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**From Minimum Viable to Maximum Lovable:
Developing a User Experience Strategy Model for
Software Startups**



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From Minimum Viable to Maximum Lovable: Developing a User Experience Strategy Model for Software Startups

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Abstract

Software startups have gained attention by disrupting traditional businesses. As startups operate with scarce resources and under time pressure, efficient business value creation needs to be of the highest priority. Creating superior user experience (UX) is a means for startups to gain competitive edge that is difficult to copy. However, early product development in startups is filled with uncertainty – considering both the characteristics of the product under development and defining its target market. This is a challenge for designing UX, as both product qualities and user groups may drastically change together with the target market. However, scientific literature has not provided knowledge on ways to integrate UX creation as part of new business development (NBD) in software startups.

This thesis contributes primarily to the field of human-computer interaction (HCI). Secondly, it contributes to software engineering, more specifically to human-centered software development. The goal of this doctoral research is to advance the knowledge and practices of software startups and user experience (UX) work. This is done by empirical research of the practices and needs for UX creation of the startups, and based on the gained understanding, by formulating a strategy model for including UX creation as a supporting part in establishing new software business. This compound thesis is based on six publications that result from four empirical studies with software startups. The studies were conducted over a period of two years between 2014 and 2016. The nature of the studies was qualitative and involved data collection from altogether 40 startups, mostly based in Finland but also in eight other countries.

The results suggest that UX work creates value in two ways: both for users and for business development of startups. This research recognized beneficial approaches and practices for UX creation in software startups, such as light-weight UX work methods, adoption of good design solutions from successful products, and an iterative approach to product development. Studying the role of UX in early product design showed how poor UX hinders startups from gaining trustworthy feedback on their product idea, as users concentrate on deficiencies in UX. To ensure sufficient quality of UX, the Minimum Viable UX (MVUX) framework was developed to guide early design decisions in startups.

The main contribution of this thesis is a UX strategy model that proposes UX strategy actions for two stages of startups lifecycle, namely validation of the product idea, and scaling for business growth. Moreover, the UX strategy model consists of UX strategy actions for UX goal setting, user involvement, and design decisions during the two phases. The UX strategy actions aim to ensure reaching minimum viable quality of UX to enable trustworthy validation of a product idea. However, for sustainable business growth and scaling, the model further aims to creating lovable UX that provides competitive advantage. The UX strategy model presents means for focusing UX creation to bringing value both to users and to the startup business.

*"It is not the critic who counts;
not the man who points out how the strong man stumbles, or where the doer of deeds
could have done them better.
The credit belongs to the man who is actually in the arena, whose face is marred by
dust and sweat and blood; who strives valiantly;
who errs, who comes short again and again, because there is no effort without error
and shortcoming;
but who does actually strive to do the deeds;
who knows great enthusiasms, the great devotions;
who spends himself in a worthy cause;
who at the best knows in the end the triumph of high achievement, and who at the
worst, if he fails, at least fails while daring greatly, so that his place shall never be with
those cold and timid souls who neither know victory nor defeat."*

~Theodore Roosevelt

Preface

When I first started this journey towards the world of research, I found it to be surprisingly similar to being an entrepreneur. The work was hard, lonely, and often full of doubts on which direction to take. However, at the same time, it was full of creativity, learning, delightful surprises, discovery, and achieving things you thought you could not achieve. Like in entrepreneurship, in research you seem to have more luck when you have the right people around you.

First of all, I would like to thank my supervisor Professor Kaisa Väänänen who has guided me through this journey. Thank you very much for believing in me, and providing me advice and support.

I am grateful beyond words to Dr. Kati Kuusinen who poured so much insight and wisdom towards me that it directly improved my work, even when she wasn't co-authoring it. Moreover, she offered a good amount of laughs over the time we spent together in the same office, and I hope we will share many more laughs in the future as well.

I would like to thank my co-authors Dr. Marko Leppänen, Yueqiang Xu, and Professor Marko Seppänen who all helped me see things beyond my own capability. I found you all to be brilliant.

Professor Jan Gulliksen and Professor Frank Maurer kindly acted as pre-examiners of my thesis and provided valuable comments for the final stretch, for which I am very thankful. Also, I would like to thank Professor Pekka Abrahamsson for agreeing to be the opponent of my doctoral defense.

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I warmly thank all the entrepreneurs who took part in this research and gave their precious time so that I could ask all those questions. I hope to find a way to return the favor and give back to you and your colleagues that keep changing the world.

At last, my family and friends have provided the much-needed breaks as well as support during these years, and I thank you all. To Mikko, I'm very grateful for the support, patience, and coffee provided at home. I find it amazing how much you believed in me, especially during my moments of desperation. I also thank Milla and Tuomas for all the laughs as well as support while I was completing my "homework". May you always stay curious, and find your own path to live your dreams. Finally, I would like to thank my mum who has been my long lasting support and sponsor. All this could not have been possible without you. Thanks for raising me up to see the infinite opportunities, and not to concentrate too much on the obstacles along the way.

Tampere 22.6.2017

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List of Publications and Author's Contribution to them

This doctoral thesis includes six original publications that are presented here. The candidate responsible for conducting all studies as well as for producing the publications. Next, the contribution of the candidate is described in more detail with each publication. The publications are reproduced by the kind permission of the publishers.

- P1. Hokkanen, L. and Väänänen-Vainio-Mattila, K. UX work in startups: current practices and future needs. In Proceedings of the International Conference on Agile Software Development (XP 2015), Springer International Publishing (2015), pp.81-92.

Hokkanen planned the study after which the plan was reviewed with Väänänen-Vainio-Mattila. Data was analyzed by Hokkanen and results reviewed together with Väänänen-Vainio-Mattila. Hokkanen conducted the study and was the principal author as well as responsible for producing the publication.

- P2. Hokkanen, L. and Leppänen, M. Three patterns for user involvement in startups, Proceedings of the 20th European Conference on Pattern Languages of Programs, ACM (2015), Article no. 51, 8 pages.

Patterns were identified from two studies conducted by Hokkanen. Formation and reviewing of patterns was done together with Leppänen. Hokkanen was the main author of the publication.

- P3. Hokkanen, L., Kuusinen, K. and Väänänen, K. Early product design in startups: towards a UX strategy. In proceedings of International Conference on Product-Focused Software Process Improvement (Profes 2015). Springer International Publishing (2015), pp.217-224.

Hokkanen planned, conducted, and analyzed the study. Kuusinen and Väänänen reviewed the plans and results of the study together with Hokkanen. Hokkanen was the principal author as well as responsible for producing the publication.

- P4. Hokkanen, L., Kuusinen, K. and Väänänen, K. Minimum Viable User EXperience: A Framework for Supporting Product Design in Startups. In proceedings of International Conference on Agile Software Development (XP 2016), Springer International Publishing (2016), pp. 66-78.

Hokkanen planned, conducted, and analyzed the study. Kuusinen and Väänänen reviewed the plans and results of the study together with Hokkanen. Hokkanen was the principal author as well as responsible for producing the publication.

- P5. Hokkanen, L., Xu, Y. and Väänänen, K. Focusing on user experience and business models in startups: investigation of two-dimensional value creation. In Proceedings of the 20th International Academic Mindtrek Conference, ACM (2016), pp. 59-67.

Hokkanen planned and conducted the study. Väänänen and Xu reviewed the plans of the study together with Hokkanen. Data analysis was led by Hokkanen, and complemented by Xu. Hokkanen was the principal author as well as responsible for producing the publication.

- P6. Hokkanen, L., Väänänen, K. and Seppänen, M. User Experience Strategy for Startups' New Business Development: A Multiple Case Study. Submitted to Journal of Quality and User Experience.

Hokkanen planned, conducted, and analyzed the study. Väänänen reviewed the plans of the study together with Hokkanen. Results were reviewed together with Väänänen and Seppänen. Hokkanen was the principal author as well as responsible for producing the publication.

1 Introduction

The goal of this research was to add to knowledge of software startups and user experience (UX), and to formulate a strategy model for including UX creation as a supporting part in establishing new software business. In this chapter, we present the background and motivation for this work, followed by a description of the scope of our research, and our research questions. Then, the results and contribution of our research are introduced. Finally, the structure of the rest of this doctoral thesis is outlined.

1.1 Background and motivation

Over the past decade, startups have gained attention for bringing disruptive innovations to markets (e.g. Uber and AirBnB), and then succeeding in scaling them globally. Moreover, small startups appear to be able to bring products to markets at a speed that is not feasible for mature companies. However, the startup failure rate remains high, and contributors for success of new innovations are yet not well understood. Furthermore, in the ever increasing global competition among new digital products and services, UX – the experience a user has in anticipation of, during, and after usage (ISO 9241-210: 2010) – can be seen as providing leverage that can be used as a competitive advantage. However, the added value of good UX has not been investigated from perspective of startups, nor are the methods for achieving good UX in small software startups. For research, software startups have special characteristics – such as scarce resources, lack of operating history, high innovation and uncertainty – that create an interesting environment to study the development of new products and services (Paternoster et al. 2014). While operating with scarce resources, software startups need to fiercely focus only on the most beneficial activities as they try to survive (Sánchez-Gordón and O'Connor 2015). Furthermore, previous experience and skills of a startup team create further limitations for adopting practices in software engineering (Coleman and O'Connor 2008). In this context, the traditional human-centered design (HCD) approach (ISO 9241-210: 2010) with laborious upfront user research and design work that aims to provide good UX, is not feasible.

The scientific literature on UX creation in startups is scarce, and at the time of starting this research it consisted mostly of individual experience reports (e.g. May 2012). The gap in research means there are no best practices recognized for startups to conduct UX work, nor does the literature discuss the role of UX for new business development in software startups. Entrepreneurs have been adopting Customer development (Blank 2007) and the Lean startup method (Ries 2011) that emphasize developing and experimenting with real customers and users at the center. However, successfully involving users and customers may still be challenging as startups often lack stakeholder networks (Coleman and O'Connor 2008). As for startups, the early phases of finding validation for their idea are crucial, and the role of UX in early product versions needs to be better understood. A holistic view on UX, one that acknowledges the role of UX in software startups' product and business development, brings up questions on how startups can create and utilize UX when developing products or services, and new business ventures.

1.2 Research scope and questions

This research belongs mainly to the field of human-computer interaction (HCI), more precisely the practices and approaches of human-centered design (HCD) and how it can improve UX. As the research concentrates on software startups and UX, it contributes also to the software engineering (SE) field of research by providing knowledge to develop SE processes in startups. Furthermore, a central relating concept is new business development (NBD) as the key objective of startups is to build new business by finding a lucrative product or service offering for a sizeable market.

The purpose of this research was to add to existing knowledge on the role of UX for small software startups, and to develop a strategy model to support efficient creation of UX as part of new business development. The basic assumption was that due to special characteristics of small software startups, they require different approaches for designing UX than mature companies. Also, we wanted to understand if the role of UX for startups changes when a startup goes through different phases of business development – from initial idea to scaling the business. As the Lean startup method (Ries 2011) has gained popularity, the concept of Minimum Viable Product (MVP) has been adopted as a means to first build minimal products, or mockups, for the purpose of testing product ideas as well as business hypotheses. Building an MVP should be done with minimum effort while achieving to gain validated learning that supports further product and business development. To emphasize that competitive products need to make a good impression and delight users, the term “lovable” has sometimes been referred to as a further evolution from a viable product (Haaf 2015). In the scientific literature, *brand love* has gained some attention and has been found to support brand loyalty, word-of-mouth as well as resistance to negative messages about a brand (Batra et al. 2012). Moreover, a product can be considered to appeal to a person's cognition, emotion, and motivation (Shimp and Madden 1988) similarly as in the triangular theory of love (Sternberg 1986). In this work, *lovable UX* is considered to produce a delightful experience to a user in such a way it promotes using

a product or a service again, creates positive word of mouth as well as a positive emotional connection. This doctoral research seeks to understand how startups can reach positive UX – from viable to lovable – to support product and business development in startups. Moreover, the scope of this research is within the intersection of software startups' goals and how UX can support achieving them. An overview of the scope is presented in Figure 1.

