecosystem” n.d.). The most pressing societal challenges get tackled as cutting-edge science meets design expertise and business thinking. The strategy consists of three elements: research and innovation, art
and creative practices, and lastly education. Combining these elements creates a tangible added value to society (“University Strategy 2016–2020: Shaping the future” n.d.).

Being a student at Aalto University offered the author the opportunity to place her research into the on-campus entrepreneurial ecosystem in Otaniemi (Espoo), Finland. The seeds of this ecosystem were planted roughly ten years prior to the start of the research for this thesis. A small group of students from the Department of Science visited a selection of the best Entrepreneurship Programs in the United States. On their return, they sought to bring a Silicon Valley-inspired mindset and the corresponding business practices back to Finland, which manifested in founding the Aalto Entrepreneurship Society in 2009. Many more initiatives followed thereafter, that aimed at contributing to the creation of a blooming and diverse on-campus ecosystem. As Figure 1 shows, this complex ecosystem consists of both student-led and faculty-led entrepreneurial activities, placed inside the broader ecosystem of Finland (“Aalto Entrepreneurial Ecosystem” n.d.).

Two types of programs found in the university ecosystem, where the above mentioned characteristics of dedicated work space, hands-on curriculum and mentoring on entrepreneurship unite, are incubators and accelerators. The main objectives of stand-alone university-based startup incubators and accelerators are traditionally to provide support on technology transfer, to support the development of entrepreneurial skills and to provide support for early-stage, high-growth businesses. As opposed to their commercial equivalents, the structure of university-based incubators and accelerators differs slightly due to the objective, which is primarily focused on the educational component, and only secondly on significant financial returns. Thus the needs of the university and of the students stand at the forefront. Some of the direction-giving key elements underlying the structure of university-based incubators and accelerators are the focus on research teams and the objectives to commercialize research and turn an invention into innovation. At the early stage startups generally utilize incubation services, which in the case of Aalto University is provided through the organization called Innovation Services. In the later stage, startups are provided services for acceleration through the organization called Aalto Startup Center. Here startups receive coaching to refine their innovation-based ventures, find market fit quickly, and scale up. Both units operate under the Aalto University’s Department of Innovation, and together they create a pipeline for entrepreneurship (see Figure 2). For the purpose of this Thesis, research in form of a Case study was conducted in collaboration with Aalto Startup Center.

1.2.3 Design at Aalto Startup Center

Aalto Startup Center has a rich history dating back to 1997. Throughout the years the organization underwent several changes. Originally named the New Business Center, it operated under the Small Business Center of Helsinki School of Economics. In 2008 the New Business Center moved to a new location and changed its name to the current Aalto Startup Center. A year later the organization merged with the business incubator Arabus of the former Helsinki School of Arts and Design, to benefit from its history rooted in creative fields. With the birth of Aalto University the following year 2010, the merged entity started...
Figure 3 shows the Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis, carried out in 2017 by Pentagon studio. A number of challenges were listed, that the organization faced at the time within the context of connecting to the University and its resources. Many opportunities on the organizational and service development level emerged. Most of the recognized opportunities, weaknesses and threats can be tackled through the means of design. Therefore, besides the organization’s internal initiatives for change, students from the respective department at Aalto University were approached.

Thus, one main reason for welcoming design to the unit is its recognized ability to be utilized as a tool to tackle the revealed shortcomings and help with connecting with the various tangible and intangible resources available from the ecosystem more effectively. Another, yet equally important reason, is the general notion that design is good for business. Previous research has shown that when used effectively, design is a valid and viable commercial tool that can positively influence the business performance as well as increase the competitiveness of small and medium-sized businesses (Council, U. D., 2007). In addition, it was indicated that if a company aspires to become design-driven, the integration of design with other company functions should happen as early as possible, since when integrated later on, the impact tends to be generally lower and the process more difficult (Lorenz, 1994). It is therefore crucial to grow the internal competence of a company to use design in its early stage, rather than later on. Since it is the role of incubator and accelerator programs to provide support for early-stage businesses with high-growth potential, growing design skills for new venture creation becomes as meaningful as supporting the growth of entrepreneurial skills.

Previous Design work
In Summer 2018, the first student of Collaborative and Industrial Design, Department of Design joined the accelerator to work on design related tasks. In order to assess the unit’s level of design maturity and set the direction of her work, the student conducted interviews with accelerator advisors. The data was evaluated against The Danish Design Ladder. As shown in Figure 4, the accelerator was assessed to have the second level of design maturity in that design was viewed by its employees as the final form-giving stage.

In order for the program to reach a higher level of design maturity, the design student facilitated workshops to help create a shared understanding of design among the accelerator staff. In addition, co-design approach was used to enable the accelerator team members in their pursuit to develop collectively new Vision and Mission statement, one that would align more closely with the strategic goals of Aalto University. A roadmap as shown in Figure 5 was created, outlining the goals on the strategic path towards becoming a more design-driven organization. As it consists of immediate, short and long term goals, it is meant to be followed for all future design work at the unit.
The student subsequently carried out interviews with a number of startup teams from the unit and found, that there is a need to adopt a more customer-centric approach. It became crucial to provide a holistic customer support by developing a program offering that would correspond with startups’ needs. A wheel-shaped visual tool named Business Generator Model, which depicts the themes most likely to be tackled in the program, has been developed continuously by the team members of Aalto Startup Center. Shown in Images 6 and 7 are two model iterations. The design student collected valuable thoughts on the themes depicted in the model, with regard to design, through a number of short conversations with design educators from Aalto University. The conversations did not translate into any significant modifications to the program model, but the collected data brought about rich discussions on the topic of design integration and implementation in the program.

Student in Residence Pilot

Author of this thesis was the first design student to officially join Aalto Startup Center in the role of a ‘Student in Residence’. The idea behind this pilot is to build an ecosystem of design students who would systematically support Aalto Startup Center as it becomes a more design-driven accelerator. The presented brief invited the author to lead a multidisciplinary team of three advisors with expertise in Business, Intellectual Property Rights and Finance, who wished to learn more about design methods and tools. Due to the previously established notion that design is currently not an integral part of the accelerator program, or that the emphasis should be put on the customer centricity, the organization was eager to adopt new design methodology in order to align with the needs of the startup teams enrolled in the program. The author was encouraged to continue contributing to the topic of design integration into the life of Aalto Startup Center.

1.3 Thesis structure

The thesis is structured to follow the natural development of the research, and it is divided into eight chapters. Chapter One introduces the reader to the thesis topic and its relevance, provides the background for the study and states the research questions. Chapter Two sets the theoretical framework for the study. Reviewed is academic and popular literature on the value of design in the business context, on startup incubators and accelerators, and lastly on the integration and management of design capabilities within organizations. Chapter Three provides a detailed overview of the methodology utilized to collect and analyse data for this study. Chapter Four provides additional information on the accelerator from the case study to feed into the theoretical framework. The information was collected in workshops with startup advisors, focusing on Business objectives & context, Customer grouping and ‘Service Blueprinting. Furthermore, the startup development journey with focus on design integration, as derived from the experience of all interviewed startups is examined. Chapter Five provides detailed research findings from the analysis of all case data. Chapter Six provides detailed research findings from the analysis of all case data. Chapter Six provides recommendations on how to manage the research findings. Chapter Seven discusses the theoretical and practical implications of the research findings on design practice and education. Additionally, research limitations are examined and further research to support the continuation of the topic is suggested. Chapter Eight, contains all references used in the study. Chapter Nine, the Appendix, contains all additional relevant material.
Prior studies agree that when used effectively, design becomes a key strategic capability that provides a long lasting value and positively influences business performance and competitiveness, in startups as well as larger organizations. In parallel, a rising number of studies have expanded the general understanding of how design practices, design attitudes and design skills can become embedded in organizations. The following chapter provides an overview of the reviewed academic and popular literature with insights on the added value and effects of design, as well as the design management in respect to early stage innovation startups.
2.1 Role and Value of Design for Businesses

The following sections summarize the role and value of Design within the business context. This literature review captures the unique qualities of Design and the relevant contextualization of innovative business. This will serve as a reference point or foundation upon which to expand these themes to the startup accelerator ecosystem in the results of Chapter 5.

2.1.1 Design – An ingredient of competitive advantage in times of radical uncertainty

According to Lester et al. “markets are increasingly unstable and unpredictable. They evolve in unforeseeable ways with unforeseeable consequences.” Due to this “radical uncertainty” under which markets have evolved, it has become challenging to define a problem and engineer a suitable solution accordingly (as cited in Bruder, 2011, p.144). In addition, a strong global competition across all industries with a product- and image-surfited marketplace forces companies to search for new ways of gaining a sustainable competitive advantage, as they hope to protect or improve their market positions. As a result, there is a need for introducing new strategic tools that would enable companies to “stand out from the crowd”, and thus gain the desired advantage over competitors (Kotler & Rath, 1984, p.16).

Design enables organizations to differentiate themselves in the marketplace by having the ability to prepare for changes in the market or by meeting the needs of new markets (Meyer, 2011). If well managed, the discipline offers to companies several benefits, such as corporate distinctiveness, personality for a newly launched product, or the ability to reinvigorate interest for products in the mature stage of their life cycle (Kotler and Rath, 1984). Moreover, design supports companies that are looking intensively for innovation, new products, and/or services. As Bruder stated in his equation, “the better products you have, the more customers you get and if your product is very good and innovative, your customer will stay with you for a long time” (Bruder, 2011, p.145). Thus, design possesses the power to attract customers and users. The discipline has been recognized as a strategic tool that enables companies to “(...) produce superiorly designed products for their target markets” (Kotler and Rath, 1984, p.16). With good design products, environments, communications, corporate identities, and more can be enhanced.

According to Kotler and Rath “the term design has several usages” where different skills are emphasized, “those of functional versus visual design”. The term design was further referred to also as a “planning and decision-making process” (Kotler and Rath, 1984, p.17).

Similarly, Dumas believes that “Design must be understood as a word that describes both a process and an outcome” (Dumas, 2000, p.1). These outcomes are typically two- or three-dimensional objects, services and communication processes and the procedure is measured from the first idea to the finalized outcome (Bruder, 2011). Verganti stresses this ambiguous nature in which design is often interpreted. As he noted, the term design spans from being referred to as “an immediate conception of design as styling” to a broader notion in which design represents a link between any creative and innovative activity (Verganti, 2009, p.21). In his words, the essence of design is referred to as “making sense of things”. As he further continues, “design innovates meanings, and meanings make a difference in the market” (Verganti, 2009, p.21).

2.1.2. How to prevent failure – Popular methodologies for Startups

In his online article for Fortune, Griffith infamously noted that “Nine out of ten startups fail” (Griffith, 2014). According to the original ‘101 post-mortem essays’ published by CB, which the online article was based on, the top four reasons for failure were with 42% “lack of market need for their product”, followed by 29% due to “lack of sufficient capital, 23% due to “the assembly of the wrong team for the project” and 19% due to “superior competition”. In other words, the main finding showed that startups often end up developing a product that the user does not need or want. Two methodologies widely used by startups, as well as corporates today to structure and de-risk innovation activities are Lean Startup and Design Thinking.

Lean Startup has its roots in the production system of Toyota, but it gained most popularity through the Startup boom of Silicon Valley in the 1990s. Ries described The Lean Startup as a scientific approach which helps entrepreneurs in creating and managing startups, while enabling them to get a desired product in the hands of the customer faster. According to him this method teaches about how to drive a startup, how to steer, when to turn, and when to persevere and grow a business with maximum acceleration (Ries, 2011). The most characteristic features are short product development cycles combined with business-hypothesis-driven experimentation, iterative product release and learning through validation, in order to prove the viability of the set business model. Thus, the goal of Lean Startup is to find a product-market fit by moving a Minimum Viable Product (MVP) through the Build-Measure-Learn feedback loop.

Design Thinking has become a buzzword in the world of business venturing, as it has provided startups with methods and tools supporting the prevention of the above mentioned failure. In design thinking, design as process permeates a range of innovation activities with a human-centred design ethos. In order to create customer value and market opportunity, the discipline aims at providing solutions that match people’s latent needs, while being technologically feasible and financially viable. Some of the characteristics inherent to design thinking are empathy, integrative thinking, optimism, experimentalism, and collaboration. A combination of these equips an entrepreneur with the ability to see the world from multiple perspectives,
create solutions that are desirable and often dramatically different – novel, and lastly to collaborate with experts across disciplines (Brown, 2008). This methodology is non-linear, iterative and consists of 5 phases – Empathize, Define, Ideate, Prototype and Test.

There are many similarities between Design Thinking and the Lean Startup approach. Both for example work with a minimum set of features to create a prototype (or MVP), which are tested in a cyclical feedback loop. Since design thinking starts by empathizing with the user, in order to reveal the most pressing problems or needs leading to various relevant ideas, this methodology provides most value when applied before the Lean Startup process. Combining these two methodologies for new product or service development, as shown in Figure 8, can reduce the risk of bringing innovations on the market.

2.2 Embedding design in organizations

In the previous section, a review of what design is and its value within business was presented. The following sections review aspects of how design is integrated into businesses; particularly management of design and associated challenges. This review, in part, informs or substantiates the recommendations presented in Chapter 6.

2.2.1 Importance of design management

Through his research, Farr recognized decades ago that due to the discipline’s unique factor in competition, design has become part of profitable trading. According to him one designer can no longer do all types of design, as the design requirements have become more complex and the design practitioners more specialized. Thus, he concluded that “skillful management of designers and designing becomes imperative” (as cited in Cooper et al., 2013, p.51).