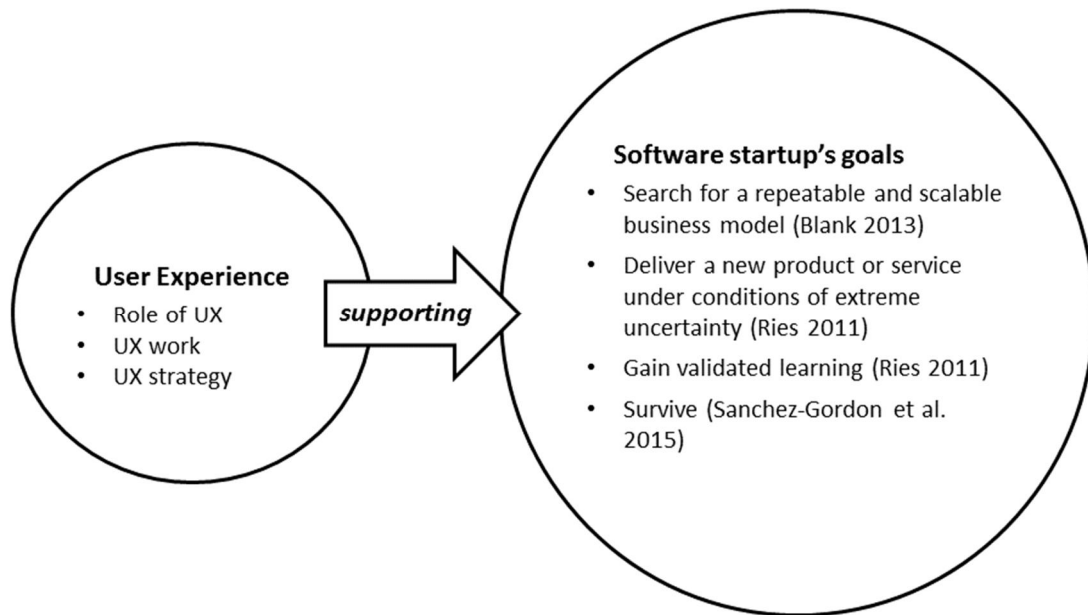


FIGURE 1 The scope of our research on UX and software startups.

In this scope, we have investigated the following research questions (RQ):

RQ1: What role does UX have in new business development in software startups?

RQ2: What methods and approaches are beneficial for creating UX in startups?

RQ3: What kind of UX strategy is suitable for startups?

First, **RQ1** enables understanding what role UX plays in startups new business development. As startups seek to build new business under scarce resources, understanding the role of UX in this process enables focusing UX work better. Furthermore, by answering to RQ1 we can better understand what startups gain from allocating resources to UX creation. In addition, this research seeks to bring clarity to software startups as a context for UX work. **RQ2** explores beneficial approaches and methods for creating UX in software startups as part of startups' new business and product development. Scarce resources and uncertainty in product development require prioritization of work as well as readiness to adapt to changing circumstances. RQ2 addresses methods that are feasible and beneficial for advancing product and business development in startups.

RQ3 seeks to explain what kind of UX strategy startups can build and deploy as part of their new business development to be able to achieve and benefit from the optimal UX. Here optimal UX refers to UX that supports startup's current goals in product and business development. The research goal of this doctoral research is to develop a UX strategy model to support software startups' new business development.

1.3 Results and contribution

This doctoral research consists of four separate studies (S1-S4) presented in Table 1. The existing literature on software startups' UX creation was very scarce at the time this research begun. The first two studies concentrated on studying how UX is designed in startups as well as what factors affect UX work (S1, S2). Then, it was investigated what kind of goals startups have regarding UX (S2, S3). Furthermore, research continued to study the value of UX as part of new business development in software startups. In the final phase (S4), a UX strategy model was built for startups to include UX as part of their product and business development. In Table 1, connections between studies, research questions and resulting publications with their main results are presented.

TABLE 1 Mapping between studies, research methods, publications and main results.

Study	Research methods	Publications	Research questions	Main results
S1	Interview study in 8 startups	P1	RQ1, RQ2	Current UX work in software startups.
		P2	RQ1, RQ2	Three patterns to support UX creation in startups.
S2	Interview study in 12 startups	P3	RQ1, RQ2	Approaches and practices for early design in software startups.
		P4	RQ1, RQ2	The Minimum Viable UX framework.
S3	Survey study with 21 entrepreneurs	P5	RQ1, RQ2	Relation between UX and value creation in startups.
S4	Multiple case study in three startups	P6	RQ3	The UX Strategy Model to support new business development in startups.

The main contribution of this research is in three types of outcomes: 1) added understanding of UX creation in software startups, 2) the Minimum Viable UX (MVUX) framework for supporting design in early phase startups, and 3) the UX strategy model to support NBD in startups.

Understanding of UX creation in software startups lacks from scientific literature and also recognizing and developing better UX practices for the startup domain has not gained attention.

While characteristics of software startups have been identified in the SE literature (e.g. Paternoster et al. 2014), more knowledge is needed to support meaningful UX creation. This doctoral research adds to that knowledge and provides an overview of found beneficial approaches and practices for UX creation. Moreover, this thesis presents findings on the relation between UX and business development in startups, more precisely the value creating capabilities of UX that startups can benefit from. These results also add to the body of knowledge on UX's value to business development, and especially to new business development in software startups.

The MVUX framework was created and validated in S2 and S3 (P4, P5), as well as used in S4. The MVUX framework presents four main UX elements that are relevant for early stage startups: Attractiveness, Approachability, Professionalism, and Selling the idea. Furthermore, each main element contains sub-elements that can be used as UX goals for early product versions or prototypes. The MVUX framework emphasizes the role of UX as an enabler to collect meaningful feedback and retain the early users, which further supports the startup in developing a product offering and business. The MVUX framework adds to the literature on UX goals and goal driven design. Moreover, P5 presents the relation between UX and business models relevant to startups in terms of value creation through both hedonic and practical dimensions. Also, in P5 it is presented that startups emphasize the practical aspects and usability rather than UX in their UX goals.

The UX Strategy model to support NBD in startups is based on this doctoral research as well as reviewed literature. Studies S1-S3 contribute to the model whereas the actual model creation was part of S4. The UX strategy model for supporting NBD in startups provides UX strategy actions for the startup's initial idea validation stage and for the business scaling phase. The strategy actions contribute to UX goal setting, user involvement, and design decisions in startups. The UX strategy model created helps software startups to concentrate on the aspects of UX that provide value during the specific stage of their current business development. The eventual goal of a UX strategy model is to provide the company means to take UX holistically into account and thus advancing the success of the company.

1.4 Structure of thesis

The rest of this thesis is structured as follows. In **Chapter 2**, we present the related literature regarding software startups and UX. Literature on software development and new business development in software startups is presented. As literature on UX creation in startups is very scarce, the related work is presented on lean UX design practices together with different approaches to UX strategy. **Chapter 3** outlines the research approach, methods, and structure of this doctoral research. The details of four separate studies are presented together including the research approach, methods, study participants, and research ethics. In **Chapter 4**, the results of this doctoral research are presented. First, an overview of contributions in each publication of this compound thesis are

presented. Then, each of the three research questions is answered. In **Chapter 5**, the contribution of this thesis is discussed. Furthermore, the validity of this doctoral research is discussed. Finally discussion of future work is provided, followed by the final concluding marks.

2 Related work

This chapter presents the related work of this thesis. First, the key concepts of software startups, user experience, and strategy are shortly introduced. After this, an overview on software startups is provided to describe their characteristics and ways of operating in business and product development. Finally, nature of UX is described together with methods and strategies for UX work.

2.1 Key concepts

Software startup

The definition of a software startup has not been fully established (Unterkalmsteiner et al. 2016). Blank (2013, p.64) has defined a startup to be “*an organization formed to search for a repeatable and scalable business model*”. Another commonly used description of a startup is a by Ries (2011, p.27) as “*a human institution designed to create a new product or service under conditions of extreme uncertainty*”

Furthermore, this thesis complies with software startup characteristics recognized by Paternoster et al. (2014) being *having scarce resources, little to none operating history, and time pressure*. To distinguish software startups and other startups, this doctoral research considers software startups to build their business on products or services that are enabled by or produced as software. Unterkalmsteiner et al. (2016) describe the nature of software startups as they “*are often caught up in the wave of technological change frequently happening in software industry, such as new computing and network technologies, and an increasing variety of computing devices.*”

Customer development (Blank 2007) and The Lean startup method (Ries 2011) have influenced the NBD in startups as it is widely taught and used in incubators and university entrepreneurship programs (York and Danes 2014). Both methods emphasize finding a feasible and lucrative business idea before investing major resources into building a complete product. Moreover, the Lean startup

method proposes testing the idea, or a hypothesis behind the idea, with real customers to gain validated learning and proof of business potential. This is done by implementing iterations of so called Build-Measure-Learn (BML) cycle. (Ries 2011)

In new business development (NBD) and entrepreneurship literature, the concept of business model and value propositions have been introduced to guide entrepreneurial activities (Osterwalder et al. 2010, Osterwalder and Pigneur 2012). Business models describe how a company creates and captures value. As startups seek for scalable business models that enable fast growth, traditional business plans have been replaced, or at least complemented with, so called canvases (see e.g. Lean canvas, Business model canvas). Canvases capture the essentials of a business plan while remaining light and nimble for iteration as new information on business domain is gained.

User eXperience

For definition of user experience (UX), the ISO (ISO 9241-210: 2010) definition as “*a person’s perceptions and responses that result from the use or anticipated use of a product, system or service*” is used in this dissertation. UX can start before a person has started using a product and it can last further than the actual usage. For example, perceived experience is affected by memories of the usage and not only the actual usage (Kujala et al. 2011). Furthermore, we use the term UX work to describe the activities involved in UX creation including user research, concept design, product design, user tests, and evaluation.

UX work aims to produce a product that enables a meaningful experience with that particular product or service. Activities related to UX design involve understanding users’ needs by means of user research, and then designing to fulfill both practical and emotional needs. UX is subjective and changes over time (Kujala et al. 2011), and thus can only be designed for and not guaranteed for a particular user.

Strategy

Designing UX is part of product development and often perceived to add to product quality by satisfying users’ needs better. In this doctoral research term UX strategy is used to describe the overall approach of creating UX as part of company’s product or service offering.

Strategy, for a company, can mean different things. For example, Mintzberg (Mintzberg 1987) describes strategy through five possible aspects of plan, ploy, pattern, position, and perspective. In this doctoral thesis strategy is regarded mainly through its elements for plan, position, and perspective, as they are perceived to sufficiently cover dimensions of UX strategy. Strategy can include elements of *plan*, that is “consciously intended course of action, a guideline (or set of guidelines) to deal with situations” (Mintzberg 1987, pp. 11). Furthermore, strategy as a *position* outlines how a company sets in the external environment, and internally defines how resources are focused (Mintzberg 1987). Strategy as a *perspective* regards the internal perspective shared by the members of an organization, which also reflects into intentions and actions of members of the

organization. UX strategy can involve any of the aforementioned aspects of strategy in regards of creating UX.

Value creation

In this doctoral dissertation, the concepts of value and value creation are considered from both the point of a business and a user. Value created with a product can be measured by how much a customer is willing to pay for it. However, it is subjective and the subjective part of value “reflects the desire to obtain or retain the item or how much the owner(s)/buyer(s) are prepared to pay for prestige, appearance, aesthetic, judicial, religious or moral reasons, or any combination of these reasons.”(Neap and Celik 1999, p.182) In this doctoral dissertation we consider good UX to add to the quality of a product and thus increase its value to a user. By making a product offering more lucrative for users and customers, a business can gain value as long as the cost to achieve it is not greater than the obtained monetary value.

2.2 Software startups

Entrepreneurship has been widely researched but the current trend of startups that aim to fast growth with lean approaches is still lacking scientific rigor. Modern startup success stories often suggest that great success can be achieved by anyone without major investments to start with. Research however indicates that major successes are extremely rare (Nobel 2013). Becoming a startup entrepreneur involves taking risks with little chance of success as startups seek to generate disruptive innovations with scarce resources.

Startups aim to fast growth with innovative new business ideas. In the process of forming new ventures, depending on the definition of failure, about 70-80% of companies fail (Nobel 2013). Failure can be seen as an essential part of finding lucrative business opportunities and creating growth while enabling individuals to gain valuable work experience (Nobel 2013). Moreover, failing fast with little risk has become a strategy to abandon poor business ideas as early as possible in order to find a better one (Ries 2011). Another perspective to failure is that too many companies are entering the markets, which inevitably leads to many failures (Åstebro et al. 2014). Considering software startups, to add to the number of market entries, development and global distribution of software products to general public may not require major investments to start with. Moreover, using crowdfunding enables anyone to seek funding for an idea which eliminates even more the geographical ties in starting a business (Mollick 2014). However, sales and contract negotiations with large organizations or governments can require a lot of time.