Farr defined design management as a function through which a design problem gets articulated and the most suitable designer found. The designer is then enabled to solve the problem at hand within a set budget and timeline. The tasks of a design manager thus lie in problem solving, planning, briefing, communications and coordination, all of which have been referred to as the ability to provide “unbiased coordinated services”. Some of the characteristics a design manager should have are wide knowledge of local and international designers, knowledge of current and upcoming trends, and the ability to think critically. Last but not least, a design manager must bring a vision in order to connect people across disciplines when producing an innovative product (as cited in Cooper et al., 2013, p.49).

Acklin perceives Design management as an activity to “implement innovation, connect management functions and processes, connect philosophy with strategy and delivery, and design a coherent customer experience for the new product or service at all customer touchpoints” (Acklin, 2010, p. 56). Design thinking acts here as a bridge between administrative management – the management of resources, time, people, and money necessary for design activities in a company, and entrepreneurial management – “setting the agenda of an enterprise and envisioning the future through design leadership” (as cited in Acklin, 2010, p. 55).

2.2.2 Challenges within design management

A common mistake observed in design management is “to bring designers into the new product development process too late or to bring in the wrong type of designer” (Kotler and Rath, 1984, p. 19). Thus, choosing the right designer for the right job, while ensuring its successful and timely integration on the project team has become crucial.

Despite the wide range of design services available today, design capabilities get neglected or mismanaged by a large number of small to medium sized companies. According to Kotler and Rath, the reasons for this neglect or mismanagement are often those of (Kotler and Rath, 1984, p. 18):

- design illiteracy
- cost constraints
2.2.3 Integration of design and design management

In order for an organization to become design-driven, an internal design capability needs to be created. This means that new “ways of thinking and working, adoption of design methods and practices, roles, structures and processes, and environments” need to be introduced (Meyer, 2011, p.194). As Meyer further stated, design seems to be embedded most effectively when the focus is balanced between process and outcomes, between improvement of customer experience and the methodology for problem solving. Thus, “it is critical to identify human-centred design as the key methodology in the organizational context”, in order to ensure focus on the needs of all stakeholders, internally and externally. The embedding of design capability can be introduced in a bottom-up, as well as a top-down fashion, while in both cases “a broad, holistic and systemic approach” is required. Lastly, according to Meyer, “installing design managers became one of the key elements of the transformation programmes” (Meyer, 2011, p.194).

Acklin believes that “there is a correlation between design and the innovation capabilities of a firm”, thus her work is particularly relevant for innovation-driven startups (Acklin, 2010, p. 50). In order to introduce and integrate design and design management into companies, the three challenges of Sensitization, Application and Implementation need to be overcome. These were further explained as following: “Firstly, a basic understanding and acceptance of design and design management need to be established in a company; secondly, design methods need to be introduced and practiced within a specific problem area or pilot project; and third, design management has to be implemented in a sustainable way into the processes of the company” (Acklin, 2010, p. 52).

Various tools are available to help companies assess their level of design maturity and overcome the first challenge of Sensitization, such as ‘The Design Ladder’ (Danish Design Centre, 2001), ‘Design Management Travel Guide’ (Acklin and Hugentobler, 2008) or ‘Four Bubble Framework’ (Junginger, 2009). Likewise, there are a number of models that aim at helping to steer the design integration process that reaches beyond the stage of Sensitization.

These can be utilized to discuss the company’s design capacity and to analyze and evaluate the company’s design potential in comparison with other companies. Examples are ‘Design-Driven Innovation Process Model’ (Acklin, 2010), ‘Design Management Absorption Model’ (Acklin, 2013) and ‘Design Capacity Model’ (Christensen, 2014), to name a few.

While Acklin provided a summary of steps that lie on the path towards design integration, Meyer provides a summary of the key ingredients, which in the right proportion enable design to enter any organization successfully. These are referred to as “positively viral” and stated as follows (Meyer, 2011, p.196-197):

- a combination of training, coaching and a supportive learning environment
- demonstration projects with broad organizational participation and visibility
- a design centre or hub to maintain the integrity of the methodology
- leadership commitment to supporting and sponsoring design initiatives
- measures and metrics that appropriately gauge design success
- HR support of design specific capabilities as job requirements and rewards for design achievement
- commitment to maintaining a customer / user research capability that services the entire organization.

2.3 Support for Startups – Incubation and Acceleration

According to Miller and Bound, perfect conditions for startups have been reached, having talented teams with big ambitions on one side, and high demand from both investors and buyers on the other. As they stated, “accelerator programmes appear to be addressing a growing opportunity in the market for innovation”, a market that is changing rapidly in part due to the technologies that this very sector has created (Miller & Bound, 2011, p. 7).

Business incubators and accelerators act as a dynamic model for efficient business development, entrepreneurship and commercialisation of new technologies. They provide methods of fostering innovation, and in the case of those operating under a university, they also contribute to the development of collaboration between university departments (Al-Mubaraki et al., 2015). Aiming to support early stage startups, these programs function as a social system which provides soft infrastructure – the know-how of startup doing. They contribute to the larger ecosystem by connecting entrepreneurs and mentors, venture capitalists and angel investors, universities, government and other service providers (Haines, 2014).
2.4 Discussion and Limitations

As Bruder stated, it is still difficult to generate confidence and clear understanding in the combination of design and management. As a solution, he proposed establishing more educational programs with strong leadership, entrepreneurialism and political robustness (as cited in Cooper et al., 2013). Moreover, as Miller and Bound noted, despite growing interest in the model of accelerator programme from policy communities or business education, only a few attempts have been made to provide a formal analysis (Miller & Bound, 2011).

To the author’s best knowledge, there have been only a handful of projects, that aimed at exploring the contributions of design and design management during incubation or acceleration phase specifically, the most notable being the project done by Acklin and Wanner (2017). While this work provided some evidence on the added value of the collaboration between designers and engineers in the incubation phase, no consistent empirical evidence was provided on how to foster the design capability with the assistance and through the service offering of incubation and acceleration programs. In addition, no systematic enquiry has been done on how start-ups develop their design capability while enrolled at such programs. In the reviewed literature, a research gap has been thus identified on the lacking empirical evidence that would provide insights on how business development programmes such as incubators and accelerators are structured in order to provide a holistic design support, next to their focus on other traditional disciplines, such as intellectual property rights and financing.

The author of this study aims at providing a practical resource for founders, and those considering running a design-driven accelerator programme. In addition the aim is to contribute to the debate on how to amplify the efforts of entrepreneurs to create new high-growth, innovative tech businesses, through fostering design capability. This study aims to help define and map the accelerator programme characteristics and begin a debate about how various types, methods and tools of design could be used in order to grow sustainable competitive advantage inside early stage startups.

2.4.1 Notes on Reference Selection and Criteria

The references utilized herein were selected based on credibility and relevance. Credibility is synonymous with authority in the academic or professional field. As a starting place, authors were chosen from lecture references or recommendations from Alto University Professors. Subsequent materials were selected based on their cross references with these parent materials. Sources found through internet searches were deemed credible only if peer reviewed and included appropriate citations. Publications that did not meet this criteria were excluded.

Relevance was determined by funneling from a wide subject matter to a more precise topic. Research of design influences on innovation was used to identify relevant themes applicable to the accelerator environment, given the inherent focus on innovation. Research threads more closely related to the startup, accelerators, or academic ecosystems were prioritized over others, such as innovation in mature business. As a result, the references noted herein are by reputable authors and characterized by either breadth of Design Innovation or niche specialized subject matter.
Methodology

The research aims to answer the question “How can design support the holistic service offering of a business accelerator”. Business accelerators offer a diverse array of services to startups that work in varied fields and may be at different stages in their development. Design contributions aid both the business and the customer experience. Such stakeholder diversity offers many areas of investigation, though there has been little foundational theory developed to address the question this thesis intends to investigate. A lack of previous research has been detected around the contemporary subject of accelerators. Lastly, as Verganti stated, “the definition of design is fluid and slippery”. The debate on various meanings of design remains open-ended and the nature of design multi-faceted (Verganti, 2009, p. 22). This chapter provides an overview of all activities carried out while at the accelerator, with the purpose of collecting empirical data to inform this thesis research.
3.1 Data collection

This study was designed in order to effectively address the researched problem of support for startup development through design. Therefore the research design was determined by the research problem. The author aimed to obtain evidence that would allow for addressing the research problem logically and without ambiguities. To answer the posed question, inductive case study design with a mixture of methods to collect qualitative data was chosen as a research strategy. This methodological choice was made due to the complexity of the researched topic. Exploratory qualitative research was chosen over quantitative research to gain an understanding of underlying reasons and motivations. The aim of the research was to gain insights into the problem, rather than create a statistical image.

3.1.1 Case study

An exploratory case study was chosen as a qualitative research framework for this thesis, since it provides tools for studying complex phenomenon with a variety of data (as cited in Muratovski, 2015). The subject of this case study is two-fold, 1) a place – university-based startup accelerator program Aalto Startup Center, and 2) a phenomenon – design for startup support. These two in correlation were studied in-depth for a period of three months, between November 2018 – February 2019, within the set context of Aalto entrepreneurial ecosystem.

In order to develop the case study and inform the research, the author focused on the following four methods of data collection: 1) archival research, 2) action research conducted through workshops with case study accelerator advisors; 3) in-depth interviews with five selected startup teams affiliated with the accelerator; 4) in-depth interviews with design and entrepreneurship experts from the entrepreneurial ecosystem. Figure 9 depicts a structured timeline of the case study with stages of data collection, analysis and reporting task, all feeding into the thesis.

The goal of each data collection method can be summarized in the following manner. Firstly, the author was granted access to the Archives of the organization. These records, mostly in the form of design reports, documented all design-specific work carried out by previous collaborators, and provided the author with the context surrounding the case. Any information about the environment of the case study, as well as cultural, historical and social factors were considered relevant. Defining the context enabled her to determine the broader relevance of the case study (as cited in Muratovski, 2015).

Secondly, action research through workshops was carried out with the accelerator advisors to add to the background of the case study, and to provide a framework for solution finding within the topic of design integration. Here the author gained a holistic understanding of the organizational structures, as well as of all past efforts to address the studied phenomena through the employee perspective. Thirdly, interviews with startup teams affiliated with the accelerator were conducted to gain an understanding of the common needs and challenges faced during early business development. Lastly, interviews with the design and entrepreneurship experts from Aalto’s entrepreneurial ecosystem were conducted to help put the data from startup interviews into the context of the current Business Generator model, and help develop a more design-driven acceleration program.

The methodological choice of a case study, complemented with archival and action research, was made because it allowed the author to gather empirical data and investigate a contemporary phenomenon in depth, and within a real life context. A case study enabled the author to apply analysis, interpretation and discussion in order to derive specific recommendations for the improvement of existing conditions. Moreover, the method was deemed appropriate for exploratory purposes due to the lack of strong theoretical foundations and the overall complexity of the topic. Examples of previous studies that were found relevant and thus inspired the methodological choice for this study are those of Acklin & Wanner (2017) and of Çeviker-Çınar et al. (2017). The former explored the contributions of design and design management during incubation phase through the method of action research, while the latter explored the implementation of design thinking into business education through a case study.

Archival research & Business Generation Model visualization

In the early stage of the residency, the author was presented with the Business Generator Model. The model needed to be further developed for future communication purposes. It was first revealed to the public at the event Slush 2018. This provided the author with an excellent hands-on starting point, next to the initial archival research, and enabled her to deep-dive into the present structure of the acceleration program. The author created a set of visuals for Aalto Startup Center (High level journey, Business Generator Model, Combination of both as seen in Figure 10). Visuals were also developed for Innovation Services, the unit that stands in the pipeline ahead of Aalto Startup Center. This model would later become an important artifact to reflect on when conducting interviews with startups and design & entrepreneurship experts for empirical data collection. Thus, researching the developing Startups was an opportunity to further validate the model.
3.1.2 Action Research – Advisor workshops

In the early stage of the Case study, method of Action research through co-creative workshops was used to collect the first set of empirical data inherent to the functional characteristics of an accelerator. The workshops were facilitated with three advisors from the accelerator, whose expertise is in Business, Intellectual Property Rights and Finance. The decision to collaborate with the advisors was made, as it is their role to guide each startup currently enrolled in the accelerator program and act as the primary contact person for each customer. This puts the advisors into a unique position as they have a deep understanding of the customers needs and experiences throughout the program. Through the workshops the author was enabled to further familiarize herself with the context of the organization, the current state of its processes, and start recognizing opportunities for design integration.

Action research was chosen as a complementary method to the initial archival research due to its cross-disciplinarity and focus on learning about practical issues for the purpose of improving or changing them. As Reason and Bradbury noted, this method "seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people" (Reason & Bradbury, 2008, p.4). According to Lewin it is a cyclical process that can be divided in four iterative research stages: "reflecting, planning, acting, and observing" (as cited in Ivan’kova & Wingo, 2018, p. 981). Thus, conducting action research in parallel to archival research was deemed appropriate, as the combination enabled the author to inform the framework of the case study in more detail. The author was enabled to reflect on knowledge gained from archives, and plan for data collection with the purpose to fill the recognized knowledge gaps. Next to the third stage – acting, represented by the workshop sessions, the author performed limited observation of the dynamics within the accelerator’s team. The element of observation was limited due to the fact, that the author did not have additional help of another researcher, and thus had to focus her attention mostly on facilitation of workshop sessions.

Workshop topics – selected canvases

Three canvases from the Lean Service Creation methodology were selected to serve as templates for the workshops with the advisors. This methodology was chosen due to a number of reasons. Firstly, it was found appropriate as it combines Lean Startup, design and strategic thinking with agile philosophy, and provides a hands-on toolset well suited for business leaders and innovators (“Lean Service Creation”, 2017). Secondly, it aligned with the author’s objective to use methods of service design. Thirdly, this choice aligned with the advisors’ wish to learn new design-centric tools and methods, which could be used later in their own work with startups, and thus served as a practical introduction to the toolset.