2.2.1 Characteristics of software startups

Paternoster et al. (2014) conducted a systematic mapping study to investigate literature on software development in startup companies. From the results, recurring themes in the literature on software startups have been reported. The characteristics of software startups include lack of resources, innovativeness, rapid evolution, small and low-experienced teams, dependence on third parties, and time pressure (Paternoster et al. 2014).

The difference between a small or micro company and a startup can be defined with the adoption of a business model. It is widely agreed that startups are in search for a scalable business model (Blank 2013). Moreover, startups are willing to change their customer focus and revenue model, for example, when more lucrative opportunities are in sight. This proposes volatility to operations as little can be predicted, and planned for, when considering a startup's future activities. Furthermore, startups are found to be reactive, and to operate without formal processes (Sutton 2000). Uncertainty of the future together with limited resources limits startups as their main purpose according to Sánchez-Gordón and O'Connor (2015) is to survive to bring a product to markets. However, to build a sustainable business startups need to create something of value for their customers over a long period of time.

Entrepreneurial alertness and opportunity identification is needed for any new business to start forming (Ardichvili 2003) but a good team is seen as a key success factor in startups. Åsterbro et al. (2014) report that among entrepreneurs overconfidence, tolerance for high risk, and persistence even when failing can be detected. Venture capitals often put effort in identifying a successful startup team to invest in while the current business idea may be of secondary priority as it is likely to change. Cassar (2014) reports about findings that suggest that experience in specific industry domain has a positive effect on company's success whereas experience on entrepreneurship does not. This would indicate that entrepreneurial experience of serial entrepreneurs does not provide leverage when moving to new industries. Also Oe and Mitsuhashi (2013) suggest revising founders' past experience in the specific industry when forming the founding team of a new company.

2.2.2 New business development

Recently, Customer Development (Blank 2007) and Lean Startup methods (Ries 2011) have gained attention as ways to develop businesses faster and with less risk by means of early validation with customers. While these methods have gained popularity, there is still little scientific evidence that they provide major benefits. However, accelerators and universities that teach entrepreneurship have widely accepted them and they are widely taught. (York and Danes 2014) Compared to more traditional business planning and product development with e.g. a stage gate model (Cooper 1988), Lean startup and Customer development emphasize early validation with real customers as well as an iterative approach to building products. The importance of being customer oriented is reported to be essential in startups (Sánchez-Gordón and O'Connor 2015). Startups do not have an established customer base and thus keeping current customers as well as having them recommend the startup's

services is important when seeking to survive. Recent research on startups shows that while startups are familiar with the Lean startup methods (Ries 2011), they do not follow the proposed process strictly (see e.g. Björk et al. 2013, Giardino et al. 2016)

The Lean startup methodology is an approach where entrepreneurs seek to find profitable business models through validated learning. While the Lean startup is based on the Lean ideology of removing waste from product development (Liker and Morgan 2006), it also contains influences from Agile product development (Highsmith and Cockburn 2001). The process of creating new business with the Lean startup method consists of phases where a startup first seeks to find a problem big enough to have business potential in resolving. Once a problem has been detected, the startup seeks to find a suitable solution to that problem. Moreover, the solution needs to be compelling to a big enough market, with a profitable business model, to be worth building. (Ries 2011)

By following an iterative process (Build-Measure-Learn, BML), a startup removes uncertainty and gains validated learning. The BML process produces *ideas*, *products*, and *data*, as presented in Figure 2 (Ries 2011). Ideas are used to build a first product version. The first product version is called Minimum Viable Product (MVP) and it is built to test the riskiest product hypothesis with as little investment as possible. The MVP is tested with real customers to gain reliable data to support or invalidate the hypothesis. As an outcome, learning is achieved, and a startup can validate their idea or pivot to a new idea. The concept of Get out of the Building emphasizes testing ideas outside the startup team, and can involve discussions with people as well as quantitative measures for assuring interest from a large market. The BML cycle is repeated to test the riskiest hypothesis of a product idea to gain enough validation for adopting a specific idea to continue with. Once validation has been achieved, and a promising business model has been established, startups can start scaling the business. (Ries 2011)

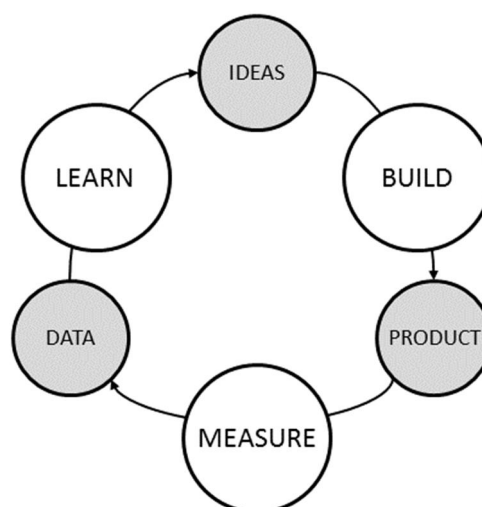


FIGURE 2 The Lean startup process from Ries (2011)

Business models. As part of NBD, startups seek a suitable business model that enables scaling and fast growth. Business model literature has adopted a notion where business models are described by a company's ability to create and capture value (Magretta 2002). Business model development in startups is exploratory and iterative by nature. Creating lengthy business plans has been found to be ineffective as companies follow the needs of fast-changing markets. The Business Model Canvas was introduced as a light tool for entrepreneurs to map their product offerings as well as competition and markets, as more knowledge is acquired (Osterwalder and Pigneur 2010).

The business model literature has embraced value creation as a key component in developing business models (Magretta 2002). Moreover, the value creation aspect contributes to customer and user experience, and customer value is a way to harness competitive advantage (Woodruff 1997). The Value Proposition Canvas was created to support the mapping of customer pains and gains for both customer jobs and the product offering under development (Osterwalder et al. 2012). In order to develop a successful new business, startups need to recognize and solve customer pains through a product or a service while supporting its own gains.

Startup life cycle. There is no one commonly accepted life cycle model describing how startups evolve. As a startup matures, it is bound to move from initial ideas and a young team to more established processes of product and business development as well as a mature team. The stages of searching for a lucrative business idea, developing a product or service, and then growing business are very different and may not occur in a linear manner. Moreover, a startup may regress from growth or scaling stage back to exploration stage if assumptions of market interest or size were not accurate to begin with. Also, seeking to scale the business before having established strong customer interest or a product/market fit, can result in failure (Giardino et al. 2014b). Startups have different challenges at different stages of their lifecycle. Being able to complete product development can be emphasized at an early phase whereas customer acquisition at scale becomes more relevant later (Wang et al. 2016).

The Customer Development proposes four phases: Customer discovery, Customer validation, Customer creation, and Company creation (Blank 2007). Similar to these four phases, the Lean startup method has a phase for exploration, followed by finding a problem-solution fit, then product-market fit, and finally scaling the business (Ries 2011). Nguyen-Duc et al. (2015) propose two stages called *Hunting* and *Gathering*. *Hunting* is defined as “*action to search, find, and freeze a target*” while *Gathering* involves “*action to collect and assembly the target*”. To connect their model to the Customer Development model, *Hunting* contains actions for *Customer discovery* whereas *Gathering* involves *Customer validation* (Nguyen-Duc et al. 2015). Also Björk et al. (2013) and Bosch et al. (2013) have proposed a framework for operationalizing lean principles in software startups – concentrating mainly to product development aspects – with steps for idea generation, collecting a backlog, and utilizing a funnel of idea testing with MVPs. As all the above mentioned models have only been established recently, they still lack scientific proof for generalization.

Relating to previous research on innovations, Overall and Wise (2015) suggest connecting these stages to the S-curve model of innovation (Bollen 1999), together with the innovation adoption model (Rogers 2010). Their approach is startups first reach *innovators* for *Customer discovery* and then *early adopters* for *Customer validation* as well as for validating *problem-solution fit*. Once this is achieved, *early majority* is needed for *Customer creation* and testing an MVP. Finally, *late majority* is needed to establish *product-market fit* that continues into *Company building*. At this last stage, a startup stops being a startup as it has found a business model. (Overall and Wise 2015) Table 2 presents an overview of different life cycle models and their phases.

TABLE 2 Summary of startup development phases.

Model	Phases and their characteristics			
Customer development (Blank 2007)	Customer discovery	Customer validation	Customer creation	Company building
The Lean startup (Ries 2011)	Validated learning and experimentation. Finding problem/solution fit	Build-Measure-Learn cycle. Finding product/market fit	Growth and scaling	
S-Curve model of entrepreneurship, start-up funding, and customer development (Overall and Wise 2015)	Involve innovators in customer discovery. Funding from personal savings and friends/family.	Involve early-adopters in customer validation. Funding from angel investors, crowd funding, or venture capital.	Involve early majority in customer creation. Funding through venture capitals.	Involve late majority in company building phase. Company is merged through acquisition or stock market launch is possible. Funding comes from venture debt or public equity.
Hunter-gatherer cycle (Nguyen-Duc et al. 2015)	Actions include searching, finding, and freezing a target. Product development activities include prototyping and requirement elicitation.		Actions involve collecting and assembling the target. Product development activities include commercialization, requirement description, testing, and deployment	

2.2.3 Software engineering in software startups

A mapping study by Paternoster et al. (2014) showed that software engineering in startups has not gained much attention in scientific literature. Organizational and managerial factors are studied more whereas software engineering activities remain to be an understudied area (Paternoster et al. 2014). However, software engineering strategies can influence the failure rate of startups. While Agile practices are suggested to be used in startups (Ries 2011), continuous innovation requires different software engineering practices (Fitzgerald and Stol 2015). Pantiuchina et al. (2017) report a large survey study about adoption of agile practices in software startups. According to their findings, startups utilize aspects that increase the speed of development while ignoring the agile practices that aim to improve the quality of software. Moreover, Yay and Murphy (2013) argue that as agile is set to solve communication related problems in teams, they do not serve startups that are very small and do not have similar problems with communication.

According to Lean ideology, finding the value generating parts enables to avoid generating waste in the process and thus create more value to business. In software development, waste can be created in the form of unnecessary features, requirements, or steps in the development process (Poppendieck 2002). Small team size, collocated teams, and tight cooperation help startups in avoiding waste in software engineering. However, requirements for a product or service under development are not well-defined in startups, and startups struggle on focusing to implement functionality that provides value to customers. Quantitative methods, such as A/B testing for comparing two alternative solutions with data collected from usage, are proposed to be used in startups and with Lean startup methods (Fitzgerald and Stol 2015). However, in reality utilizing quantitative methods at early stages does not seem plausible for startups as they have no user or customer base to test with.

Startups are characterized to work in a reactive manner, and software engineering is not conducted according to established processes. Early development activities can aim at producing software for testing ideas fast by means of MVPs or prototypes. Software is built with an evolutionary approach and great speed while product quality remains of low priority (Giardino et al. 2016). Moreover, pivoting can result from multiple reasons including deficiencies to understand the target market or concentrating to only a part of it (Bajwa et al. 2016). Pivoting can result in abandoning much or all of the developed software which proposes different objectives for development work in general.

Volatility of development process is common and planning robust processes is not purposeful. Instead, product development processes are formed in an iterative manner and only at later stages in a startup's lifecycle as a startup matures. (Paternoster et al. 2014). Coleman and O'Connor (2008) found startup entrepreneurs' backgrounds to have the greatest effect on the adoption of software product development processes. Learning new ways of working takes time and effort which are not available in startups. However, as startups from one life cycle stage to another, software engineering practices need to be adapted swiftly. Pressure comes from increasing customer base, and process

and product quality become of higher importance (Heitlager et al. 2007). Moreover, accumulation of technical debt needs to be handled effectively as it is a natural outcome from exploratory, fast development, but can hinder further development (Giardino et al. 2016).

The scientific literature has not established best practices for software engineering in startups. Giardino et al. (2014a, pp. 31) summarize common practices in startups to include:

- using well-known frameworks that enable quick change of product according to market,
- use of existing components to enable evolutionary prototyping and experimentation, continuous
- customer acceptance testing,
- continuous value delivery through core functionality,
- empowerment of teams, use of metrics for quick learning, and
- easy-to-implement tools for product development.