The first two thematic workshops on ‘Business objectives & Context’ and ‘Customer group’ provided contextual data which fed into the framework about the university-based accelerator. The first canvas ‘Business objectives & Context’ was designed as a template of six questions, with the aim to produce a clear formulation of Business objectives & Context of the organization. Unlike the first canvas, the second canvas does not use the form of questions. Instead, a template structured through headlines was provided. The specific headlines lead the workshop participants to share their knowledge on the main and secondary customer groups, share a detailed description, complemented by the possible problems assumed as worth solving. In case primary and secondary groups were defined, their common traits were described as well. Distinct characteristics and drivers of the organization emerged from the research. In particular, an increased understanding of business objectives driving the unit’s activities, and the features of the main customer group were gained. The first workshop on Business objectives and Context was held for three hours and the second, on Customer grouping, for two hours.

The third workshop, an in-depth front stage blueprinting, was carried out in three consecutive sessions, resulting in the total amount of five hours. According to Hollins, blueprints have been used for quality improvement in services. They are helpful when identifying touchpoints or bottlenecks, and can even serve as a building block to develop prototypes (Hollins, 2013). The Service Blueprint canvas, which is widely used in design consultancy, served the author to look into the current state of the provided services and learn about all the typical program components. Thus, the template was designed to address currently provided services through the perspectives of the advisors, and the user. Mapped out was the front stage, as this is the one where advisors have an active role. In the case of the user perspective, all activities were reviewed which the user experiences along the steps labeled as: “beforehand, using the service, and after use.” In the front stage/advisor perspective activities and touchpoints were mapped out. In touchpoints, the author reviewed any media or channels the user (customer)
and employees (advisors) use, related to any specific service. Also here revision was done along all three above mentioned chronological steps. Processes behind Selection, Initial Co-evaluation phase, and those underlying the program’s Business Generator Model were reviewed. The latter was especially important, in order for the author to understand how exactly the support in each of the three modules of Solution, Business and Asset development is provided.

Documentation
During each workshop, the author took photos of the working session in order to capture the interactions between the business accelerator advisors, and when present also the members of the organizations leadership. The ideas put forth by participants were written on post-it notes, which allowed for fluid arrangement as trends came into perspective. At the end of each workshop, the final arrangement of the post-it notes got photographed and the resulting completed canvases were digitized. A digital document with a detailed summary of each topic addressed, the session development, the collected results, and the key learnings was sent to the advisors and to the leadership for feedback and corrections as necessary.

3.1.3 Interviews with selected Startups
A series of semi-structured, in-depth interviews with the executives of five startup cases comprised the second dataset used for analysis in this thesis. The goal of the interviews was to gain a more detailed understanding of the development process each startup endured up until the point of the interview. Special attention was given to the topic of design integration by investigating what design capabilities had been needed and how they had been acquired, beginning with the conceptual inception of the company up until the current day. It was important to interview a number of startup representatives, instead of only one, as the author searched for patterns in order to ensure that the information is valid and representative of a broader group of people. The format of interviews, combining the characteristics of semi-structured and in-depth, was chosen as the authors goal was to receive an extended response, and understand the way participants feel about the researched topic (as cited in Muratovski, 2015).

The author prepared for the interviews by following the steps suggested by Muratovski. First, preliminary preparations were made, by learning about each startup from their online presence, website or linkedin. Then, the interview process was planned by setting the time duration and the space for each interview session. Questions were prepared in order to allow for gathering enough data, while meeting the set time duration. Lastly, the author prepared the documentation process, that would allow for the subsequent stages of analysis and reflection (Muratovski, 2015).

Selection criteria for startups and interviewees
Based on the research question “How can design support the holistic service offering of a business accelerator?”, the following criteria was defined to select suitable interviewees.

Purposeful sampling was used to identify and select startup cases relevant for the objectives of the qualitative research. This sampling method was used as it allows for the most effective use of information-rich cases in a setup of limited resources, by identifying and selecting individuals or groups experienced with the studied phenomenon, who are willing to participate and able to articulate their experiences in a reflective manner (as cited in Palinkas et al., 2015).

The following sampling criteria was inspired by the knowledge gathered from the workshop on Customer grouping conducted prior with the advisors. The knowledge was utilized to steer the choice for criteria in order to meet the profile of a most common customer type enrolled in a university-based business accelerator program. This criteria was set as following:

- Early stage startup case (striving for Seed- up to First round funding stage)
- Team size below 10 members
- Technology originating from Aalto research at the core of the product or service
- History as a customer of either both or at least one unit operating under Aalto University Research and Innovation Services
- Interviewee in an executive position, representing the top management level

Finding the desired number of five startup cases to fill the research slots was challenging because the Aalto Startup Center had only been a part of the University Research and Innovation Services for three years at the start of the data collection process. The start up sample pool was small and it had to be further reduced by applying the participation criteria. Despite this challenge, the accelerator advisors identified enough startup cases to meet the needs of the authors investigation. It played to the authors advantage that some of the advisors who are now active at the accelerator, migrated from the Innovation Services unit. Thus, they had worked with the teams that originated in research from Aalto University and which were especially insightful to this study. The accelerator advisors recommended startup cases for the research initiative based on the selection criteria above. Introductions were made by email, and all of the proposed startups volunteered to participate.

Sample size and duration
A sample of five startup teams were selected to participate in the in-depth, semi-structured interviews, which matched the criteria well enough to be feasible for the purpose of this study. The number of participating startups was determined based on the case studies reviewed from past academic research, as well as to meet the minimum requirements for information validity while utilizing the study time available for the data gathering phase. For detailed information about all selected startup teams, see Table 3 in Appendices.
One interview ranging between 60 to 90 minutes was carried out with each startup representative. Due to the schedule constraints of each startup it was not possible to have more than one interview opportunity, therefore if needed, with some cases the interview took over one hour.

The Interview guide design
The main goal of the interviews with the startup executives was to map out the design capabilities that manifested throughout the startup development. The interview sessions were structured to produce relevant data with enough detail on the aspects of design competence and design management during a prolonged period of time. In order to meet the set goal, the main method used for data gathering in these interview sessions was journey mapping.

Despite the main focus on the journey mapping for design, no formal definitions of the discipline were made at the beginning of the interview, so as to not influence the interviewee; the research intent was to learn specifically about the way in which the interviewees perceive their role and value, what it represents to them. This was particularly important as all startup interviewees, except one, have no formal design education.

Additionally, the interview queried the level of services the support units provided to the startup teams as customers. Therefore, the interviewing author aimed to create an environment that would encourage trust with the interviewees leading to honest answers. Some of the elements that support an environment of trust are careful choice of space to conduct the interview in, as well as a set of initial warm up questions to make sure the interviewee feels comfortable and refreshed.

The interview comprised of two parts. First part consisted of a set of four questions always asked in the same order, to gain a more general overview of the company structure as in responsibilities and the company mission, as well as the relation to the support programs of incubation and acceleration. Second part was hands on, in which the interviewee was asked to walk the author through their startup development, thought of as a journey. While the first part of the interview lasted no more than 15 minutes, the walk-through task lasted up to 45 minutes. In the walk-through task the interviewee was first asked to independently create a journey based off of their own perception and experience. After that, additional questions were asked in order to eliminate ambiguities in the answers given to the first set of questions. Such questions would possibly address the type of design needed in reference to place in time, as well as the way in which it was acquired or the reason why one way of acquisition was preferred over the other. The additional questions were asked without predefined structure.

If the interviewee showed difficulties remembering the milestones of the journey, the Business Generator Model visualization that was co-developed with the help of the author for Aalto Startup Center, was used as a visual aid to help them recall the more significant themes in the startup development process. The author would show a print of the Business Generator Model to the interviewee (see Figure 11) and point to the Solution development module, as this module is most traditionally represented by design. A few key themes tackled through design were listed under the specific module to help the interviewee recall any relevant themes undertaken by the startup itself.

Once all steps of the journey were covered sufficiently, the session was wrapped-up. Part of the wrap up was assuring each interviewee that all names mentioned in the interview would undergo the process of anonymization, including the company title which would be reduced to a descriptive one-liner to keep the informative character (see Table 1). Lastly, the author informed each interviewee of the way in which the data would be documented and sent back to the interviewee for the final proof-viewing.

Treatment of data
In order to provide anonymity to each startup case, each company name was replaced by a more generic term Startup A-E, accompanied by a descriptive one liner sentence. The interviewees names were anonymized and given their respective roles in the company. See the anonymised list of companies with the used pseudonyms in Table 1.

<table>
<thead>
<tr>
<th>Company</th>
<th>Interviewee role</th>
<th>Company description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup A</td>
<td>CEO</td>
<td>Surgical drills made safer</td>
</tr>
<tr>
<td>Startup B</td>
<td>CEO</td>
<td>Anti-bacterial treatment for better dental hygiene</td>
</tr>
<tr>
<td>Startup C</td>
<td>CEO</td>
<td>Mobile analytics company for high-quality connectivity</td>
</tr>
<tr>
<td>Startup D</td>
<td>CDO</td>
<td>Novel camcorder for extreme sport enthusiasts</td>
</tr>
<tr>
<td>Startup E</td>
<td>CEO</td>
<td>Experiential private space to regain focus and recharge</td>
</tr>
</tbody>
</table>

Table 1: Anonymised list of companies with the used pseudonyms
METHODOLOGY

Innovation inside the Aalto ecosystem pointed to individuals relevant for data collection.

ecosystem mapping for related educational programs supporting entrepreneurship and

Additionally, benchmarking and the three previously mentioned research methods; 1) archival research, 2) advisor workshops, and 3) interviewing startups for development journeys. The corrected digitized journeys of the respective startups were sent back for the second, final review round.

The third set of empirical data was collected through in-depth, unstructured interviews with design and entrepreneurship experts from the Aalto University ecosystem. These interviews enabled the author to gain additional data to support the researched topic from the perspective of a crucial stakeholder group, which were the educators and serial entrepreneurs from the ecosystem. They did so by demonstrating details of their teaching practices and beliefs rooted in their domain expertise. The main goal of these interviews was to provide additional support from the perspective of an expert to the primary data set collected through the startup journey mapping.

Selection criteria for entrepreneurship & design expert interviews

Due to its flexibility, opportunistic or emergent sampling is a method that can complement well other types of data gathering in an exploratory research. The author used this method when selecting design and entrepreneurship expert interviewees. It enabled her to “gain more knowledge of a setting”, “… or make sampling decisions that take advantage of events, as they unfold” (Cohen & Crabtree, 2006).

The experts to be interviewed were identified by the author based on the insights provided by the three previously mentioned research methods; 1) archival research, 2) advisor workshops, and 3) interviewing startups for development journeys. Additionally, benchmarking and ecosystem mapping for related educational programs supporting entrepreneurship and innovation inside the Aalto ecosystem pointed to individuals relevant for data collection.

Sample size

In total 10 representatives from the Aalto University ecosystem were interviewed throughout the duration of the case study, out of which two represented the design field, six the entrepreneurship field, and two represented both fields.

The Interview guide design

No formal design guide was created for the ten in-depth, unstructured interviews with the selected design and entrepreneurship experts. Instead, an open approach was used to align with the opportunistic or emergent sampling. The interviews lasted from 30 to 60 minutes, and depending on the field the expert represented, the questions were focused either on the topic of design education and adoption of design competency, or on design capabilities and innovation within entrepreneurship. The two interviewees that had experience in both the areas of design and entrepreneurship received both lines of questioning. In addition the Business Generator Model was reviewed for constructive feedback when interviewing this select group.

Documentation

All interviews were audio recorded with the consent of the interviewees. The author transcribed the interviews. The total amount of 10 hours of interview recordings with design and (or) entrepreneurship experts resulted in 32 pages of transcribed notes.

Treatment of data

To ensure anonymity, the names of the interviewed design and (or) entrepreneurship experts were replaced by a pseudonym and a short description referring to the field of their expertise. An identifying number was then added to each interviewee, corresponding with the chronological order in which the expert was interviewed. The anonymised list with the used pseudonyms is shown in Table 2 below.

Table 2 Anonymised list of experts with the used pseudonyms

<table>
<thead>
<tr>
<th>Interviewee role</th>
<th>Chronological order</th>
<th>Expertise description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design expert</td>
<td>1</td>
<td>Postdoctoral Design Researcher at Aalto University</td>
</tr>
<tr>
<td>Entrepreneurship expert</td>
<td>2</td>
<td>Communication Coordinator at the Aalto University-run Accelerator</td>
</tr>
<tr>
<td>Entrepreneurship expert</td>
<td>3</td>
<td>President of student-run Aalto Entrepreneurship Society</td>
</tr>
<tr>
<td>Entrepreneurship expert</td>
<td>4</td>
<td>CEO of student-run Incubator and Accelerator, Aalto University</td>
</tr>
<tr>
<td>Entrepreneurship expert</td>
<td>5</td>
<td>Managing Director of student-run Design Hackathon, Aalto University</td>
</tr>
<tr>
<td>Entrepreneurship expert</td>
<td>6</td>
<td>Former Manager of Aalto Entrepreneurship Platform</td>
</tr>
<tr>
<td>Design &amp; Entrepreneurship expert</td>
<td>7</td>
<td>Strategic &amp; Eco-design Consultant, CDO at a Modular Smartphones Startup</td>
</tr>
<tr>
<td>Design &amp; Entrepreneurship expert</td>
<td>8</td>
<td>Global Partnerships Coordinator at Aalto Ventures Program</td>
</tr>
<tr>
<td>Design expert</td>
<td>9</td>
<td>CEO of an AI data junior Startup</td>
</tr>
<tr>
<td>Design expert</td>
<td>10</td>
<td>Strategy &amp; Experience Designer and Lecturer at Aalto University</td>
</tr>
</tbody>
</table>
3.2 Data analysis

Mixed methods for data collection were used, in order to create an integrated approach when addressing the topic of this exploratory research. The advisors workshops, startup and design & entrepreneurship expert interviews, and startup journey mapping walk-through tasks resulted in three different data sets. In the following sections, the data and its treatment will be further described.