In a later study, Giardino et al. (2016) present their Greenfield Startup Model where the role of accumulating technical debt affects startup's performance if a startup grows fast, in addition to factors presented before. Technical debt grows as startups seek to ship quickly without concerning documentation or structures, or in general the product quality. However, with this approach the product also becomes more complex and if a startup survives to start scaling business, it needs to handle the acquired technical debt in order continue. (Giardino et al. 2016)

2.3 User experience

The roots of UX are in the human-centered design (HCD) that consists of user research and design activities (ISO 9241-210: 2010). The HCI field has evolved from more pragmatic approach of usability into a more holistic view of UX that covers also the emotions, especially the hedonic aspects. HCD is conducted with an iterative approach that begins with thorough research for understanding users' needs (ISO 9241-210: 2010). Agile and lean software projects require a different approach that enable design to move in incremental iterations. In this section the nature of UX is shortly outlined. Then, the HCD is process presented, after which related work for lean UX design is discussed, followed by strategic approaches for UX. Finally, the literature for UX creation in startups is presented.

2.3.1 Nature of UX

User experience (UX) is defined by as *"a person's perceptions and responses that result from the use or anticipated use of a product, system or service"* (ISO 9241-210: 2010). UX was perceived with usability. Usability regards the pragmatic aspects of usage, such as ease of use, efficiency, or learnability. At first, usability was the focus in designing human interaction with computers. However,

usability does not cover needs that humans may have when using products and services. UX provides a more thorough view on regarding users' needs for both pragmatic and hedonic qualities.

While this thesis uses the ISO definition for UX (ISO 9241-210: 2010), other definitions have also been proposed. However, it is commonly agreed that UX is dynamic, context dependent, and subjective (Law et al. 2009). Moreover, UX is grounded in user-centered design (UCD) practices (Law et al. 2009). Hassenzahl and Tractinsky (2006, pp. 95) state that "UX is about technology that fulfills more than just instrumental needs in a way that acknowledges its use as a subjective, situated, complex, and dynamic encounter." The non-utilitarian side with hedonic elements like beauty and enjoyment are also part of UX (Hassenzahl 2004). Bargas-Avila and Hornbaek (2011) have reviewed the experiential dimensions studied in UX research. Their findings include generic UX, affect and emotion, enjoyment and fun, aesthetics and appeal, engagement and flow, motivation, and frustration (Bargas-Avila and Hornbaek 2011). Moreover, Hassenzahl and Tractinsky (2006) include to the facets of UX to be *emotion and affect, beyond the instrumental, and the experimental*.

As technology is becoming more pervasive, it needs to fulfill users' needs that do not limit to utilitarian elements. Moreover, hedonic aspects of UX seem to contribute more to a positive experience whereas practical aspects help avoiding bad experience (Hassenzahl et al. 2010). Improving UX and especially usability has been considered important in industry but also difficult to implement (Ardito et al 2014). For industry to be able to design meaningful UX, they need to repeatedly seek to re-focus on the experience to be created (Hassenzahl 2008).

2.3.2 UX work

UX work includes activities related to creating UX. Involving users to product development from early on has been suggested to ensure satisfaction of users. Thus, UX work can involve user research, concept design, product design, user tests, and evaluations. The traditional HCD process describes a set of phases for involving users in product development from early stages throughout the whole product design and development in order to assure meeting user's requirements. The HCD process is presented in Figure 3. The HCD process starts by planning and understanding the context of use. Understanding users' needs can be achieved e.g. through interviews or observing users in contexts of usage. The HCD process consists of iterative cycles that first specify user requirements, produces designs to meet defined requirements, and continues to evaluate if designs sufficiently meet the requirements. Moreover, user tests already with early prototypes or paper prototypes enable collection feedback that can guide further development of products. Appropriate iterations should be conducted as long as design solutions do not meet user requirements. (ISO 9241-210: 2010)

The HCD includes thorough planning and user research at the beginning of product development. With agile and lean product development this is not feasible as product qualities are defined and developed iteratively. Means to conduct UX design as part of lean or agile software development have been developed to better support short iterations. For example, scientific literature on agile UX

has been studied by Jurca et al. (2014). In regards of agile UX, completing separate parts of UX design work one sprint ahead of development is encouraged in the literature. Another prospective approach for agile UX is completing UX and development within an iteration, enabled by close co-operation between developers and designers (Kuusinen 2016).

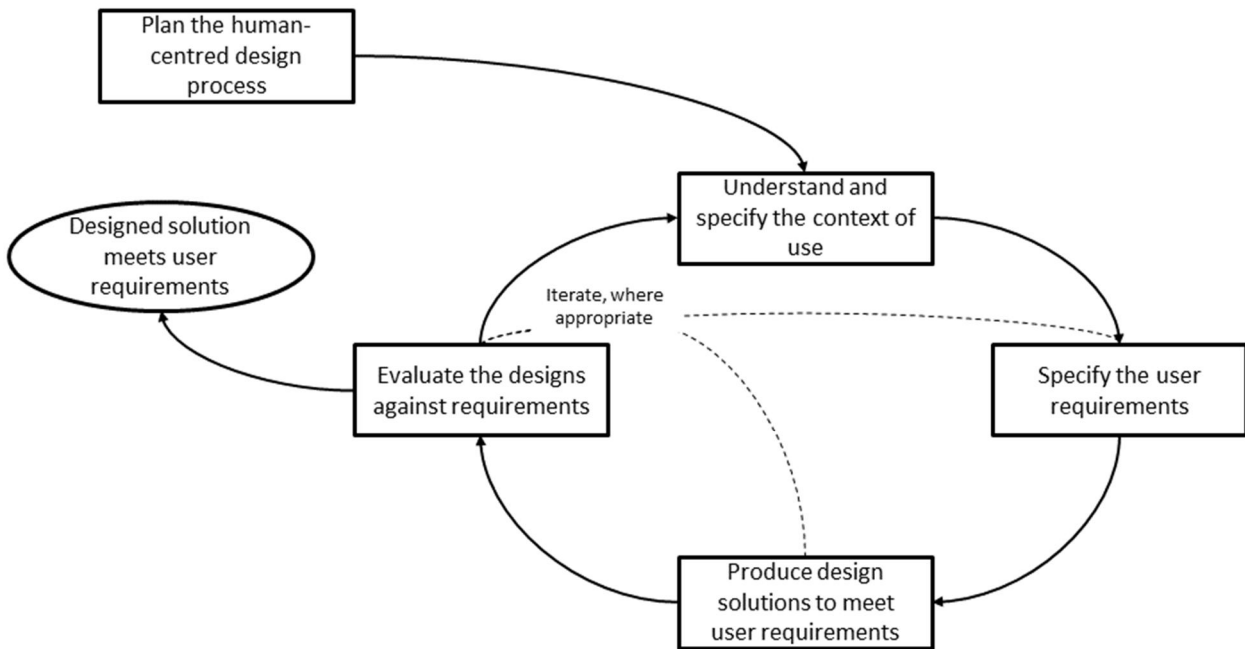


FIGURE 3 The human-centered design process (ISO 9241-210: 2010)

2.3.3 Towards Lean UX

Lean UX practices are developed to continue transforming the traditional HCD work to suit better the iterative and fast software development. Lean UX practices have gained little attention in the scientific literature but practitioners have proposed different approaches for completing UX work as part of lean product development. For example, in his book *Lean UX*, Gothelf (2013) identifies three parts for the Lean UX philosophy: the design thinking movement (Lockwood et al. 2009), the Lean startup method (Ries 2011) and Agile software development (Beck et al. 2001). The goal of Lean UX is to produce a product extremely fast and with little resources but without compromising the customer satisfaction. Moreover, in the *Lean UX* book Gothelf (2013) applies the four principles of Agile development to product design and 15 principles for Lean UX. The Lean UX principles combine existing theory of lean thinking as well as design, and thus offer reasoned guidelines while lacking scientific proof. The Lean UX process proposed by Gothelf (2013) is presented in Figure 4.

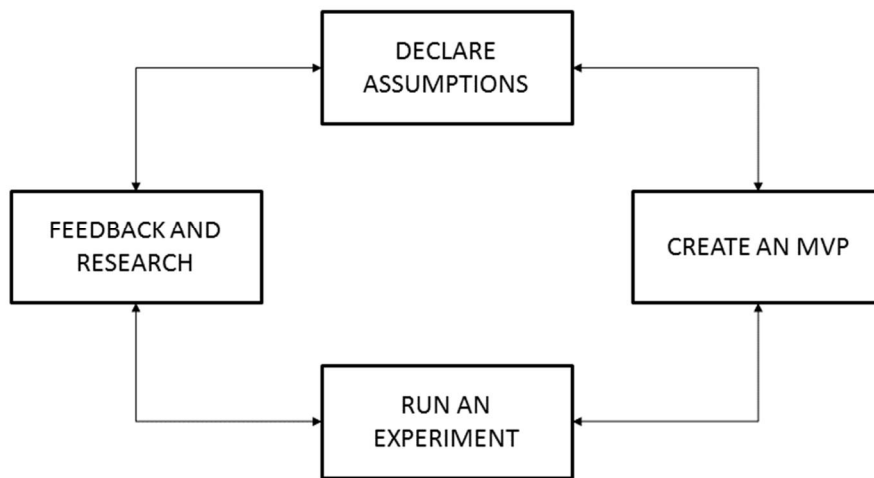


FIGURE 4 The Lean UX design process (Gothelf 2013)

The Agile principles Gothelf (2013, pp. 6) suggests to follow in Lean UX process are:

1. Individual and interactions over process and tools.
2. Working software over comprehensive documentation.
3. Customer collaboration over contract negotiation.
4. Responding to change over following a plan.

The 15 Lean UX principles by Gothelf (2013, pp. 7-12) are:

1. Cross-functional teams
2. Small, dedicated, collocated
3. Progress = Outcomes, not outputs
4. Problem-focused team
5. Removing waste
6. Small batch size
7. Continuous discovery
8. Get out of the Building (GOOB): The new user-centricity
9. Shared understanding
10. Anti-pattern: Rockstars, gurus, ninjas
11. Externalizing your work
12. Making over analysis
13. Learning over growth
14. Permission to fail
15. Getting out of the deliverables business

Another view on Lean UX was created in the form of The Lean UX Manifesto (Viviano 2014). The Lean UX Manifesto (Viviano 2014) was composed by collecting ideas from UX professionals and published in early 2014 in the style of Agile manifesto for software engineering (Beck et al. 2001). The Lean UX manifesto (Viviano 2014) has six principles:

1. Early customer validation over releasing products with unknown end-user value,
2. Collaborative design over designing on an island,
3. Solving user problems over designing the next “cool” feature,
4. Measuring Key Performance indicators over undefined success metrics,
5. Applying appropriate tools over following a rigid plan, and
6. Nimble design over heavy wireframes, comps or specs.

As mentioned before, the scientific literature on Lean UX design is scarce. However, experiences have been reported by Liikkanen et al. (2014), and Gasik and Lamas (2013). Liikkanen et al. (2014) present an experience report on adopting Lean UX. Results include the observation that organizational readiness in Agile practices is needed as well as possibly educating developers on UX work practices as there is no designated UX designer (Liikkanen et al. 2014). Gasik and Lamas (2013) report that applying Lean principles allowed development of good UX. However, it is reported that during the development of an online service with a Minimum Viable Product, users were not consulted before having completed an initial design, and having sought to eliminate known usability problems.

2.3.4 Strategies for UX

In this doctoral thesis, the approach to UX creation is also viewed from a strategic point of view. As defined before, in this thesis UX strategy is defined to include the overall approach of creating UX as part of a startup company’s product or service offering. UX strategies have not been thoroughly discussed in literature. Some books offer views for UX strategy (eg. Levy 2015), and related to UX, generally describing design strategies (see e.g. Lockwood et al. 2008, Lockwood 2009). However, the scientific literature has not provided knowledge for this area. Next, the concept of UX strategy is presented through three aspect of possible meaning of strategy adopted from Mintzberg (1987): a plan, a pattern, and a position.

UX strategy can offer a *plan* on how to conduct UX related activities, or how to create a UX. This view is presented in a book by Levy (2015) that offers a set of methods for reaching good UX. A plan can include a roadmap on how to reach the wanted UX for a specific product but also for adopting UX practices within a company. UX strategy as a plan would be made in advance to purposefully design UX related actions. To accompany a plan, UX strategy as a *pattern* can include actions for moving towards good UX. For this purpose, patterns describe how to respond to a specific situation regarding creation of UX.

UX strategy as a *position* can define the role of UX in the internal and external environment of a company. The position of UX can be evaluated by its value generating abilities such as competitive advantage, generating positive word-of-mouth (Fuller et al. 2013), or creation of positive experiences (Hassenzahl 2004). Liikkanen (2016) reports strategy was used to begin transforming a company into regarding UX and design aspects. With this view, UX strategy contributes to a company being more capable to produce good UX. Moreover, a process can be conducted in an iterative manner while revising the goals for UX strategy as needed. Design thinking (Lockwood et al. 2009) proposes all aspects of business to be valid for developing through design, and thus emphasizes the strategic role of design.

The UX design literature concentrates on providing guidance on developing good UX. Moreover, UX strategies have not gained much attention while literature suggests UX also creates value to business (Passera et al. 2015). At the same time, measuring UX and defining the value of UX in concrete measurements is challenging. However, regarding UX goals can be perceived to guide deployment of wanted UX, and UX strategy as *perspective* could be fostered through shared UX goals. Kaasinen et al. (2015) identified five approaches to design that can contribute to UX goal setting: brand, theory, empathy, technology, and vision. Successful UX goals are a result of multiple approaches and consider the viewpoints of multiple stakeholders. Furthermore, Varsaluoma et al. (2015) propose three stages for defining and evaluating experience goals: 1) Describe, prioritize, and choose the experience goals, 2) Communicate and iterate the goals with relevant stakeholders, and 3) Measure and evaluate the experiences.

2.3.5 UX creation in software startups

Scientific literature on UX and design in software startups is very scarce. While literature on agile and lean UX practices can guide UX design in startups, the specific needs of small startups would be beneficial to understand as even seasoned UX professionals may not succeed in designing in the startup context (May 2012). Moreover, different methods serve in different lifecycle phases of startups, as with software engineering in general (Giardino et al. 2016). Also, startups could provide innovations also to the HCI field and thus present an interesting domain (Lindtner et al. 2014).

Common themes for UX creation in startups are light methods and continuous user involvement. An experience report by May (2012) states that early planning for UX, designing, and customer validation should be in place when developing good UX in startups. May (2012) also suggests continuous testing with users in every step of developing the business idea and the product. In their book for startups Klein (2013) proposes light-weight methods for UX work in Lean startups. Moreover, Klein (2013) advises to do “enough design” and testing designs before seeking to validate product idea.

At early stages, Lean startups create products for the purpose of testing a product hypothesis or product idea. With little resources, startups need to test their ideas fast while quality is of lower

priority. UX creation for the purpose of prototypes and experiments has not gained much attention in the scientific literature. Prototypes can serve to concretize a design idea (Lim et al. 2008). However, while the HCI literature suggests utilizing low fidelity prototypes as part of testing user interface designs or concepts, design of functional prototypes for efficient testing of business potential has no established best practices.

2.4 Research gap

In this chapter, the related work on software startups and UX was presented. The characteristics of software startups have been recognized to include a lack of processes, uncertainty, and a team with little or no operating history (Paternoster et al. 2014). Moreover, startups tend to be reactive, and processes are formed later in their lifecycle. While Customer development (Blank 2007) and the Lean startup method (Ries 2011) emphasize continuous testing of ideas with real customers, practices for UX creation in startups lack in the scientific literature. However, more Agile and Lean practices for UX work have been then developed to support modern software development. These advances do not necessary support startups, as their goals for product development differ from established companies due to extreme uncertainty of product requirements and target user groups.

This doctoral research adds to the knowledge of UX and startups on three different viewpoints. First, the role of UX for a startup's new business development (NBD) is investigated. As understanding in how startups can benefit from UX work and good UX increases, resource allocation can be made to relevant UX work. Secondly, the basis for understanding what methods and practices are beneficial and feasible in startups are established. Through understanding these practices together with needs of startups, more practices can be developed to support startups. Thirdly, this doctoral thesis contributes to a strategic approach UX in startups. This regards how to strategically aim at good UX and efficient UX work to create value and support NBD.

3 Research approach, methods, and process

In this chapter the research approach, methods, and process with details of research participants are presented. This doctoral research consisted of four studies carried consecutively, starting in October 2014 and ending in October 2016. Figure 5 presents the relation between studies, publications, and research questions.

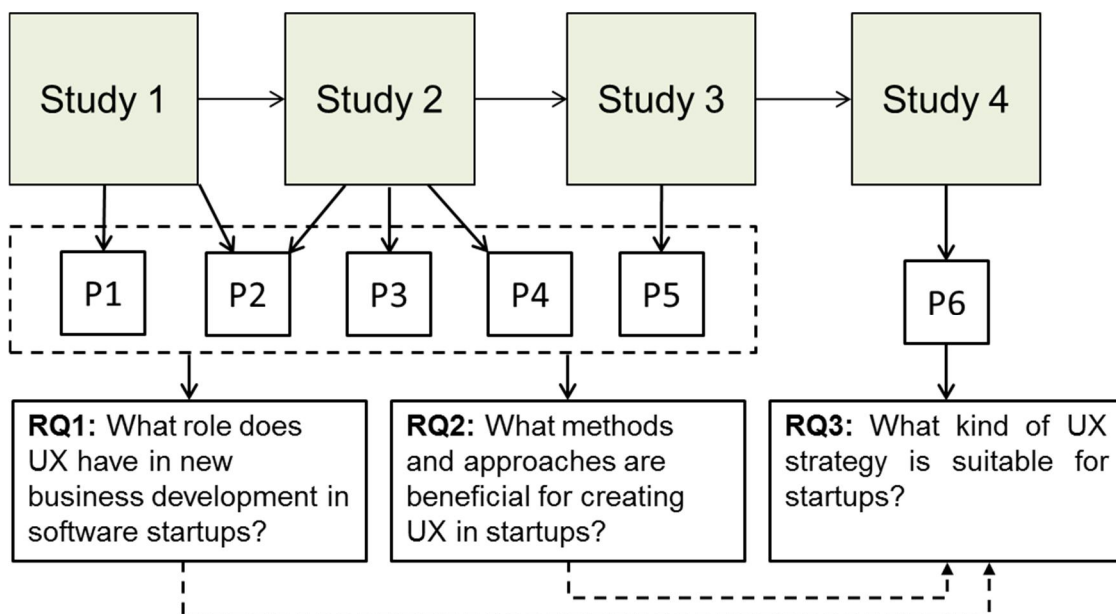


FIGURE 5 Connections of studies, publications and research questions.

Studies S1 and S2 were conducted as interview studies, and they contributed to understanding how UX work is done in startups, and what challenges startups have in creating good UX. Moreover, in S2, UX goals were studied in startups to form a Minimum Viable UX framework for supporting early stage UX goal setting. In survey study S3 the Minimum Viable UX framework was further validated, and the connection between UX and business models was discussed. Finally, in multiple case study

S4, UX strategy for startups was studied, and the UX strategy model for new business development in startups was formed. While S1, S2, and S3 mainly contributed to RQ1 and RQ2, S4 contributed mainly to answering to RQ3. However, answering the first two research questions also contributed to answering to RQ3, and for construction of the UX strategy model.

In addition to the four conducted studies, relating literature was reviewed over the course of the research. Starting point for literature search was the mapping study of Paternoster et al. (2014) that describes the state of literature on software engineering in startup companies. According to their findings, some authors had identified user involvement to be important for requirements engineering as well as for testing. However, UX was mainly covered in reporting experience from individual startups by Taipale (2010) and May (2012). Further literature was searched by a “snowball approach” from publications as well as conducting literature searches on Google Scholar, Scopus, Elsevier, and other databases. These searches were repeated during the whole research period. As literature on UX and startups was found to be scarce, in addition to searching for key words such as startup and user experience, searches were made to cover literature on UX and innovation, entrepreneurship, new business development, and strategy.

3.1 Research approach

The goal of our research was to investigate UX creation in software startups to develop a UX strategy model to support software startups’ new business development. For reaching the research goal, we adopted a commonly acknowledged research strategy of building theory from a case study (Eisenhardt et al. 2007). In this process we collected data in multiple cycles, and compared emerging theory with existing literature as suggested by Eisenhardt and Graebner (2007). The first two studies (S1, S2) consisted of interview studies and the third study (S3) was conducted as a questionnaire. To develop the UX strategy model, a multiple-case study of investigating three startups over a period of six months was conducted (S4). In S4 the author had an active consultative role in helping startups solve their UX related problems. This approach is in line with Runeson and Höst (2008) stating that “*case studies in the software engineering discipline often take an improvement approach, similar to action research*” (Runeson and Höst 2008).

At the beginning of this research there was, and also currently is, little previous scientific literature around UX creation in software startups. Thus, the research started with *an exploratory approach*. The initial goal was to lay basis for understanding the phenomena and describing affecting powers, leading to recognizing patterns. As startups operate with limited resources, different operations within a startup organization are strongly connected and even handled by the same person. To understand these settings, we needed to examine the UX creation in relationship with other related – or even competing – activities within a software startup. After initial understanding on the

phenomena was gained, an *inductive approach* was used where after gathering data we looked for patterns to develop theory.

The research approach was *qualitative* in nature as the studied phenomena are highly dependent on multiple factors regarding studied organizations and people, and in no way controllable by the researcher. In the scope of this doctoral research this was further emphasized as volatility within the process of building new products and services in startups is high (e.g. Paternoster et al. 2014, Coleman and O'Connor 2008). Furthermore, no suitable measurements for the phenomena existed. Thus, the phenomena were found suitable to examine with qualitative methods as suggested by Seaman (1999).

Three of the studies (S1, S2, and S4) were conducted in the field and involved one researcher interacting with the study participants to collect the data. The principles for interpretive field studies suggest seven aspects that improve the quality of field studies (Klein and Myers 1999). In the scope of this work, the seven principles were applied in the following way:

- *The fundamental principle of the hermeneutic circle:* The results and added understanding in this research was gained through multiple iterations. The data analysis process of each study included considering the interdependent meaning of parts of data as well as considering the whole they form.
- *The principle of contextualization:* The contextual aspect of the studied phenomena as a whole was investigated from the literature. Moreover, each participating startup was asked to give background information to understand how the history of their startup and how the team had been formed.
- *The principle of interaction between the researchers and the subjects:* The data was constructed in interviews and workshops guided by the researcher. Moreover, in studies S2 and S4 participants also created materials that presented their mental models. In S4, the data also included observations made by the researcher.
- *The principle of abstraction and generalization:* The gained results were compared to the existing literature and theory for generalization.
- *The principle of dialogic reasoning:* Multiple cycles of revising the results with multiple researchers enabled dialogic reasoning.
- *The principle of multiple interpretations:* Group interviews and workshops enabled sharing of multiple views by the participants. This was also encouraged by the researcher.
- *The principle of suspicion:* For the analysis, the possible biases or distortions in the narratives collected from participants were considered. The background of participants, past experiences, or current goals and priorities can possibly cause biases. For example, a single comment or a recent feedback may be overly emphasized in a participant's responses while something that had occurred previously was considered less important. Sensitivity was applied to recognize if the current situation may blur the wider perspective of participants.

3.2 Research process and methods

The research process was presented in Figure 5. Furthermore, Table 3 presents the method of each study, and a description of collected data. The nature of the collected data was mainly qualitative. Next, the four studies of this doctoral research are introduced in further detail. A description and details of participants in each study are presented in section 3.3. As startups operate under great uncertainty, we estimated a high risk of participants quitting in a long term or even short term studies. Furthermore, time constraints mean startup entrepreneurs may not be willing to give their time if they do not gain anything from participating in studies. For these reasons, methods that require small time investment (such as interviews) from the participants were found suitable. In addition, to motivate participants we emphasized the possibility for reflection and solving UX related issues with a researcher after interviews. This was especially important in the multiple case study S4, where startups took part in multiple interviews and discussions over a period of six months.

TABLE 3 Summary of studies, methods, and data collected for analysis

Study	Method	Data for analysis
S1	Interview study	71 pages of interview transcripts from 8 interviews.
S2	Interview study	97 pages of interview transcripts from 12 interviews.
S3	Survey study	21 survey responses with 3 open questions and 7 scaled questions
S4	Multiple case study	133 pages of workshop transcripts, materials created during workshops, notes of follow-up meetings and phone calls.