3.2.1 Workshops

The data gained from the first two workshops with advisors on ‘Business objectives & Context’ and ‘Customer group’ served as a structural framework for the case study. Since it represents the background for the study, this data was not further analysed but merely used to a) construct the narrative when introducing the reader to the topic, b) provide more detailed background to the case study (which can be found in Case background chapter) and c) to help steer the sampling of interviewees.

The data gained in the third workshop, an in-depth front stage blueprinting, was similarly used to inform the background of the case study, as it provided the author with an overview of the services currently offered. Program components, touchpoints and bottlenecks, as well as processes underlying the phases of Selection and Co-evaluation of newly enrolled startup teams were revealed. Blueprinting as a service design tool was helpful in reviewing the training program – Business Generator Model, and opportunities for design integration were explored. Since blueprinting revealed the current way in which Solution-, Business- and Asset development modules and according themes are organized, all gathered data provided a framework for the narrative addressing the quality improvement for services inside the Conclusions & Recommendations Chapter.

3.2.2 Expert Interviews & Data Source Triangulation

The interviews with experts resulted in transcribed data, which was analyzed to produce understanding of the context/ecosystem, findings regarding the integration of Design, and data supporting the recommendations (presented in Chapter 6). The flow chart of Figure 12 depicts the process of data collection and analysis. Inductive thematic analysis was chosen to treat the data. This method for data analysis was found most appropriate as it enabled the author to organize the collected qualitative data, with the purpose of identifying, analysing and interpreting themes or patterns across the data set, and in relation to the research question (Braun & Clarke, 2006). In the following sections, the data and its treatment will be further described.

The method of data source triangulation was used as a means of validation through multiple perspectives (Carter et al., 2014). Data collected in the interviews with startups was triangulated with that collected in the expert interviews. This choice was made to increase the credibility and validity of the results. All verbal data collected from interviews with startups and design & entrepreneurship experts was analysed and cross-referenced with the reviewed literature, to provide reflection on broader implications this case study may have for design practice and education at large. The findings are reported in the Conclusion & Discussion chapter.

Verbal data from startup interviews

Interviews with startup representatives were audio recorded and transcribed, and all relevant information from the startup development journeys were added to the transcripts. All additional data collected in the interviews was treated through the thematic analysis to provide more detail relevant to the research topic of the use of design and its integration in the specific context of early stage startups.

Verbal data from expert interviews

All expert interviews were transcribed and the collected data was thematically analysed in order to identify and interpret themes or patterns related to the goals of this research. Firstly, to achieve a comprehensive understanding of the design capabilities relevant for early stage startup development (including examples of design methods and tools). Secondly, to achieve a comprehensive understanding of how these design capabilities can be managed through integration across the accelerator service offering components, and by utilizing the resources available from Aalto’s entrepreneurial ecosystem.

In practice, the data set was analysed as following. Each data, which was assessed as meaningful to the researched phenomenon, was first organized manually into clusters based on semantic content. Subsequently, the author would use a mind map as a visual aid to sort these clusters into overarching main themes.
3.2.3 Visual Journey Mapping – Startup Executive Interviews

The journey mapping interviews with startup executives resulted in the development of unique journey mappings for each startup and the identification of 5 design themes commonly featured in the journey. The flow chart of Figure 13 depicts the process of data collection and analysis. Inductive thematic analysis was chosen to treat the data, for the same reasons it was applied to the Expert Interviews (Chapter 3.2.1); it enabled the author to organize the collected qualitative data, with the purpose of identifying, analysing and interpreting themes or patterns across the data set, and in relation to the research question (Braun & Clarke, 2006).

Interviews with startup representatives comprised of two parts. First part consisted of a short set of warm-up questions focused on a more general overview of the company structure, the company mission, and the experience with support from the incubation and acceleration programs. Second part was hands on, in which each interviewee was asked to walk the author through their startup development, thought of as a journey.

The walk-through journey mapping task was created to support the author’s understanding of the process of startup development, with a special focus on design capabilities. The tool of journey mapping was furthermore chosen with the aim to provide a visual aid for the interviewees, while recalling all the relevant activities or milestones that occurred over a prolonged period of time. Representatives of five startups were interviewed, and respective journeys were created, using post-its and a large paper canvas.

The journeys have been considered in conjunction with the audio recordings of interviewees, to provide more detail. At the end of each interview, the author transcribed the respective audio recording, and digitized each journey. Where relevant, data from transcript was added to the digitized journey for more depth, and sent to the respective startup for final validation of correctness.

Thematic analysis was performed in order to search for themes across the journeys of all five interviewed startups. All referred activities or milestones, perceived by the interviewee as crucial to the startup development, were first organised into clusters, and subsequently overarching themes were identified. Each theme which was identified as a design capability, was color coded. In the event that designerly tools were identified for a theme, they would be represented as subthemes.

The thematic analysis of the five journeys produced a total number of 11 main themes, perceived as strong contributors to the successful startup development, out of which 5 were identified as design-driven. The five design-driven themes representing the design capabilities retrieved from the journey mapping exercise are as follows: 1) Research, 2) Concepting, 3) Design Strategy, 4) Communication & Marketing and 5) Product/Service development. The five themes representing the design capabilities, and thus identified as supporting startup development, are reported in the Results chapter.

One common journey

Besides revealing the diverse themes occurring during startup development, with the main focus on design capabilities, the author was equally interested in learning about the point in time at which the capabilities were needed most. It was the author’s aim to determine one common, generalized journey with the purpose of providing a simplified visual tool, that could serve for the improvement of the accelerator’s service offering in regard to design integration. In order to reveal one common journey when analysing the five journeys collectively, chronological order in which all activities or milestones happened according to each interviewee, was deemed crucial and thus kept unchanged.

All five journeys consisting of all identified themes, were cross-referenced and analysed by comparison between each other to search for patterns. The sequential themes of each journey were divided evenly into four temporal quarters. This approach to group the themes by sequential order was chosen since each journey had a unique number of themes (19 being the highest number of themes per startup journey, and 10 being the lowest). Themes occurring with the frequency of 40 percent or more, per quarter were perceived as relevant, and noted on the common journey. A visual representation of this thematic analysis using color codes (grey for non-design related themes, and five hues of other colors representing the identified design-related themes), can be seen in Figure 14. The analysis resulted in a derived common journey of 21 themes presented in Figure 19 in the Case Background of Chapter 4.2.
### METHODOLOGY

**Figure 14** Startup journeys treated through algorithm for most frequently occurring themes. The themes referring to Design Capabilities are color coded.

<table>
<thead>
<tr>
<th>Company</th>
<th>Themes in Startup Development Journeys</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startup A</td>
<td>R C C&amp;M F P PSD F IPR BM PSD S F C&amp;M</td>
</tr>
<tr>
<td>Startup B</td>
<td>R C IPR C&amp;M F C R C&amp;M S C R C&amp;M BM IPR BM S F IPR PSD</td>
</tr>
<tr>
<td>Startup C</td>
<td>R BM IPR C P C C&amp;M F PSD IPR PSD F PSD IPR F C&amp;M</td>
</tr>
<tr>
<td>Startup D</td>
<td>R C DS PSD C&amp;M DS F IPR BM PSD F PSD F BM G-M PSD IPR PSD G-M</td>
</tr>
<tr>
<td>Startup E</td>
<td>R C&amp;M C BM F G-M R C IPR PSD</td>
</tr>
</tbody>
</table>

Legend:
- **Research (R)**
- **Concepting (C)**
- **Design strategy (DS)**
- **Communication & Marketing (C&M)**
- **Product & Service Development (PSD)**
- **Funding (F)**
- **Business Model (BM)**
- **Partnering (P)**
- **Sales (S)**
- **Go-to-market (G-M)**
- **IPR**

<table>
<thead>
<tr>
<th>Quarter</th>
<th>R</th>
<th>BM</th>
<th>C</th>
<th>DS</th>
<th>PSD</th>
<th>C&amp;M</th>
<th>F</th>
<th>IPR</th>
<th>BM</th>
<th>PSD</th>
<th>C&amp;M</th>
<th>G-M</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
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<td>1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
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<tr>
<td>II</td>
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<td>0.4</td>
<td>0.6</td>
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<td>0.2</td>
<td>0.2</td>
<td>0.2</td>
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<td>0.4</td>
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<td>0.8</td>
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<tr>
<td>III</td>
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<tr>
<td>IV</td>
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<td>1.2</td>
<td>0.4</td>
<td>0.6</td>
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<td>0.4</td>
</tr>
</tbody>
</table>

The themes referring to Design Capabilities are color coded.
Case Background

The Case Background chapter aims to provide additional information about the Aalto Startup Center accelerator, collected during the development of the case study. Firstly, the author will present insights gained in the three workshops conducted with the accelerator advisors on the topics of ‘Business objectives & Context’, ‘Customer grouping’ and ‘Service Blueprint’. Where relevant, insights derived from interviews with startup representatives were added. This data creates a theoretical framework about a university-based accelerator. Secondly, the derived common journey, which was extracted through thematic analysis, will be reviewed.
4.1 Aalto Startup Center – Theoretical framework

In the early stage of the Case study, method of Action research through co-creative workshops was used to collect empirical data inherent to the functional characteristics of an accelerator. Advisors from the accelerator, with expertise in Business, Intellectual Property Rights and Finance participated in these workshops and shared their knowledge with the author. Drivers of an accelerator, distinct characteristics of the main customer group and the current state of processes behind offered services were revealed. First steps were made towards recognizing opportunities for design integration in the program.

4.1.1 Business Objectives & Context

The first workshop shed light on Business objectives and Context of the accelerator. The author facilitated an open discourse on each of the six questions from the corresponding Canvas. Participating advisors were invited to place post-its with their own thoughts into each section of the canvas. The author captured any additional thoughts and added them to the canvas. To conclude the session, advisors were asked to summarize the collected thoughts in a short narrative, which was concluded by the author as following.

1. The objective of the university-based accelerator Aalto Startup Center is to help customers commercialize their research results, find a market fit and receive funding in order to scale-up faster.

2. It is important to guide research-based companies with potential for growth, and provide them with speed and quality boost because of two reasons. Firstly, startups originating in research have potential to have societal impact by creating new jobs and spark the awareness of success. Secondly, they need support due to a strong competition. A lack of vision for growth or a lack of speed could cause them to miss their opportunity on the market.

3. There are several ways in which the accelerator assesses whether they succeeded as an organization for business support, or not. While a team is enrolled in the program, the organization aims to provide regular status check-ups, in order to assess if the set milestones were met. After the startup left the program, success is being measured by keeping track of the teams. This is done by following the companies through public reports, that can be acquired online. On the accelerator level, quality is measured by benchmarking against other similar entities.

4. In order for an accelerator to be a flourishing organization, various stakeholders need to be involved, as following:

- Research groups – the main customer
- Innovation Services (organization that is ahead of Aalto Startup Center in the pipeline and acts as “the interface to the research teams”)
- Mentors who act as advisors by providing expertise on a specific domain
- “The Champions” who are experts from various industries and who become team members
- Founders
- Investors and Financiers
- Partners who can support the startup teams by providing any kind of resources

5. The accelerator employees felt that the factors that can enable the organization to function were as follows:

- Brand and strategy of Aalto University
- University-owned facilities
- Pipeline provided by Innovation Services
- University Invention law
- Good funding tools such as Business Finland
- Success teams which attract more talents and funders

6. On the other hand, tight budget, bureaucratic restrictions, low commitment from University management and risk-averse policies were perceived as factors that can be restricting for the smooth operation of the accelerator.

4.1.2 Customer grouping

The second workshop, on Customer grouping, was deemed important as it enabled the author to understand what type of customer the program aims to serve. Analysis of the data collected in startup and expert interviews provided additional characteristics of a team entering the incubation and (or) acceleration programs.

From the workshops with the advisors it was found that the accelerator’s focus is primarily on teams that evolved from university-based research. These represent the primary group as they align strongly with the strategic framework of Aalto University. Moreover, teams that show high growth potential represent the best fit for acceleration. For this reason, the organization provides the opportunity of an open application to the secondary customer group, teams with the potential to become an innovative scalable startup, but whose novel technology does not necessarily originate from Aalto University. Most teams would enter the acceleration program at an early stage, before a company was founded. In order to enroll in incubation and (or) acceleration program, a team usually consists of at least two to three members.
Based on the data collected in the interviews with startup executives, there is a common belief among startup executives, that new technologies allow companies to manage tasks well also with less people employed full-time. Thus the author concluded that there is a trend to keep the number of core team members at the minimum. In interviews with experts it was argued, that it is important to strive for a team with diversity of backgrounds. The reason for the preferred diversity can be explained as following. Upon research commercialization the author has to acquire entrepreneurial mindset. However, this often poses a challenge since, according to the experience of the business advisors, authors tend to have a rather low understanding of the business side. Due to this reason, it is strongly recommended to have at least one person on the team with expertise in business. The same can be concluded about the use of design, in that it is crucial to have an integrated (strategic) designer join the team early on, when the possibility for integration is high, as opposed to later on, when used merely as an ad-hoc.

As exemplified during interview with Entrepreneurship expert 2, upon entering an incubation and (or) acceleration program, the team has to be coachable in that it shows flexibility, readiness to experiment and the ability to execute fast and well. A good team is able to iterate and make changes to their business quickly, in case the market research revealed that the product is not meeting the needs of the intended market. These qualities are important as all startups go through cycles of transformation in the early stage.

4.1.3 Service Blueprint

The third workshop, an in-depth front stage blueprinting was carried out in order to gain a better understanding of the current state of the provided services, and learn about all the typical program package components. Data from workshops, complemented by benchmarking, showed that besides an affordable office space an acceleration program usually offers many intangible services to support a successful startup development. Most accelerator program packages thus consist of common service components such as Advisory services, Mentoring services, Training program, Strategic and Community events, as well as a Demo day. When all components are tailored accordingly to the startups’ needs, a holistic support can be provided and cornerstones for successful future endeavours and growth set. Following stages were revealed when blueprinting the current processes at the accelerator: Application, Selection, Enrollment, first Assessment through Co-evaluation, Startup development through Business Generator Model. The full blueprint can be seen in the Appendices under Figure 15.

In the Application stage new teams traditionally fill out the application form online, which then gets reviewed by the accelerator advisors collectively. In the Selection phase one advisor is assigned the new startup team, depending on availability and industry match. Advisor who was assigned the team reviews the application in detail, using the criteria described in the previous chapter. In a group meeting, advisors evaluate all gathered information collectively, upon which a new team is either accepted into the program or declined, due to not fulfilling the admissions criteria.

Upon enrollment into the program, Co-evaluation process follows. The aim is to create a common understanding among the advisors and a startup team on the current status of the company. The startup team first uses an online tool for self-assessment, answering six to seven questions related to the three development modules from the Business Generator Model (Solution, Business and Asset Development). In a face-to-face pitch the team presents the current state of their startup to the advisors. The same online tool is then used by the advisors for the assessment of maturity in all development modules. In a meeting the startup team receives feedback and prioritized topics with an estimated timeline and milestones are set. Over a period of 12 months, startup teams participate in the acceleration program, covering various topics from Business Generator Model. Here the areas of development are tackled as defined during the assessment stage.

It was shown that accelerator’s own advisors provide support to startups in the fields of their respective expertise – Business, Intellectual Property Rights and Finance (Funding). Respectively, the advisors keep track of the teams’ progress. It was found that there is a need for a project management tool, with which all advisors could track and update the progress of each enrolled startup team. At the time of data collection, this was done in personal folders of each advisor, and thus there was a lack of transparency.

Next to providing support on their field of expertise, advisors can access a pool of mentors in order to match startup teams with mentors, who have a deeper expertise from a specific industry. It was shown, that the incubator Innovation Services and accelerator Aalto Startup Center share a common pool of mentors. This pool was at the time of the data collection undergoing an update, and the amount was likely to rise from 40-50 members. The units agreed to categorize the industries the mentors are active in the following:

- Information and Communications Technology (ICT) and Digitalization
- Industrial engineering and management
- Arts and design (Creative Industries)
- Health and well-being
- Chemical engineering
- Electrical engineering
- Mechanical engineering
- Applied physics

Besides talking through issues with advisors on a regular basis, and being mentored, teams can participate in one-day long workshops to work through problem areas, or tackle more specific issues in a one-on-one clinic. The workshops (training sessions) and clinics are traditionally led by external consultants and service providers. The program runs for 12
As exemplified during the workshops, the accelerator advisors provided active support on themes represented by Asset development module (IPR, Funding, Partnering), and the module of Business development (Business Model, Sales, Marketing, Go-to-market). The themes listed in the current Business Generator Model under the third module of Solution Development, such as Proof of Concept, Proof of relevance or the Minimum Viable product, fall most traditionally under the domain of design. Since none of the advisors present at the time had a formal background in design, it could be concluded by the author, that the enrolled teams did not receive any support from the accelerator’s side on design related themes. Lack of support in design-related themes became visible when blueprinting the Assessment stage. These design-related themes will be expanded on in Chapter 5 Results and Chapter 6 Recommendations, and briefly discussed herein for context of the case background. Despite the existing set of questions aimed to reveal the level of maturity within the Solution development module, the accelerator did not evaluate the answers. At the time of the case study, there was no formal process of establishing a tailored acceleration path with set milestones for each individual startup team, which would include design-related themes. Since the author wasn’t able to map out the processes behind the Solution development module in workshops with the advisors, further investigation was needed.

The author conducted interviews with five startup cases affiliated with the organization. In addition, design and entrepreneurship experts from the Aalto ecosystem were approached. The goal was to learn about design capabilities by investigating the development journeys of five startups, with main focus on the use of design in respect to time, level of integration, and management. Patterns across the referred design capabilities were investigated in order to derive one common journey. Creating one common journey would serve merely as a starting point for further design integration, for further tailoring.

Four design-related themes, out of the five observed, reached placement on the derived common journey. Creating one common journey would serve merely as a starting point for design integration and further tailoring done by the accelerator.

4.2 Derived Common Journey of Startup Development

The following section presents the author’s understanding of the startup’s business development process. The author entered this investigation with limited prior knowledge of the startup environment or business development process. This section details the contextual understanding acquired through the visual journey mapping (more detail in section 3.2.2). Related conclusions and recommendations can be found in section 6.2.

Thematic analysis was performed in order to search for themes across the journeys of all five interviewed startups. Each theme which was identified as a design capability, was extracted and color coded. The thematic analysis of the five journeys produced a total number of 11 main themes, perceived as strong contributors to the successful startup development, out of which 5 were identified as design-driven (more details can be found in Figure 12). The five design-driven themes representing the design capabilities retrieved from the journey mapping exercise are as follows: 1) User Research, 2) Concepting, 3) Design Strategy, 4) Communication & Marketing and 5) Product & Service development. All five themes representing the design capabilities are reported in detail in the Results chapter.

The themes of the five journeys were cross-referenced and analysed by comparison between each other to search for patterns. An algorithm was used to determine the most frequently occurring themes, which were then noted on the derived common journey. A detailed description of how the author analysed the journeys can be found in the previous Chapter, under the section 3.2.3. A visual representation of the thematic analysis using color codes can be seen under that same section, in Figure 14. The analysis resulted in a derived common journey of 21 themes. The derived common journey, with most frequently identified themes, can be seen in Figure 16.

It was shown that certain themes tend to occur earlier or later into development. The process of building a startup is more often than not iterative, with a majority of themes being intertwined and reoccurring. Even though the journey of each Startup is unique, common trends could be observed. This observation enabled the author at creating one common journey that would serve as a starting point for further design integration, for further tailoring.

4) Communication & Marketing and 5) Product & Service development. All five themes representing the design capabilities are reported in detail in the Results chapter.
Results

The results of the case study are presented in the following chapter, as derived from the interviews with startup representatives and design & entrepreneurship experts. The author will report on five design capabilities that were identified and deemed beneficial for startup development. These are organized to follow the most common sequence identified from the process of startup development. At the end of this chapter, challenges that occurred when integrating design into the startup development will be indicated.
5.1 Design capabilities beneficial for startup development

The essence of design as stated by Verganti is “making sense of things” (Verganti, 2009, p. 21). As such, the application of design to innovation can be characterized in multiple ways. Verganti suggests that design themes can be demarcated with heightened empathy for the end user, expanded perspectives of context, and an ultimate focus on generating value through new meanings (Verganti, 2009). According to the interviews, five capabilities were identified that could be improved with this demarcation of design. These are presented in chronological order of appearance on the development timeline, with no explicit hierarchy to the themes, as following:

- **User Research – Humanizing technology**
- **Design Strategy – Bridging the gap between design and business**
- **Concepting – Ideas start taking on a full shape with outlines of function and form**
- **Communication & Marketing – Raising finances and communicating with the stakeholders**
- **Product & Service Development – Research and Development**

5.1.1 User Research – Humanizing technology

Two scenarios were revealed as starting points for the studied entrepreneurial businesses, according to the interviews. In the case of Startups C and D, at the beginning there was a novel technology previously invented by a research team stemming from Aalto University, with potential for productization. In the case of Startup A, B and E on the other hand, the teams used observation for need finding, and technology was added later on. In the latter scenario, one or more members were exposed to an environment that showed potential for innovation. Despite the identified difference of initiating a startup journey, following findings can be applied to both scenarios.

As exemplified during the interviews, in the early startup stage, design can become highly beneficial by providing tools and methods for qualitative research. Startup teams are able to connect with the users – future customers, in order to learn about their problems and reveal their unmet needs, by using the most common methods of observation and interviews. It was argued that even though most companies are technology-driven, everything is designed for people. Therefore, unless the needs and requirements are understood, technology does not mean anything. As the Design and Entrepreneurship expert 7 stated: “We have to remember that we are tweaking technologies and technology tweaking us - how we behave, how we do things.”

5.1.2 Design Strategy – Bridging the gap between design and business

While many reported capabilities are essential to the world of design, many more are at the intersection where design meets business. Data from interviews with startup cases as well as Design and Entrepreneurship experts show that Design Strategy is one of such themes. Here the merge between the two disciplines is most obvious. This theme became particularly meaningful to the Results chapter, due to its strong link to the growth of design competency.
and the use of design management. Among the interviewed startup case representatives, only CDO from Startup D directly referred to Design Strategy as a specific competence area. This came as no surprise due to his educational background in Industrial and Strategic design, as well as his role of a CDO in the company. The executive stated that the team came up with several business ideas and focus areas. Many solutions for products were developed before the team settled on the solution that represented the best fit for a new growing market. Subsequently a Development plan was created. In regard to the plan, the CDO emphasized that:

“The main benefit of having design in the core of our competency is that we managed this complicated process. I could plan how we’re gonna do this, what steps we will need to take. (...)The start is crucial. All these companies are unique and they all need unique design strategy to define what they need.” CDO D

From his experience, the way in which one approaches Design Strategy is by looking at the business plan in order to define what the core competence of each startup team is. After that design services or types of design that are needed can be determined easier. Next to visual identity, each case needs a Design Strategy for the products or services that are to be developed. Once a design strategy is in place, an overall plan with time estimates can be applied to help steering the application of design.

The CEO of Startup C perceived questions regarding Pricing, Value and the Way in which services are delivered to the customer as fundamental. The CEO of Startup C stated that the team came up with several business ideas and focus areas. Many solutions for products were developed as well as the way in which the device would roughly work. The latter step was important towards the market as a company is what I call Business model design!”

It became clear that in the case of Startup C the themes Business Model and Design Strategy were strongly intertwined.

Similarly to CDO from Startup D, Design and Entrepreneurship expert 7 believes that when it comes to Design strategy, Business model is an important aspect that supports any physical or digital product, as much as the Brand does. The expert further elaborated on the theme by saying that:

“Too much effort is put into developing a product without first building the future. On the strategic level you use future tools to see where the industries are going – this is the systems level, the visionary. When you are creating a product, you should have activities planned for the future; you should be creating future assets and roadmaps towards next steps. You need to know what is the problem you want to solve and how you’re going to do it; have a mission.” Design and Entrepreneurship expert 7

As an example for specific tools and methods used in Design strategy, Expert 7 mentioned Foresighting – used to look at the possible futures, which helps with defining where a company wants to be. Backsighting on today which is to be used to recognize what technologies are available and what would be feasible. Roadmaps with stepping stones which are to be used to bring the Mission in place and move towards the long term Vision. He furthermore outlined some of the characteristics inherent to the Design Strategy competency, such as:

“You are a strategic designer if you have enough experience to see the big picture on a system level and you can also contribute with something there. Most people see design through the product (‘peak of the iceberg’), but the journey and the processes are very important, what has been done and why.” Design and Entrepreneurship expert 7

5.1.3 Concepting – Ideas start taking on a full shape with outlines of function and form

While the very first raw ideas for a future business often pop up even before the research stage begins, and continue throughout its duration, it is in the stage of Concepting when ideas start taking on a full shape – with outlines of function and form. The author identified a pattern that upon gaining understanding of people’s needs, the cases shift their focus towards how to meet the recognized needs with new products, services, interactions, experiences and by applying new strategies. This theme mostly aligns with the second and third part of the Double Diamond design process, ‘Define’ and ‘Develop’, as shown in Table 3 in Appendices. Since the recognized needs are being answered by emergent strategies, an overlap of Concepting and Design Strategy was observed. The associated tools and methods of each theme were found at this intersection.

Methods which were found to be used most commonly by the interviewed startups are user cases, personas and user journeys. These tools not only enable entrepreneurs to give shape, function and form to the novel ideas, but also they enable the startup teams to make strategic decisions regarding their businesses, for example when defining the mission by using visualizations, case studies and storytelling.

CDO from Startup D emphasized that the process of brainstorming – bouncing off ideas helped the team to come up with countless solutions for the new business. According to the interviewee this process was “free and open” and contributed to growing and strengthening the startup team. In the role of an integrated designer, he started the Concepting stage by creating visualizations, user cases and user journeys.

In the case of Startup B, after the extensive research phase, detailed concept generation phase followed. In order to develop a holistic solution, the team defined the user, the idea as well as the way in which the device would roughly work. The latter step was important as it helped with specifying the technical requirements. Since the team members had no formal design education, a design company was then approached to help with the concept
drafting. The outsourced product designer was described as “someone with Vision” and with understanding of how the drafted device would “work with people”. The latter piece of data points yet to another moment when themes intertwined, in this case between Concepting and Design Strategy. CEO of Startup C confirmed that the designer would define the esthetics and user experience. For this purpose user cases and user journeys were created.

“When developing the solution, it comes to product design. ...How does the product look, but also what will be the user experience while the user interacts with the website or the application.” CEO C

Similarly, in the solution development of Startup E, the CEO noted that the product designer “worked on the dashboard, web and user cases”. At that time still an outsourced collaborator, the industrial designer developed a customer journey, product and space visualizations. The collaborating designer, who later became an in-house designer, was hired through an online matchmaking tool not affiliated with the accelerator.

5.1.4 Communication & Marketing – Raising finances and communicating with the stakeholders

Next to the predominantly process-driven capabilities found under the themes of Design strategy and Concept Design, the theme of Communications and Marketing represents mostly form-driven design capabilities. This theme was perceived by all interviewed startup representatives as one with the most obvious link to design, namely through Visual design, and it played an important role already very early into the development, when applying for the first funding either as a research team or a newly founded company. The data collected in the interviews with the startup representatives revealed that design helps entrepreneurs establish an image of the company and allows them to leverage resources as well as build confidence in their stakeholders.