3.2.1 Interview studies S1 and S2

Interview study was selected as the appropriate method for the first two studies (S1, S2), because interviews provided rich qualitative data for gaining understanding of UX work in startups. Semi-structured interviews with individual entrepreneurs and startup teams were conducted to form a general understanding of how startups were conducting UX work and what were their motivations for creating UX. This was seen as the most useful starting point as there were only a few references to UX work in startups in the scientific literature.

S1 consisted of one round of data collection from eight startups. The main goal of this study was to understand the current practices for UX work in software startups. The research questions in S1 were 1) what practices startups currently have for UX work, 2) what challenges startups have in UX work, and 3) what needs startups expect to have regarding UX research and design in the future

when they scale up. The results of S1 are reported in P1, and the data was also used in forming the patterns supporting UX creation in startups, presented in P2.

S2 consisted of two rounds of data collection. The goal of the study was to gain knowledge in startups' approach to early product design, and to map the UX elements that support creating Minimum Viable UX. The first round of data collection consisted of interviews with eight startups after which an initial Minimum Viable UX framework was built to describe the UX goals of startups. This was followed by a second round of interviews with four startup entrepreneurs with UX knowledge, aiming to validate the framework.

The research questions of the first phase of S2 were 1) how startups start the UX design of their early product versions, 2) what skills and resources help startups to achieve the wanted UX for the first publicly launched products, and 3) what are the goals and key elements of Minimum Viable UX (MVUX) from the startups' perspective. In the second phase interviews the research question was 4) how can MVUX design framework help startups at the early phases of their product and business development" (P4). The main results are reported in two publications; research questions 1 and 2 are answered in P3, and research questions 3 and 4 are answered in P4. Furthermore, the data was utilized in forming the patterns presented in P2.

In both studies S1 and S2, interview structures were planned by the author and reviewed by two other researchers. After the first interview, interview structures were again revised in both studies. Interviews were conducted by the author.

3.2.2 Survey study S3

The survey study was selected as a research method for S3 as the goal was to collect data from multiple startups that were located in different geographical areas. Survey questions were mainly qualitative, and they were planned based on the previous findings of interview studies. Furthermore, the aim was to validate the MVUX framework and explore if factors affecting UX work in startups found in previous research were found in more startups. The qualitative nature of this study enabled bottom-up analysis of data, and comparing the emerged themes against previous findings. The study process is presented in Figure 6. As presented in the process description in Figure 6, emerging results from surveys were used to guide the study towards analyzing the connection between UX and business models in startups.

The survey was planned by the author and reviewed with two other researchers. Then, the survey was tested with four entrepreneurs and revised based on the results. The challenge with the survey study was to recruit enough respondents, as entrepreneurs were highly selective on how they spend their time. Data was collected between November 2015 and March 2016. Researchers actively promoted the survey both personally and to startup networks, resulting in 21 responses. However,

as the survey provided mostly qualitative data in the form of open ended answers, the sample was considered to be sufficient for providing valuable information. The results are reported in P5.

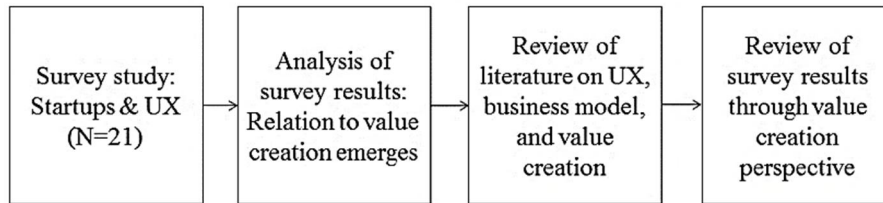


FIGURE 6 The study process of survey study S3 (P5)

3.2.3 Multiple case study S4

Multiple case study (Yin 2003) was selected as the method for constructing the UX strategy model. The study (S4) lasted for six months between March and September 2016, during which development of UX in three startups was studied. Figure 7 presents the study phases that resulted in creation of a UX strategy model. Data was collected through surveys, workshops, interviews, and follow-up phone calls and emails as well as through observations in the startups' meetings. After collecting initial status information of startups and participants, a workshop was held with each startup team to establish goals and initial understanding of the state of UX. During the study, matters related to UX were discussed multiple times with startup teams and the researcher actively sought to assist in solving UX related problems the startups encountered. However, implementation of UX work was left to startups and the researcher's role was mainly consultative. Advantages of this approach were in gaining deep understanding on realities in software startups: which activities were truly feasible for them, and how they prioritized the UX work.

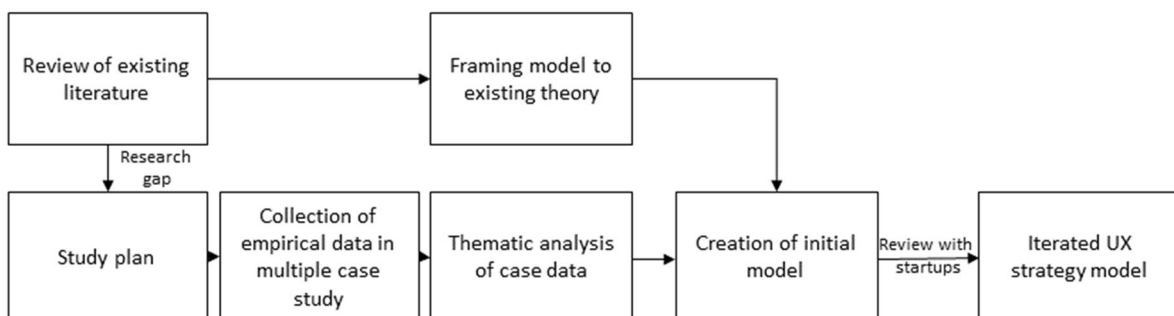


FIGURE 7 Research process of the multiple case study S4 (P6)

The case study method was found suitable because it provides data from a real-life context, to study a contemporary phenomenon within that context (Yin 2003). Furthermore, as suggested by

Eisenhardt and Graebner (2007), the case data was collected in multiple cycles and emerging theory was compared to existing theory. Through this process the UX strategy model was built and reviewed with study participants. The study was planned and executed by the author of this thesis. Furthermore, one other researcher participated in multiple reviews on the research plan and activities during the execution of the study. Moreover, the results, and the model, were also reviewed with co-authors of P6.

3.2.4 Data analysis

In all the studies, data was analyzed mainly by the author of this thesis after which the results were reviewed together with other researchers. With qualitative data, a thematic analysis was used in all studies. Analysis consisted of coding data, translating codes into themes and creating a model of higher-order themes followed by assessing the trustworthiness of the synthesis, as described by Cruzes and Dybå (2011). Moreover, the initial round of coding was carried out to find emerging themes relating to the research questions in the study at hand. The initial coding was conducted by the author in all studies and then reviewed with one or more other researchers. Moreover, the themes and their relations were reviewed together with one or more other researcher to increase validity through triangulation of results. In studies S1, S2, and S4 NVivo tool was used for making analysis. For S3, Microsoft Excel and printed responses were used in coding and establishing themes.

For the formation of patterns in P2, the results of analysis in S1 and S2 were used to further recognize patterns, meaning solutions for problems related to UX creation encountered by multiple startups. The three patterns presented in P2 were then formatted and conflicting forces together with solutions were described in the common pattern format (see e.g. Kelly 2012).

3.3 Studied startups and research participants

According to our definition, software startups participating in the studies were expected to be young (less than six years), small (maximum 40 persons), and their product or service offering was required to include a software component. Moreover, participating startups had not yet established their business model. Studied startups were selected based on their age, size, and type of product or service under development. In studies S1, S2, and S4 convenience sampling was done based on the location of startups as interviews, observations, and workshops were carried face to face. Startups were recruited through startup incubators and accelerators as well as by contacting them directly based on their websites. Furthermore, the survey study (S3) was advertised in social media. The selection of participants was affected by their availability and possibly interest in discussing UX related topics. However, the background of participants as well as products and market areas of startups varied. In case of multiple participants from the same incubator, researcher actively sought to recognize the effect of startups having been mentored by the same people and thus emphasizing similar aspects because of it.

The studied startups were aiming to both business-to-business (B2B) and business-to-consumer (B2C) markets, and their products and services varied greatly from entertainment to professional products. Detailed descriptions of products were not included in reports to anonymize participants as well as to protect their business ideas. The summary of startups is presented in Table 4. The number of participants in each study presents the number of people that directly took part in the study by taking part in interviews, surveys, or workshops.

TABLE 4 Summary of startups participating in studies

	S1	S2	S3	S4
Time of study	October 2014	May 2015	November 2015- March 2016	April 2016- September 2016
Number of startups	8	12	20	3
Number of participants	11	17	21	13
Founding year of startups	2013-2014	2011-2015	2010-2016	2015-2016
Size of startups (persons)	3-5	1-6	3-40	3-7
Market B2C/B2B/Both	3/2/3	2/6/4	4/12/5	1/1/1
Country of startups' origin	Finland (7), Australia (1)	Finland (12)	Finland (14), Hong Kong (4), Australia (1), Armenia (1), Belgium (1)	Finland (3)
Startups participating in multiple studies	Two startups involved in both S1 and S2.		One startup involved in both S3 and S4. One entrepreneur also participated to S1 with a different startup.	

Studied startups assigned diverse roles and some decided not to assign specific titles for team members – only exception being the CEO role. From all participants, 40 were CEOs. From interview studies (S1, S2), 14 of 20 startups had at least some UX related expertise in the startup team. In survey study S3, 13 respondents reported being involved in UX design. As small startup teams require people to work on what is most important at the moment, tasks can be redistributed quickly as situations change. Generally, participants reported working on multiple areas of product and business development. The background of participants was mainly in technology, and education wise the major part had a master's degree.

3.4 Research ethics

During the research we followed the generally accepted ethical rules that concern anonymization and data storage. Furthermore, all participants were made aware of purpose of the research, research parties, how their data would be handled, and on general level how the results would be reported to secure anonymization. Also, participants were aware that participation was voluntary, and they could stop participating at any time. By following the abovementioned practices, the research covers the issues recommended to be addressed by the Finnish research ethics authority TENK (Finnish Advisory Board on Research Integrity). However, Tekes (the funding agency of this research) and our university do not require to have external evaluation of ethical processes and governance for this type of research in the field of software engineering and HCI.

4 Results

In this chapter the results of this doctoral research are presented. In section 4.1, a summary of how each publication contributes to answering to the research questions is provided. Then, results are introduced in three parts to answer each of the three research questions. The role of UX while developing new business in startups is presented in section 4.2. Then, approaches and practices found useful for UX creation in startups is presented in in section 4.3. Finally, the strategic approach UX creation in startups containing the UX strategy model is presented in section 4.4.

4.1 Summary of contributions per publication

The first interview study (S1) concentrated of understanding startups' needs and challenges for UX work. The contribution of results from S1 were mainly to RQ1 and RQ2 with publication P1. Furthermore, data from S1 was utilized together with data from S2 to form patterns of user involvement in startups, presented in P2.

P1. Publication P1 presents the key findings of interview study S1 and lays out basis for the rest of the research. Results show practices and challenges regarding UX work in startups. Moreover, we conclude with key factors for successful UX work, together with suggesting startups would benefit from a focused strategy for achieving the wanted UX.

Findings suggest that knowledge in HCD and UX helps startups to use different methods for gaining useful information on users whereas teams with no UX knowledge struggled with even basic feedback collection. Moreover, lack of skills hinders moving beyond generic feedback in order to gain insight from user involvement. Light-weight methods for quick interviews and user tests were found beneficial, as the needs for gaining feedback from users changed together with the startups' product and business development. However, a common pitfall was to collect feedback from only friends and acquaintances who do not represent the target user group.

Willingness to use data to understand users was common. However, data rarely provided meaningful input for startups. Startups had vision for UX, however they lacked strategies for UX creation.

The interview study S2 consisted of two phases: first, understanding how startups approach the early product design, and then constructing the Minimum Viable UX framework and validating it. The main findings contributed to answering RQ1 and RQ2. In the first phase interviews focused on approaches and practices for designing early product versions in startups. Furthermore, data was collected on what kind of elements startups found important for UX of their early product versions. Based on these results, a framework was created to present the key elements of early product versions that was then evaluated during the second phase of interviews.