Unless a designer has been integrated into the startups core team from the beginning, the author observed that it is a common practice to outsource design help through design students or design professionals/ a design studio. Due to the scarce finances, it is common for startups to go for a low threshold solution first and invest in a renowned designer or design studio later on, as the startup matures. Thus, the level of referred design proficiency spans from semi-professional to professional, with the former one being acquired commonly in the early stage and the latter one further into development. The most common design artifacts that occurred in the early stage, before applying for the first funding are Pitch, Visual identity or Branding (Logo), Animations, Product visualizations, and in some cases a Webpage. In the later stage startups would most frequently need a website to communicate the offering of the company to the customer, and packaging for the developed product.

According to CEO from Startup A, there is an easy link between design and marketing. Traditional visual design comes into play to answer “What and to whom the startup aims to sell”. He further stated that in the case of their startup, Communication and Graphic design was used “for raising finances and for communicating with the customers”. Due to the lack of designers in the founding team, various assets were created with the help of outsourced design students found through recommendations. Despite the graphical services being perceived as “widely available”, it was noted that a structured student network would have been highly appreciated.

“We had a couple students for animations, 3D visualizations of the product, images of the team, pitch; We had logo made by industrial design student for his course work (branding); University of Helsinki student did the webpage for us.” CEO A

Similarly, the CEO of Startup B noted multiple approaches to communication. In the early stages, the team contracted with a graphic designer to communicate the business idea in a fashion similar to Startup A (more details on this can be found in section 5.3). In addition, the team was invited to practice their pitch at the Berkeley Method of Entrepreneurship Bootcamp, which in the CEO’s words: “...helped us immensely before applying for the research funding.” In a later stage, an external consultant for communication and marketing was hired to support the team with the Marketing matters: “She gave us the know-how for the target market in the field (who is the customer; what is the problem, what are the regulations and the points of sales). She knows medical opinion leaders.”

Interviewee from Startup C stated that: “In Marketing there are many traditional design elements and things related to Visual Design. “This team included an inhouse expert on Visual and UX/UI design. This designer’s role was to lead by the question “What is the product?” with the core responsibility of defining the branding of the company and of its product. The CEO described the branding as “the look and feel”, as well as the product usability.

The CDO – integrated designer of Startup D stated that: “My task was to create visual identity, visual concepts, service concepts” with the purpose to present in a visual way to all kinds of stakeholders what the company was doing, as well as to explain what their aims were or how they understood the situation on the market in respect to their business idea. Thus also in this case, design was utilized for advertisement purposes in order to receive funding. In addition it was mentioned that design for Communication was used to support the recruitment process for coders and other experts.

Both representatives from Startup A and Startup B referred to visual design being used for packaging. Furthermore, CEO from Startup A pointed out that as their design needs changed over time a professional design studio was preferred instead of design students in order to
ensure consistency of the progressively more complex and maturing brand. In the interviewees' mind, the professional design studio equals a higher grade of independence and thus, even though more costly, it represents a more effective price - outcome ratio. In respect to the customer being the main target in the later use of design for communications and marketing, CEO of Startup B noted that a studio was outsourced to develop the website. Additionally, it was noted that in the near future the company would consider hiring an in-house designer to do communications on a more regular basis, as opposed to packaging that was created in a one-time project.

Reflecting on the data, the author found Communication design being applied at various stages of the business development. In the early development stage, design for Communication and Marketing was utilized to showcase the understanding of the company’s position towards the market as well as the concepts related to the business idea to raise finances. In the later stage, graphic design and marketing skills were needed to support mainly the advancement of the product or service. The focus shifts and instead of targeting primarily the investors or potential professionals to collaborate with, the designed outcome is targeted towards the customer.

5.1.5 Product & Service Development – Research and Development

Last theme from the journey discussed in the Results chapter is Product and Service Development (including Research & Development along the product iterations). Similar to the previously discussed theme of Communication & Marketing, this theme plays an important and strongly design driven role, from the perspective of all interviewed startup representatives. While both themes have an irredeemable position in the design awareness of all interviewed startup cases, it is here that the representatives see design at the forefront, accompanied by engineering. Product and Service development usually happens right after the phase of Concepting and could be best categorized under two stages of the Double Diamond Process starting with “Develop”, and continuing at its full scope in “Deliver”. For this phase all interviewed cases sought out the help of professional designers, either in the form of freelancers or well established design studios. Hence, while in some of the previous stages design students and semi-professional designers represented a well suited design aid, in this stage all companies prefer collaborating with renowned design professionals.

As the data showed, once the teams sketched out their ideas into concepts and specified the requirements for the envisioned product, the first round of prototyping or – the minimum viable product would be developed. As the Design & Entrepreneurship expert noted: “Good product always has to pass three main gates: Desirability, Feasibility and Viability”. In other words, the new product or service should come as a solution proposed and developed to meet a need or answer an existing problem, the resources and the ability to manufacture should be in place either through an in-house competence or by partnering with suitting external stakeholders, and lastly assets such as the company’s strategy and brand should be applied in order to assure a profitable outcome. Only once all three gates are passed, the company can prevent its endeavour from the commonly feared failure. Next to the three gates, commonly referred to in literature on product development, the expert added the fourth “Horizontal gate” – Sustainability and Circular economy. Today, more than ever, this gate is rapidly growing on importance due to the concerns caused by decades of poor and unsustainable decision making in production and use of resources. Thus, the fourth gate addresses the topic of the environmental impact caused by all three gates mentioned above, and underlines the overall responsibility any newly established business carries, from People involved, through Research & Development to the choices made in Manufacturing.

Prototyping, the crucial part of product and service development was mentioned by all interviewed startup executives. It was stressed that networks and facilities inside the ecosystem are of critical importance, since when developing new technologies, many iterations leading up to a couple hundred prototypes are a necessity. As CEO from Startup C noted, Minimum viable product was one of their key topics and developing a product means going back and forth between Solution and Business Development at all times. This statement was complemented by the experience of CEO from Startup B and CDO from Startup D, in which having a prototype in assembly process, and the demo unit finalized meant that further funding was required so that the next stage of manufacturing and go-to-market plan could be initiated. In the words of CEO from Startup A: “From the manufacturing perspective, a new phase starts with mass production.”

The author notes, an important aspect that emerged from discussions around prototyping and testing was usability, the feature which takes into consideration the end user. While the CEO of Startup C referred to the teams expert on UX design as the one taking care of the matter, CEO of Startup B admitted that while their product was definitely feasible, they might not have answered quite well whether it was also comfortable to use. CEO of Startup C further added that in terms of Solution Development module all relevant topics were covered, from the Proof of Concept through Proof of Relevance to testing with “real people”, done for the purpose of enhancing the product. Running tests is an important part of the Development stage as it can determine whether a company does or does not receive Sales approval.
5.2 Challenges of Design Integration

Several challenges exist with integration of design. These can range from preconceptions inhibiting the startup’s demand for design (i.e. lack of awareness in the benefits of design) to pragmatic obstructions to the actualization (i.e. funding, lack of legal structure for Intellectual Property, etc). In this section, the author notes related observations experienced by the studied startups or highlighted by the interviewed experts.

Entrepreneurship expert 5 expressed, that in the startup world, design is not yet as well appreciated as it should be. To support this statement, the interviewee noted that “many startups think they don’t need a designer.” The author did not see evidence of this in the Startups studied. While each startup held a unique and varying understanding of what Design is and how they could benefit from Design, the research found no case in which a Startup denied that the inclusion of Design would be beneficial. Startup E most closely reflected this, in that their startup process largely lacked Design Thinking. For example, minimal to no product research was done on the early stages and as a result a product was developed with no consumer interest. This deviated slightly from the assertion of expert 5, in that Startup C did not assert that they do not need a designer, they simply failed to acknowledge the need.

On the other hand, the CEO of Startup B was aware of the benefits of design as well as the University ecosystem and its resources. The beginning of Startup B dates back to a competition called Biodesign Finland. Unlike the example of a weekend long design hackathon referred above, this competition lasted several months. The competing teams took part in an entrepreneurial program on Design thinking, that originated from Stanford University. After the completion of Biodesign Finland, the CEO pointed out that, the team considered contracting a design student for the communications and marketing related job. Yet, this intention wasn’t followed through due to complications that occurred shortly after.

“He tried to look for design help around the University, but contracting design students from Aalto was complicated. There were some complications with IP transfer. Also there was no agreement on what the price should be.” CEO B

He further stated that even though approaching the design school department at an early stage seemed like the perfect fit, there were no existing channels which would support the hiring process. Thus, unless a startup team has contacts to find the right match for this type of design collaboration, the process remains complicated. Ultimately, a relative of the company’s Chairman of the board trained in graphic design was approached to help communicate the business idea.
Recommendations

The study aims to help navigate future decisions of the accelerator leadership on the path towards a higher design maturity. Therefore, recommendations on how to approach design integration through an improved service offering across the program package components are provided. In this chapter, the author will propose a set of recommendations with special attention on the components with opportunity for design integration. This part is valuable as it provides evidence on how design maturity and design management competency can be grown inside a startup accelerator.
6.1 Program components with opportunity for design integration

Through the workshops with the advisors, the author gained a better understanding of how the organization is perceived through the eyes of its employees. The gathered data was cross-referenced with relevant literature written on the subject of incubation and acceleration models. The aim of the author was to support the findings from the workshop by those of other researchers, in order to inform the Recommendations chapter.

According to Pauwels, three main types of accelerators were recognized, and as she further pointed out, there are also hybrids between them. A hybrid would incorporate characteristics of two different accelerator types. Aalto Startup Center appeared to be most closely aligned with the definition of a hybrid type, one between ‘The deal-flow maker’ and ‘The Welfare Stimulator’. Such accelerators typically count government agencies among their main stakeholders. The primary objective is to stimulate start-up activity and foster economic growth either within a specific region or within a specific technological domain. Ventures selected are in a very early stage and quite often a value proposition has not been developed yet. The focus of such hybrid type of accelerator is on high-potential technology start-ups, being in the role of a strong advocate of ‘Tech for Good’, due to the focus on companies that leverage products and services for social good. As a consequence, the curricula and training programs provided should be well developed (Pauwels, 2016, p.21). In a case such as Aalto Startup Center, a training program offering a rich curriculum to choose from thus appears essential.

Data from workshops complemented by benchmarking, showed that besides an affordable office space, a good accelerator usually offers many intangible services to support a successful startup development. Most accelerator programs consist of service components such as Advisory services, Mentoring services, Training program, Strategic and Community events, as well as a Demo day. When all components are tailored accordingly to the startups needs, a holistic support can be provided setting the cornerstone of a successful endeavor. In this case study, it was found that several of the above mentioned service offering components provide opportunities for design integration, as derived from the thematic analysis of data collected in interviews with startup executives and design & entrepreneurship experts. The author will further elaborate on four selected program package components: Advisory services, Training program, Mentoring services, and Community events.

6.1.1 One-on-one sessions with the accelerator advisors

The main role of the advisors at the accelerator was to gain an overview of the case’s current state and guide them through the entrepreneurial process. Advisors were made available to understand the needs of each case in the program. They suggested a path, guided and educated the team through the program modules, just like a doctor would suggest a treatment and a recipe to its patient. The advising or coaching happened in a number of one-on-one sessions.

It was further revealed that the support from advisors appeared rather on an open door policy. The startups would approach any advisor in case help was required. While this flexible approach fits well for startups with experienced and highly independent members, a more structured systematic approach appears necessary for less experienced entrepreneurs.

As the blueprinting revealed, at the time of the study the organization did not have enough advisors to fully cover all three modules represented in the Business Generator Model (for reference see Figure 16). It was observed that advisors tended to focus consultancy on legal or business processes. For example, most startups applied for public funding from the Public Funding Agency Business Finland. Since this agency does not help with the application process, advisors seemed to be in the most suitable role to do so. This finding brought up a great opportunity for design integration on a level beyond the currently assessed ‘design as form-giving’ (Danish Design Ladder, 2001).

“If you want to profile yourself as a design startup accelerator, you need to hire a design manager - a person who has the mandate and who works with the education to help startups.” Design expert 1

“I would like to see the accelerator hire a designer in the near future as a consultant, so that there is one person who can help define the design needs of each startup. He needs to keep a distance not to do the work on the design!”

CDO D

Hiring an advisor with senior level experience at the intersection of design and entrepreneurship would strengthen the support in both Solution and Business development modules. Such advisor—design manager would be capable of helping each startup by recognizing the design needs and suggesting a personalised path towards systematic design implementation. It would be furthermore of a great advantage, if an individual hired into such position had an understanding of the Aalto ecosystem, as it is often the role of a design manager to be not only savvy with design processes, but also able to direct the customer to the right resources.

Design management, if following the design process and using the best practices, is able to empower all startups – especially in case when no designer is part of the core team. Once the needs are verbalized in a design brief, it will be much easier to recognize whether the startup case would benefit most from having a mentor or also require an additional outsourced design support from a design student, a design studio or a consultant.
6.1.2 Trainings, Workshops and Clinics

An important part of a university-based accelerator service offering is a well crafted curriculum of educational activities. These can range from colloquial talks, university curriculum (classes), university based interdepartmental forums, to government sanctioned projects.

An example of a design workshop that was beneficial for startups previously at Aalto Startup Center, was part of the Innovation Scout Project lead by Innovation Services and funded by Business Finland (previously known as “Tekes”). In this project, a team of professors and innovation agents from Aalto University’s Design Department explored a number of startups that came out of Aalto University, and in which the combination of technology and design lead to a successfully innovative outcome. Even though Aalto Startup Center was not originally in direct connection with the Innovation Scout Project, as the project progressed a synergy with Aalto Startup Center developed. This collaboration culminated in a workshop on Design thinking, offered to startups at the accelerator.

“All startups need some kind of a ‘design aid’ - giving lectures or trainings can be done easily, as long as the requests come to the right people and well in advance.”

Design expert 1

The interviewed design expert suggested that startups can benefit from design inputs as small as one afternoon long workshop. A prerequisite to success is that the accelerator staff knows their customers, so that the knowledge of current needs can be used to offer relevant workshop topics facilitated by the right people. People from various school departments, consultants, and even Alumni who are active in the industry can be then invited by the accelerator itself. The author observed the lack of such influence on Startup E, in that the lack may have contributed to the minimal design driven research and ultimately abandonment of the first business idea due to lack of customer interest or demand.

Similar to the Innovation Scout Project, another example of an influential activity observed from Aalto ecosystem is the annual design hackathon ‘Dash’. Entrepreneurship expert 5 explained that a pre-event is organized every year to kick-off the learning experience, at which a design professional teaches all participants (designers and non-designers) the process of Design thinking through the Double Diamond methodology. To conclude, such curriculums that feature both lectures and workshop exercises would enhance the service offerings of the accelerator.

Lastly, the entrepreneurial ecosystem of Aalto is a highly active network of scholars and practitioners. Talks and classes that are many times open to the public are being offered on various design topics. Examples are Masterclasses and other publicly accessible events organized by Aalto Ventures Program, as well as workshops organized by the Department of Design (in collaboration with the Design Factory), to name a few. Developing partnerships with other departments and actors from the ecosystem requires time and persistence at first. Yet a continuous synergy is necessary, in order to provide the best possible ground for learning and growth. Thus, being on the lookout for educational activities happening around the campus is crucial and should not be underestimated. Newsletter to the startup cases is a quick way to build awareness and spark engagement.

Current advisors are part of the training program because they help startups by providing knowledge on themes such as Business plan, Sales and Go-to-market strategy, Funding strategy and Intellectual Property rights (IPR) strategy. External providers such as consultants, or teachers are also part of the curriculum since they can be invited to give a teaching session or a workshop on a specific theme.

6.1.3 Mentoring services

“One accelerator has developed over a number of years, the alumni network can be an important source for mentors and investors, as successful graduates are more likely to invest back into the community that supported them in the first place” (Pauwels et al., 2016, p.19).

One of the strongest assets of any startup accelerator is the pool of mentors. A mentor is an experienced business professional, who acts as an advisor – supporter, not as a consultant. Business mentors offer benefits to startups through their authority, experience, contacts and understanding of the external business scene. Mentoring traditionally works on a voluntary pro-bono basis. The goal of mentoring is to improve the long-term functioning of startups and to help them develop their network. In later phases, it is not uncommon for mentors to financially invest in the teams.

“Mentoring itself doesn’t necessarily provide enough to integrate design competency into a startup. But it provides leads, sparks ideas and gives tips. As a mentor you are recycling good.” Design & Entrepreneurship expert 7

There is an opportunity to further enlarge the number of mentors representing the Creative industry, as most mentors in the pool today represent ICT and Digitalization. New mentors can be found through the accelerator’s leadership network, professional networking platforms such as LinkedIn, Alumni and through networking events at A Grid. The author notes that, A Grid is a hub which houses many individuals which match the profile of a mentor. It is important to keep good Alumni relations as they can play a big role in mentoring.
6.1.4 Community Events: Peer to Peer Networking

Next to the organizations’ own advisors, mentors, and educational trainings, the Aalto Startup Center accelerator hosts a number of community events. As interviews show, such events are important as they give all startup teams attending the program an opportunity to network and set up future collaborations for peer to peer support, by sharing their expertise. Therefore, these events should happen on a regular basis. A facilitator from the staff who knows all teams can help initiate conversations if needed.

“In the office we had many informal discussions at events organized by ASUC. Interaction between companies at the accelerator is very helpful – you can always ask for help and speak to the other guys around you. There was this one company; they had the brand and needed the product so I stepped in and did a small design project with them and they entered the market with that.” CDO, D

“One of the best outcomes of Startup Sauna was that teams could meet each other – other entrepreneurs, and it didn’t matter if they were from a different industry. Each batch created very close friendships.” Entrepreneurship expert 2

6.2 Updated Tools and Training Materials

Besides expanding accelerator’s program components to facilitate design integration, it is important to provide structured content on the subject of design. The author identified two tools to serve as vehicles to communicate Design; 1) a high level journey map highlighting when various design themes can and should be implemented (see Figure 17), and 2) a revised Business Generator Model featuring the added design themes discussed in Section 5 (see Figure 18).

6.2.1 Proposed Startup Journey – Inclusion of Design Strategy

Through the interviews with startups, it was found that design practices were utilized throughout the development process. While four revealed capabilities of User Research, Concepting, Communication & Marketing, and Product & Service Development were noted on the Derived Common Journey, fifth theme referring to the Strategic design capability was not. As noted in detail in Chapter 4 – Case Background, only those themes reached placement on the Derived Common Journey, which were used and referred by all interviewed startups and assessed as the most frequent (40% and more).

Startup D featuring a Chief Design Officer, uniquely incorporated Strategic Design into the early stages of the business. As a result, the respective startup team was able to manage the complicated process successfully, by creating a development plan with incorporated steps for the use of design. As the author further learned from interviews with design & entrepreneurship experts, Design strategy is perceived as a highly beneficial contributor to the process of developing new ventures. Additionally, the theme ‘Go-to-market’ was identified to be consistently present in three out of five Journeys.

Upon the reflection on the findings from all analysed data, including what was said by experts, the author reviewed the Derived Common Journey and recommends inclusion of both themes of ‘Design strategy’ and ‘Go-to-market’ into the modified Proposed Startup Journey.

Strategic design could be introduced with workshops and reinforced with mentorship and advising. The author recommends for the advisors to build these connections with local resources from Accademia or reputable design firms, and host a lecture forum to introduce the topic to the Startup community within Aalto Startup Center.

6.2.2 Business Generator Model

The Business Generator Model is recommended as a visual aid, to educate startups of what types of design themes to incorporate. Additionally, the visual aid should facilitate the collaboration of designer in the startup ecosystem. This model is intended for use within the accelerator ecosystem, and could be distributed through mentorship, advising, or workshops.

The Business Generator Model was originally co-developed by the author as a design deliverable to the accelerator, as her employer. The intention was to communicate the offerings of the accelerator to their client startups. For this research, this tool was used to facilitate and guide interview dialogues with design & entrepreneurship experts. Upon completion of the interviews and thematic analysis of the data, the Business Generator Model has been updated as shown in Figure 18. The model has been updated to include ‘Design Strategy’
and ‘Communication & Marketing’ within Business Development, and ‘User Research’, ‘Concepting’ and ‘Product & Service Development’ to Solution Development. Updates to both these development modules reflect the desire to insert Design Thinking into earlier phases of the startup development as recommended by Bruder (as cited in Cooper et al., 2013) and observed within Startup B.
Conclusions & Discussion

In the research, the author explored how startups as well as design and entrepreneurship practitioners perceive the role and value of design. This was important as it enabled a more detailed specification of the design capabilities that appear to be beneficial to the startup development. In addition, it was the aim of this research to shed light on how the referred capabilities were acquired in regard to the university ecosystem, to attempt to make a contribution to the field of design management.
7.1 Implications for Accelerator Leadership and Design Management

If an accelerator strives to become an attractive and value-bringing service provider, there is a necessity for customer-centric service offering. A prerequisite to such accelerator service offering is to know each customer currently enrolled in the program. Subsequently a tailored service path to support the startup on the journey towards a successful market fit and scale up can be provided.

The quality of a holistic service offering at an accelerator can be increased through several actions. Firstly, the leadership at the organization needs to stay up-to-date about the current needs of each startup case by asking the question "How can we help you?" on a regular basis. This way the organization can always be one step ahead, ready to provide the most suitable aid at any given moment. Secondly, it was found that good design support inside incubators and accelerators depends to a large degree on the design maturity and design management competency of the organization. It is important to know the ecosystem, since only by navigating successfully through the complexity, the most suitable “design aid” can be provided to the customer as in startup teams.

For the Accelerator Leadership looking to fully infuse design into the culture, a potentially useful framework was found. Within the framework ‘The Design Management Staircase’ (Kootstra & Gert, 2009) the different roles design management can have in companies or organizations is articulated. Like The Design Ladder (Danish Design Centre, 2001), this framework is structured in 4 levels: no design management, design management as a project, design management as a function and lastly design management as a culture. On the first level design has no role in business objectives. On the second, project level design is limited to adding value to products through aesthetics. As a function design management can be a lever for innovation and multidisciplinary collaborations. Lastly, in the case that design management represents part of the culture, design turns into an asset that is able to differentiate the business strategy and thus it becomes an integral part of the innovation process. All four levels through which we measure the design management capabilities connect to five factors: Awareness, Planning, Resources, Expertise and Process. If a company or an organization desires to become truly design-driven it should aim for the highest level, and having in place the above listed five factors.

7.2 Implications for Design Practitioners

Opportunities exist within the startup and accelerator business environment for Design Practitioners to introduce design capabilities. While startups generally recognize the importance of strong communication or design for product & service development, it was observed that Design Thinking in the early phases of the business development can help ensure that a successful direction is set (Bruder, 2006). Design Practitioners should be encouraged to find opportunities within the accelerator environment, to introduce Design Thinking to early stage startups. Such opportunities may take the form of mentorship or hosted lectures and workshops.

Such engagement is likely to be mutually beneficial to the Startup as well as the Design Practitioner. In this method, the practitioner would expand his or her professional network while strengthening the business ecosystem. In turn, this should create an expanded demand for Design related skills and services, nurturing the symbiotic relationship between design and business.

Additionally, advertised design capabilities of the student body should be made available to the Business Accelerator and Startup community for increased student exposure to the business environment. Through this research effort, the author has witnessed the general opportunity to connect design needs with talents. For businesses, there are some easy gains by out-sourcing to this work to students of design, which in turn enriches the student experience.

7.3 Implication for Design Education

Business schools have included portions of Design thinking into their curriculum (Gözde et al., 2017). It would be equally beneficial for Design Schools to incorporate lectures and other course materials on Business Design in order for the student to more rapidly assimilate to the business, startup, or accelerator environments. In doing so, it is expected that leaders in the education system (both advisors, professors, and students), would continue to build on the body of knowledge on the infusion of innovative design skills in business models (Bruder, 2006).
7.4 Process Relevant Choices and Limitations

7.4.1 Influences on Research Direction, Methods of Execution, and Quality of Results

The author has chosen to address “How can design support the service offering of a university-based startup accelerator?” as a result of several influences. The growing field of Service Design had caught the author’s attention when initially pursuing graduate studies with an intention to expand from Graphic Design to discipline more broadly grounded in Design Thinking. When the opportunity for employment arose with the Aalto Startup Center, the author had little familiarity with the business process of an Accelerator or a Startup, but was none the less motivated by aspirational qualities of these organizations. Building on her interest in Service design, the author chose to treat the Accelerator as a client, providing it with Service Design targeting its curriculum.

Upon arrival at the Aalto Startup Center, the influences from the previous Design Student, were apparent, as detailed in the Introduction Chapter under the section ‘Design at Aalto Startup center – Previous design work’. Julianna Nevari had focused on establishing the foundation for incorporating design into the curriculum by working towards the Immediate goal – Shared Vision & Direction (as shown in Figure 5). Building on her efforts, the author focused on the elements that could contribute to the Immediate, Short term and Long term goals of amplifying the service offerings of the accelerator (Figure 5). The staff of the Aalto Startup Center additionally influenced this direction, as their expectations had been set towards this. Their experiences in workshoping with Julianna influenced their expectations on the methods and contributions of a Service Designer. As such, the previous work directly (and positively) influenced the direction of research and indirectly influenced the quality of data gathering.

While building on the work of the previous Design Student in Residency, an effort was made to minimize the influences of the previous work on the studied organization from contaminating the results of this thesis. This was done by researching a different population of startups within the accelerator, with the only exception being Startup C. The intention of this was two fold: a) to study startups without the previous influences, and b) to provide a wider breadth of Service Design to the Accelerator, since the author was an employee of the organization. As such, the quality of data from startup interviews is considered to not be impacted. The same is not true of the advisor set though. Due to the limited number of advisors in the organization, most advisors participated in workshops hosted by both the author and the previous Design Student in Residency. As mentioned before, this likely influenced their expectations on how a workshop is conducted. The author considers these impacts as noteworthy for the data collection and subsequent recommendations.

When conducting the research, two contrasting methods were utilized; the journey mapping approach imposed a structure while the interview of experts was unstructured. The unstructured interviews are as such inherently skewed by the unique perspectives and personalities of the interviewer, interviewee and the advisors who recommended them. In contrast, the journey mapping inherently imposed a chronology to the research. The data collection, analysis, and conclusions are all framed in temporal series. The effects of this research method on the results have not been explored herein, nor has the causal relationship between the researched themes. Both of these related elements are deemed significant though, and are opportunities for further research.

7.4.2 Resource Limitations

Of the studied Startups, few fit the description of “Design Driven” in the popular sense. For reference, some strong examples of design driven companies include Braun, Apple or Tesla. As a result, the studied population provided limited insights on well integrated design practices. Conversely, this provided ample opportunity to identify where design was omitted and could strengthen the program.

Finding the desired number of five startup cases to fill the research slots was challenging because the Aalto Startup Center had only been a part of the University Research and Innovation Services for three years at the start of the data collection process. The startup sample pool was small and it had to be further reduced by applying the participation criteria. It appears that the advisors played a crucial role in matching startups with this research initiative in a timely manner. Their first-hand knowledge of each business, their general knowledge of the startup experience, and the trust they hold in the startup community increased the likelihood for successful matches and participation in the study.