P2. Publication P2 introduces three patterns for user involvement in startups, mined from data collected in S1 and S2. In P2 it is presented how there are different needs for UX in different phases of a startup's lifecycle. Then, the three patterns present startups' challenges, and forces affecting, in this context. The three patterns presented in P2 are ONLY REAL USERS, MEANINGFUL USER FEEDBACK, and HAPPY TEST USERS. The patterns present solutions by means of meaningful feedback collection, using only real users for gaining feedback, and conducting user tests to assure good enough UX before seeking to validate a product idea with a large number of users or customers.

The presented patterns provide concrete solutions to problems encountered in startups concerning user involvement in product development. Also, the affecting forces, and consequences of using the solutions, are described in a format that can provide insight to practitioners. The publication also contributes to the software startup patterns literature (see e.g. Dande et al. 2014) and software business patterns (see e.g. Kelly 2012).

P3. Publication P3 presents results from the first phase of interview study S2. Results present approaches for early design together with beneficial resources, skills, and practices for UX work. We conclude that startups approach product development with minimal implementations for which creating "good enough" UX from early on is beneficial. However, challenges lie in scarce resources and limited skillsets in startup teams.

The publication contributes to literature on UX and startups by describing beneficial skills and practices for UX work in startups. Being able to produce minimal implementation that brings value to users was perceived beneficial, as well as recognizing good user interface solutions from other products. Furthermore, graphic design skills, skills for user testing, and knowing usability heuristics was valued. The results reported in P3 can be utilized to further develop suitable methods for UX work in startups. For practitioners, the publication offers examples and insight on practices for designing early product versions in startups.

P4. Publication P4 presents the Minimum Viable User eXperience (MVUX) framework to support early product design in startups. The framework was built through analyzing what UX startup entrepreneurs were aiming for with the first product versions. Moreover, MVUX was defined to be realized in the software under development when (1) user can perform the core use cases to gain value, (2) basic hygiene factors for usability and appearance are in place, and (3) the startup is able to get enough of feedback and data to validate and further develop the product idea. The framework consists of four main categories: Attractiveness, Approachability, Professionalism, and Selling the idea. Under these categories, a set of sub-categories is listed. Furthermore, results of validation interviews indicate that the MVUX framework seems to be comprehensive and useful for keeping focus in UX. However, it is concluded that practical guidance for achieving the wanted UX as well as measuring it might be needed to startups truly gain value from the use of the MVUX framework. The MVUX framework is further presented in 4.4.1.

The MVUX framework contributes to the literature by presenting UX goals found relevant for early design in startups. For practitioners, the MVUX framework can offer a set of possible UX elements to consider when designing the first product versions, or to set UX goals. Moreover, the MVUX framework can serve as a check list for evaluating early design decisions or product versions.

The third part of research (S3) was conducted as a survey study to further elaborate the affecting factors of UX work in startups. Furthermore, startups' goals for UX were collected to validate the MVUX framework. In addition, a thorough review of literature was conducted to understand the value creation aspects of UX that are connected to startups' business models. S3 mainly contributed to answering RQ2 and RQ3, and resulted in P5.

P5. Publication P5 presents factors affecting UX work in startups as well as collected UX goals categorized in terms of the MVUX framework. The results show that the affecting factors were related to startup's strategy, team qualities, and ability to interact with users. Furthermore, startups' UX goals were mainly pragmatic with little emphasis on hedonic aspects. However, goals were found to be in line with elements of the MVUX framework although they indicated startups do not fully utilize the potential to create value with UX. Moreover, in relation to business models, startups could benefit from regarding both practical and emotional value as suggested by the business model literature.

The publication contributes to the literature on UX and business models in addition to discussing them in the context of software startups. Connecting the value creating aspect of UX to aspects of business model development can help startups to gain more value for their business. For practitioners, the MVUX framework can assist in guiding setting UX goals and UX creation.

The last study of this doctoral research (S4) was conducted as a multiple case study with three startups, resulting in a UX strategy model for NBD in software startups. S4 lasted for six months during which previous findings were used to formulate feasible plans for UX creation in investigated startups, and to follow up on their development. Moreover, S4 consisted of an initial workshop for

focusing companies' UX work and setting goals, follow up meetings and interviews, and the final interview where also feedback on the built UX strategy model was collected. In regards of research questions, S4 contributed mainly to Q3.

P6. Publication P6 presents as the main result the UX strategy model formed based on the multiple case study and existing literature. The UX strategy model consists of UX strategy actions relating to UX goals, design decisions, and user involvement. Moreover, the model contains elements for two different phases of startup's lifecycle: validation of an idea and scaling business, adopted from literature (Blank 2007, Ries 2011). As the model is framed with the startup lifecycle model adopted from Ries (2011), it answers to changing needs for UX work during the validation and scaling stages. For UX, the model complies with human-centered approach by involving users to product development from early on (ISO 9241-210: 2010), while specifying the means to gain meaningful information of users efficiently in startups.

For practitioners, the UX strategy model offers guidelines for planning UX related activities. During the validation stage, focusing UX work to support gaining trustworthy validation creates value. This is achieved by ensuring viable UX when testing with users. However, as the startup finds a lucrative business idea and product/market fit, *lovable* UX can support business growth. The UX strategy model is presented in more detail in 4.3.2.

4.2 Role of UX for NBD in startups

The first research question was as follows:

RQ1: What role does UX have in new business development in software startups?

The role of UX for startups was investigated as part of this research mainly based on views of entrepreneurs themselves and not e.g. through measuring the impact of UX. The reason for this was that no suitable measurements for the effect of UX in startups' NBD existed. Moreover, measuring the effect would be extremely difficult due to complexity in factors affecting NBD. Furthermore, the role UX plays was investigated based on how entrepreneurs perceived the UX to affect startup's product and business development, or success of them. Moreover, studies gave insight on how lack of UX work affected startups. Also literature was reviewed to understand how UX links to business models and thus, may affect business success of a startup. While investigating UX creation in startups, it became evident that UX is connected to both the business and product development. UX work in startups is characterized with uncertainty and lack of resources (P1, P3, P4, P5) and thus can be demanding for startup teams to conduct. However, this doctoral research implies that good UX can create value not only to users but also to startup's business model development (P5).

4.2.1 Role of UX in product development

Software startups often build product versions to receive feedback and to gain information on how to further develop the product. While these product versions may not bring any revenue to the company, they are still essential for validating a product idea. A finding from studies S1 and S2 was that sufficient UX in early product versions enables a startup to collect trustworthy feedback for developing a product idea further whereas poor UX can make attempts to validate product idea futile.

Sufficient UX can be considered important from the very beginning of a startup's lifecycle as early versions need to communicate effectively the product idea. For creating UX, it was found that activities related to UX design were beneficial. Active interaction with potential users enabled feedback collection for product development but also for further creation of new ideas for business (P1, P3). Startups begin with an idea of a product, often generated by one of the founders. Pivoting to another idea is however common if the initial idea is found to be unattractive for customers, or unfeasible to develop. Many startups brought up that execution of the idea into a product or service is a key factor for success (P3). Even though the startups did not always have UX skills, **creating a good UX was seen as an enabler for success of a product.**

The Lean startup method (Ries 2011) emphasizes gaining feedback from real customers to validate if a product would solve a problem a customer has. While the studied startups did not follow the Lean startup method thoroughly, it was well known amongst the research participants (S1, S2, S4). Gaining feedback and testing early versions with real users was considered useful and important (P1, P3). Startups reached for friends, early adopters, and fans who were intrigued by the new product idea, to conduct user tests and to ask for feedback. However, **even for the early fans the UX needed to be sufficient for them to understand the potential of the product** (P1).

The role of UX was less critical with on the spot testing that were often unplanned and happened as entrepreneurs encountered a potential user who was interested in a product a startup was developing. These tests were perceived useful even with poor UX as further explanation could be given to describe the planned product qualities. In contrast, remote testing by interested users was challenging unless users were able to gain real value from the early product version before abandoning the product due to bad quality also in terms of UX (P1, P6). However, **successfully creating positive experiences for early users enables both co-creation and creating positive buzz through word of mouth** (P1).

4.2.2 Role of UX in business development

The main finding regarding this theme was that **good UX supports creating value to customers and users, but also to business.** Business models' view on value creation is composed of practical and economic but also emotional aspects, and thus support regarding the hedonic and practical

aspects of UX in product offering. Disregarding UX can hinder startups from generating and capturing the maximum amount of value according to their chosen business model.

The value of UX for startups was found to have a connection to business models. **UX can create value to both users and the startup company, referred to later as two dimensional value creation (P5).** In S3 the focus of UX in startups was investigated, and the results showed emphasis on practical attributes. The same study showed startups regarding UX to be of lower priority, similar attitude as discovered in a survey study in the Swedish industry (Gulliksen et al. 2004). For example, in some startups, adding more features was preferred over using resources to improve UX (P5). However, as business model literature indicates, considering the emotional value of products or services as part of value creation, UX can create additional value. Startups may not reach the full potential of their product offering when they disregard UX or focus only on practical aspects or usability.

Good UX can enable startups to further develop their business as it contributes to user satisfaction. However, regarding longer usage and UX, the importance of long term user satisfaction may be emphasized later in the startups' lifecycle. Still, ensuring satisfaction of first customers is critical for startups. As startups seek to survive to even complete the product development, they may need to impress other stakeholders before users – depending on their business strategy and business model. For example, in the B2B market, startups can gain funding or even sales before having developed a functioning product. Thus brand, sales, and personal connections – rather than UX – is emphasized (P4). Fulfilling the promises made during pre-sales becomes then crucial, and as part of it the UX must be at the level customers expect (P4). The same model – selling before implementing the product – can also work in the B2C market if startups utilize crowdfunding as part of their strategy.

Good UX contributes to product success. In general, throughout the studies, interviewed startups considered good UX to be contributing to product success. In some cases, UX was perceived to bring leverage against more established competitors with outdated or poor UX. (P1) However, reasons for not committing to UX creation were e.g. the sense that other activities provide more value at the moment, or the team lacked skills for UX work. To justify resources allocated to UX creation, UX needs to be assessed through its value creating abilities. The connection between UX and business models further elaborates how startups can benefit from good UX. (P5)

4.3 Approaches and practices for UX work in startups

The first research question presented views to what role does UX have as startups develop their product and business. In order to recognize feasible and beneficial ways for startups to reach good UX, approaches and practices for UX work were studied. The second research question was as follows:

RQ2: What methods and approaches are beneficial for creating optimal UX in startups?

All the studies provided insight on how startups approach UX and what practices are used to achieve the envisioned UX. However, this question was discussed the most in publications P1, P2, P3 and P4. Strategic approach to UX is also discussed in section 4.4 in relation to the UX strategy model that is presented. Approaches and practices for UX creation in startups need to be feasible to implement by startups. Time pressure, lack of resources, and uncertainty present a challenging context for work. Thus, factors affecting UX creation in startups are first presented. Then, startups' approaches to UX are described to present how startups moved toward the envisioned UX. Furthermore, practices for conducting UX work in startups are presented in terms of gaining understanding of users, and conducting design.

4.3.1 Factors affecting UX creation in software startups

Factors affecting UX work in software startups are presented here for the purpose of providing insight for what type of practices can be beneficial and feasible. To investigate beneficial approaches and practices for UX work in startups, the limitations as well as goals of startups need to be understood. Factors affecting UX work in startups were found in both studies S1 and S2. In addition, they were further queried as part of S3. Figure 8 presents an overview of our findings describing what affects and especially limits UX creation in startups. The affecting factors have been synthesized from the results of this doctoral research by recognizing occurrences over several studies as well as the factor being in line with literature on characteristics of software startups (Paternoster et al. 2014). Moreover, in Figure 8, *searching for a business model* and *software created for experimentation* is based on the idea of the Lean startup method (Ries 2011) but also findings from this research (P1, P3, P6). These aspects affect the product and business development in startups, including activities related to UX.

In all the studies, startups brought up that uncertainty and lack of resources affect UX creation. *Uncertainty of the target market* as startups *search for a business model* can cause changes in targeted user groups (P1), *making the user needs unclear*. In addition, the goals for UX need to be adjusted depending on the purpose of the product under development which can vary from an early prototype for testing a product idea to launching a product and gaining traction (P3). For the earlier type, *the software created is mostly for experimentation* and the startup may discard the product completely if the product idea is perceived not to have enough business potential. While these versions are not always completely discarded as described by Terho et al. (2015), efforts invested in such a product version while working under time pressure may not cover UX work and *resources are prioritized for other work* (P1). For the latter case where a startup seeks to scale and reach a large customer base, quality of the product including UX becomes more important (P1). As for lack of resources, the startup team may not have knowledge or *skills for UX work* (P1, P3). Lack of skills and time can also relate to *not having a strategy for UX* even though the team would have a vision of it (P1, P6).