Despite this challenge, the accelerator advisors identified enough startup cases to meet the needs of the authors investigation. It played to the author’s advantage that some of the advisors who are now active at the accelerator, migrated from the Innovation Services unit. Thus, they had worked with the teams that originated in research from Aalto University and which were especially insightful to this study.
7.4.3 Influences of Previous Work

Tim Brown of IDEO popularizes ‘Design Thinking’, noting that not all those who design are educated as Designers. Principles of empathy, integrative thinking, optimism, experimentalism, and collaboration are the cornerstone of Design Thinking and permeate the startup culture. Despite this popularization of Design Thinking, academic literature is sparse on the topic of how Design practices can be infused in the curriculum of a business incubator or accelerator, much less within a university ecosystem. One notable exception is the project done by Acklin and Wanner (2017) which explored the contributions of design management during incubation phases. Their conclusions highlighted the benefits of collaboration between engineering and design, though lacked empirical evidence on how to foster design capability. As a result, the author was primarily influenced by previous academic studies, tangential literature of Design in later phase business (examples include Bruder and Kootstra) and published texts on the topics of Design Strategy and Design Management (Cooper et al, 2013).

7.5 Further research

The proposed tools of Chapter 6.2, including the revised Business Generator Model and the recommended Startup Development Journey are currently theoretical. Additional research and experimental validation is required to determine if the tools accurately reflect reality, and if the recommendations increase the likelihood of a startup’s eventual success. Experimental validation would require a significant population of startups, in order for the impacts of these findings to be isolated across the wide range of other influences on a startup, including but not limited to quality of mentorship, financial resources, inherent business merit, cultural influence, etc. Methods of experimental validation across such population can be speculated on, but it is beyond the core competency of the author.

A more tractable next step is likely to continue sourcing expanded expert perspectives to validate or dispute these conclusions. One such method would be to interview additional experts external to the Aalto University ecosystem, including Accelerator Practitioners, Business Design Practitioners, Startup Consultants, and Venture Capitalists.
References


REFERENCES


Appendices

Appendix 1

Table 3 Compiled Data on Startups Studied

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<th>Startup B</th>
<th>Startup C</th>
<th>Startup D</th>
<th>Startup E</th>
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<td>Company description</td>
<td>Surgical drills made safer</td>
<td>Anti-bacterial treatment for better dental hygiene</td>
<td>Mobile analytical company for high-quality connectivity</td>
<td>Novel camcorder for extreme sport enthusiasts</td>
<td>Experiential private space to regain focus and recharge</td>
</tr>
<tr>
<td>Industry / Focus area</td>
<td>Health technology</td>
<td>Health technology</td>
<td>ICT and digitalization</td>
<td>Consumer Electronics</td>
<td>Arts and Design/Well-being</td>
</tr>
<tr>
<td>Interviewee</td>
<td>CEO Chief Executive Officer</td>
<td>CEO Chief Executive Officer</td>
<td>CEO Chief Executive Officer</td>
<td>CDO Chief Design Officer</td>
<td>CEO Chief Executive Officer</td>
</tr>
<tr>
<td>Team members</td>
<td>8 full-time 2 part-time</td>
<td>5 full-time 3 part-time</td>
<td>8 full-time 3 part-time</td>
<td>4 full-time 3 part-time</td>
<td>8 full-time 3 part-time</td>
</tr>
<tr>
<td>Core of business</td>
<td>Physical Product</td>
<td>Physical Product</td>
<td>Digital Product</td>
<td>Physical Product, Software</td>
<td>Physical Product</td>
</tr>
<tr>
<td>Company founded</td>
<td>Mid 2017; 1 summer</td>
<td>2018; present</td>
<td>2017</td>
<td>2014; present</td>
<td>End 2016</td>
</tr>
<tr>
<td>Aalto Spin off/ out</td>
<td>Yes (2017)</td>
<td>Yes (2018)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Aalto Startup Center</td>
<td>Mid 2017; 1 summer</td>
<td>No</td>
<td>2017–present</td>
<td>2014–present</td>
<td>2017–present</td>
</tr>
</tbody>
</table>

Appendix 2

List of Interview Questions for Startups

1. Please introduce yourself: your educational background, your role in the company and your responsibilities.
2. Describe to me in a few words what does your startup do?
3. How many team members are on the team and what are the roles?
4. What is your connection to Innovation Services and Aalto Startup Center? How and why did you join the program?
5. Walk through task: Please walk me through the most significant development stages of your startup. You can think in terms of milestones, starting with the initial idea and reaching the stage you are at today. For an easier orientation, please place each stage on a timeline. There are two colors of post-its. The first color is meant for the general developmental overview, and the second color is to be used with any information related to design. Feel free to reshuffle the post-its as you go.

List of Props used during the Interviews with Startups

- Plain paper canvas
- Post-its in 2 colors
- Marker

Appendix 3

Table 4 Application of Double Diamond Method on Themes from Development Journey

<table>
<thead>
<tr>
<th>Discover</th>
<th>Define (Brief)</th>
<th>Develop</th>
<th>Deliver</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Research</td>
<td>2) Concepting</td>
<td>3) Concepting</td>
<td>4) Product/Service development</td>
</tr>
<tr>
<td>“To understand the ground and problem better through interviews, observations, desktop, service, big data, trends, weak signals, behavioural and technology trends, etc.”</td>
<td>“Define stage is where you create a synthesis of all the collected knowledge, where you gain insights and define what is the Mission.” Design &amp; Entrepreneurship Expert 7</td>
<td>“Develop is the creative ideation stage; to create solutions – rather quantity than quality – possible solutions” Design &amp; Entrepreneurship Expert 7</td>
<td>“Here is the iterative stage, when you create a prototype, do the testing, learning and tweaking. 2nd, 3rd round and so on following the design thinking process.” Design &amp; Entrepreneurship Expert 7</td>
</tr>
</tbody>
</table>

Appendix 4

Figure 15 Aalto Startup Center Blueprint 2018/19, Acceleration Program Components and Current service offering inside the Business Generator Model modules in detail

The full Service Blueprint was divided into five parts to provide good readability. The parts depict stages of 1) Application and Selection, 2) Enrollment (Entering the Program), 3) 1st Assessment through Co-evaluation, 4) Overview of all service components provided inside

the 12-month-long Business Generation Program, and lastly 4) Modules of the Business Generator Model in detail. (Note that only two out of three total Modules are presented, as the third Module of Solution Development is intrinsic of design and was lacking in the team as noted in section 4.1.3).
### 2) Enrollment (Entering the Program)

#### Entering the Program

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Startup signs the agreement</strong></td>
<td>(If coming from Aalto, Transfer Agreement of User rights needs to be signed beforehand; this can slow down moving in processes in weeks/months)</td>
</tr>
<tr>
<td><strong>Startup moves in</strong></td>
<td>(Receives Access Cards, Keys, Mailbox, IT, etc.)</td>
</tr>
<tr>
<td><strong>Startup receives a tour of the premises</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Agreement (paper + scan in net drive)</strong></td>
<td>IDEA: hire a person for administrative tasks NEED: project management tool (IS has Keto)</td>
</tr>
<tr>
<td><strong>Conversation between advisor and startup</strong></td>
<td>IDEA: “Welcome box” (including the iScout Booklets)</td>
</tr>
<tr>
<td><strong>Walking tour</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Advisor walks the startup through the agreement and gets the signatures</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Advisor does the practical arrangements in the office, updates the startup information in Aalto Startup Center system (Agreement info, Contact info, etc.)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Advisor initiates the Assessment process by setting up a meeting to explain the assessment process &amp; tool</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Internal Communication Coordinator shows the new startup team around the premises</strong></td>
<td></td>
</tr>
</tbody>
</table>

### 3) 1st Assessment through Co-evaluation

#### 1st Assessment

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Startup does the Self-assessment by answering a set of questions from main focus areas of the accelerator program</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Startup pitches to the advisors</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Startup meets with the advisors to discuss the prioritized themes + timeline with milestones</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Online Multiview tool (“Traffic lights”)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Face-to-face Pitch Multiview tool (“Traffic lights”)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Multiview tool (“Traffic lights”)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Face-to-face meeting, Presentation Advisors use Multiview tool (Common view) for rating</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Advisors use Multiview tool for rating, they assess the startups maturity in the main development areas – modules</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Advisors meet to discuss the results, set priorities for development and create a task list with milestones for the next 6 months</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Advisors give Feedback to startups, discuss results and jointly agree on areas that need development. Thematic fields are prioritized and timeline with milestones is agreed</strong></td>
<td></td>
</tr>
</tbody>
</table>
4) Startup development through Business Generator Model

<table>
<thead>
<tr>
<th>Program – Business Generator Model 12 (+12) months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Startup</strong> meets advisors in sessions where they cover prioritized topics from the development modules</td>
</tr>
<tr>
<td><strong>Startup</strong> is connected to mentor’s with a matching expertise</td>
</tr>
<tr>
<td><strong>Startup</strong>’s can participate in training sessions to work through common problem areas</td>
</tr>
<tr>
<td><strong>Startups</strong> can mingle at Aalto Startup Center Community events (ca 4-6 per year)</td>
</tr>
<tr>
<td><strong>Startups</strong> can apply to participate in Strategy events to showcase their work and network</td>
</tr>
<tr>
<td><strong>Startups</strong> can book timeslots in a clinic with experts to tackle more specific issues</td>
</tr>
<tr>
<td><strong>Startups</strong> presents a pitch in front of investors at the ‘From Ideas to Impact’ Demo Day</td>
</tr>
<tr>
<td><strong>Startups</strong> is either ready to exit the program after 12 months, or remains for extra 12 months</td>
</tr>
<tr>
<td><strong>Startups</strong> leaves the program</td>
</tr>
</tbody>
</table>

**Face-to-face meetings + digital tools**  
Progress documented in personal folders  
**NEED:** online project management tool

| Advisors meet with the startups in one-on-one sessions as agreed to help strengthen topics from development modules |
| Advisors provide the startups with matching mentors from the pool  
Pool of 40-50 mentors |
| Consultants, service providers or external entities give one day training sessions on a common topic  
Example: Seed Forum |
| Internal Communication Coordinator organizes Community events for all startup teams in the program |
| Entrepreneurship Coordinator organizes external events for all startup teams in the program |
| Experts and Staff offer clinic sessions on a specific topic  
Example: Digital marketing |
| External stakeholders such as partners, media, business mentors, investors, keynote speakers are invited to network with the startups |
| External stakeholders such as partners, media, business mentors, investors, keynote speakers are invited to network with the startups |

**Advisors** meet with the startups in one-on-one sessions as agreed to help strengthen topics from development modules

| Face-to-face workshops |
| Excel sheet with ‘Own’ mentors + Email introduction  
Online database ‘Bordio’ |
| Community events |
| Arctic15 Slush  
Face-to-face meeting workshop  
Pitch |
| 2 face-to-face check-up sessions with all advisors |

**Online project management tool**  
**NEED:** online project management tool

| **NEED:** online project management tool |
| Face-to-face meetings + digital tools  
Progress documented in personal folders  
**NEED:** online project management tool |

**Face-to-face meetings + digital tools**  
Progress documented in personal folders  
**NEED:** online project management tool

| Advisors meet with the startups in one-on-one sessions as agreed to help strengthen topics from development modules |
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**Face-to-face meetings + digital tools**  
Progress documented in personal folders  
**NEED:** online project management tool

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Example: Digital marketing |
| External stakeholders such as partners, media, business mentors, investors, keynote speakers are invited to network with the startups |
| External stakeholders such as partners, media, business mentors, investors, keynote speakers are invited to network with the startups |
5) Modules of the Business Generator Model in detail

<table>
<thead>
<tr>
<th>Business Generator Model – Business Module (Advisor 1)</th>
<th>Business Generator Model – Asset Module – IPR (Advisor 2, 9-12 months)</th>
<th>Business Generator Model – Asset Module – Funding (Advisor 3, 6-9 months)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Startup</strong> builds a Go-To-Market Strategy (including the Marketing Plan)</td>
<td><strong>Startup</strong> learns to understand its relative position towards competition – FYO (Freedom to operate)</td>
<td><strong>Startup</strong> prepares for the Fundraising Round by building a Funding Strategy</td>
</tr>
<tr>
<td><strong>Word Doc</strong></td>
<td><strong>Face-to-face meetings</strong></td>
<td><strong>Face-to-face meeting</strong></td>
</tr>
<tr>
<td>Business Model Canvas</td>
<td>digital tools:</td>
<td>Patient Application</td>
</tr>
<tr>
<td>– Profound</td>
<td>– digital tools: Profound, F&amp;S, Clariant Analytics</td>
<td></td>
</tr>
<tr>
<td>– Fonecta</td>
<td>– Vainu</td>
<td>all documents saved in “Data Room” (digital tool Fondia)</td>
</tr>
<tr>
<td>– Hubspot</td>
<td>– Frost &amp; Sullivan</td>
<td><strong>Pitchbook</strong> (digital tool)</td>
</tr>
<tr>
<td>– Cronchbase</td>
<td>– templates</td>
<td><strong>Face-to-face training</strong></td>
</tr>
<tr>
<td><strong>Adviser guides the startup in one-on-one sessions</strong></td>
<td><strong>Face-to-face meeting</strong></td>
<td><strong>Face-to-face training</strong></td>
</tr>
<tr>
<td></td>
<td>Patient Application</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Adviser guides the startup in one-on-one sessions</strong></td>
<td><strong>Adviser guides the startup in one-on-one sessions</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Adviser guides the startup in one-on-one sessions</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Adviser guides the startup in one-on-one sessions towards defining the right investors</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Adviser collaborates with partners to offer 1-day pitch training Example: Seed Forum 2-3 times per year</strong></td>
</tr>
</tbody>
</table>