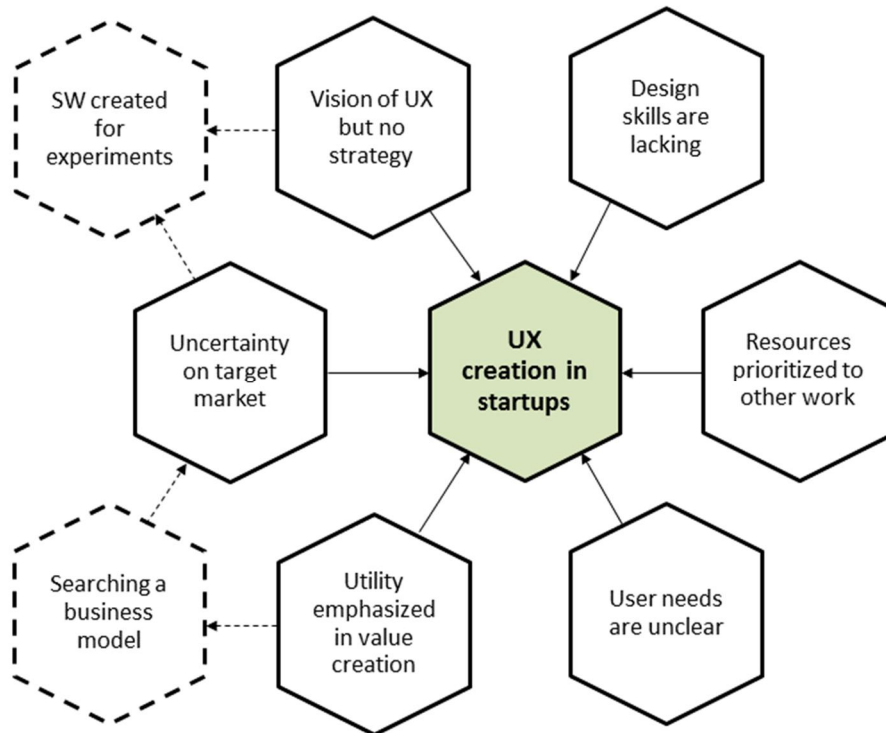


FIGURE 8 Overview of factors affecting UX creation in startups.

4.3.2 Approaches to UX

Regarding the approaches to UX, our findings suggest startups benefit from an iterative approach to UX creation with continuous feedback cycles. Furthermore, creating Minimum Viable UX from early on, and focusing to a vision that the whole startup team shares are beneficial.

Approaching product development, including UX creation, in **an iterative way with continuous feedback cycles** was common in startups (P3, P4). This is in line with modern software engineering practices such as agile software development (Dingsøyr et al. 2012) and lean software development (Poppendieck and Poppendieck 2003). Short iterations are a commonly accepted way of working. Adoption of these practices however can be due to previous experiences of entrepreneurs in the field of software engineering rather than current needs in startups (Sutton 2000). Moreover, being able to create implementations and settings for effective testing of ideas, or experimentation, remains challenging (P3).

Results show that teams with UX knowledge were able to utilize multiple methods for user research and feedback collection. Moreover, teams with only little knowledge on UX were struggling e.g. with basic user interviews. However, in general the startups were satisfied with their ability to gain useful feedback while utilizing feedback was more challenging (P1, P5). Overcoming gaps in knowledge is difficult as startups mainly rely on entrepreneurs as primary information source due to not having

established stakeholder networks (Coleman and O'Connor 2008). However, startup incubators or accelerators may offer support for UX creation among other activities (P1).

Efforts for gaining feedback may be in vain if a startup seeks to test with a prototype or an early version that does not communicate the nature of the product. In such situations, test users focus mainly on deficiencies and provide little new knowledge for the startup team (P1). As a solution, it is suggested that **early phase startups aim at Minimum Viable UX (MVUX)**. MVUX is realized when (1) user can perform the core use cases to gain value, (2) basic hygiene factors for usability and appearance are in place, and (3) the startup is able to get sufficient feedback and data to validate and further develop the product idea (P4). Moreover, MVUX supports early activities of startups such as testing ideas, gaining feedback, and satisfying early users to keep on using the product. The MVUX framework presenting UX elements to aim at in early product design is presented in 4.4.1 as contributing to UX strategy.

Startup teams are initially small and members are empowered to influence the product outcome. To make decisions that support creation of good UX, **the whole team should be involved in understanding users**, and the gained **information about users' needs to be shared efficiently** (P1). An assigned UX designer lacks from many startup teams and thus the user-centric mindset needs to be adopted by the whole team. As discovered in S3, startups perceive the right mindset to be one of the enabling characteristics of a startup team in the creation of UX (P5). Furthermore, business ideas often come from a personal need for a product or service, and entrepreneurs may make decisions based on their own preferences. This may not however present the majority of users and may cause problems later. (P1, P4) **Developing a shared vision for UX and updating it iteratively** enables a team to work towards a common goal. Research participants of S1 and S2 had visions for UX but it was not communicated between team members (P1, P4). In S4 it was discovered that different team members occasionally had very different visions on what the startup was creating, nor were they aware of these differences (P6). In addition, a strategy for reaching the envisioned UX was often lacking (P1, P5). This is a natural outcome considering the UX vision is not even shared among team members.

4.3.3 Practices for UX creation in startups

The main findings of practices for UX creation in startups relate to gaining user knowledge and making informed design decisions. Lack of skills and other resources provide challenges for adopting good practices for UX creation.

Even experienced UX designers may struggle to find feasible solutions for user research and design in the volatile environment of startups. It is characteristic for startups to not have clear processes for software engineering (Sutton 2000) and the same seems to apply for UX creation (P1). **Resources allocated to UX creation need to provide value for the current needs of product and business development** which may contradict with the traditional goals and methods of HCD. While time and

resources are scarce, startups also may need to change the direction of their development activities often as more understanding of market needs is gained. Due to these changes, results of user research can become useless. (P1) However, conducting user tests before seeking to validate product with a larger group of people, or before moving to measure part of the Build-Measure-Learn cycle, is beneficial, as suggested in pattern HAPPY TEST USERS. (P2). This contributes to achieving MVUX as major deficits can be removed – resulting in happy test users – before seeking validation from a larger audience (P2).

To satisfy users' needs, **startups have to understand their users and provide solutions that suit them**. In S1, it was discovered that from eight startups participating in the study, six were developing a product that answered to their personal need. For this reason, entrepreneurs themselves were the first users of their product, similar to findings by Sutton (2000). While the personal aspect to developing the product may help in understanding users, it may cause entrepreneurs to make decisions based too much on their own preferences (P1). Changes may then be needed as the customer base increases (P3, P5). **The use of personas** as a way to communicate user needs to the whole team was found beneficial. Personas were perceived to be useful also for shifting thinking towards a more user centric mindset. (P1, P6) However, personas may be problematic if they are not updated as more knowledge is gained, or if they provide too narrow stereotypes of users (Liikkanen et al. 2014).

Interaction with users offers startups a possibility to gain knowledge and reflect their ideas. However, the lack of skills for user research methods can hinder startups from gaining useful feedback and conducting effective user tests (P1). Having at least one team member or advisor with knowledge on UX work helps in overcoming this as suggested in pattern MEANINGFUL USER FEEDBACK (P2). Furthermore, **light-weight user research methods were beneficial for startups**. Short interviews or user tests with paper prototypes provide fast feedback to startup teams while not requiring major investment of time or other resources. Practices for involving users as part of product and business development were for example user interviews and tests (P1). Entrepreneurs with knowledge in HCD conducted more thorough interviews and surveys. It was also found that they were not able to analyze the results thoroughly but rather used the data for inspiration and consultancy when needed. (P1, P6) Nature of discussions and user tests was often informal as startups discussed their product ideas with their acquaintances or friends. While they offer a fast channel to gain feedback, feedback from friends may not be trustworthy unless they are from the targeted user group (P1). **The use of real users as a source of information** is necessary for startups. Recruitment of users for tests or interviews can be challenging, as there is no existing user or customer base. Also, startups may not have established their direction enough to have identified clearly who are end users. The pattern ONLY REAL USERS proposes finding a target user group and creating channels to reach them even though this can be perceived laborious, and the user group may change (P2). However, reacting to feedback from people who are available – such as friends – but who are not likely to be users of the final product, can steer product development into a wrong direction and thus be costly (P2).

Early design decisions in startups require major decisions on which features to include to fulfill the purpose of the current product version. In addition, the quality of UX needs to be appropriate for that purpose. Intuition guides design in startups, and small teams can easily share ideas and opinions. To gain speed in UI design, startups **utilize copying good solutions from successful products or services**. However, lack of graphical design skills as well as limitations in capabilities to produce the implementation limit possibilities in startups. (P3)

Visions for UX of the final product were discussed with interviewees in S2. However, in S4 it was discovered that participating startup teams did not have a united vision for their product. Also, strategies and plans for concrete actions to achieve the wanted UX were not established. To compensate the lack of planning, **iterative testing by users** was perceived as an efficient mean to guide further design and development. However, turning user research into design decisions was discovered mainly to not be feasible due to lack of time or skills for analysis of gained user information. Startups operate in a reactive manner (Paternoster et al. 2014), and design decisions may reflect this tendency by for example overemphasizing feedback of few individuals and causing the startup to change design often. A threat to validity of user tests conducted by entrepreneurs may be that users are unwilling to criticize products when products are designed and produced by the entrepreneur.

4.4 UX strategy model for startups

The previous two sections presented how UX relates to product and business development in software startups, and gave an overview on factors affecting UX creation in startups together with beneficial practices for UX work. As these results give a better understanding of needs and goals for UX creation in startups, the research continued towards developing a UX strategy model suitable for startups. The strategy model was chosen as the goal of this research as rightly focusing UX related activities was found to be hard for startups. The last part of this research (S4) was conducted to answer the last research question:

RQ3: What kind of UX strategy is suitable for startups?

As a result of this doctoral research, a framework for early UX goal setting in startups as well as a strategy model are presented. Earlier in section 4.3, the concept of MVUX was introduced as ensuring sufficient level of UX of early product versions. The Minimum Viable UX framework was created to support UX goal setting as well as for supporting early design decisions in startups (P4). Effective goal setting enables startups to focus on the essential UX elements that support product and business development from early on. The MVUX framework is further presented in section 4.4.1 as contributing to UX strategy. The UX strategy model for supporting startups NBD is presented in section 4.4.2. As a result of the multiple case study S4, and reviewed literature, the UX strategy

model was built to include strategy actions for UX goal setting, user involvement, and design decisions (P6).

A startup's lifecycle consists of different phases during which it has different needs for product and business development. Early activities need to ensure validation or readjustment for the idea and market size, while scaling of a business requires attention to marketing and satisfying customers. As startups struggle with scarce resources and time pressure, constant prioritization of activities is required. This environment poses challenges for software development and business development, and startup teams may strongly prioritize other activities over UX creation. However, disregarding UX may hinder a startup as discussed in section 4.2. A UX strategy model needs to provide value to a startup while being feasible to utilize. Moreover, UX strategy needs to support the startup's business goals as startups struggle to survive to bring a product to market, and then scale activities.

4.4.1 The MVUX framework

Creating UX may not be prioritized in startups in the early phases of product and business development. However, presenting users early product versions or prototypes that do not provide sufficient UX can hinder startups' development as was described in 4.2.2. To understand what good UX can be in early product versions of startups, the MVUX framework was created. The MVUX framework was first established during the first phase of S2. Building the framework was done by analyzing UX goals and vision described by entrepreneurs in order to synthesize what UX goals are perceived useful for contributing to startups' product development. The MVUX framework was validated from two perspectives: 1) its sufficient coverage of the most important UX elements for startups and 2) its usefulness for helping startups focus on UX work. The MVUX framework was validated with entrepreneurs with UX expertise in the second phase of S2 (reported in P4) as well as in the survey study in S3 (reported in P5). In S4, the MVUX framework was used as part of a workshop conducted with each startup team, and it enabled further validation of how the MVUX framework can be used in practice for internal communication and goal setting. The MVUX framework supports early design in startups as it presents the important elements for UX of early product versions to assure sufficient UX creation. The four main elements of MVUX are Attractiveness, Approachability, Professionalism and Selling the Idea, as presented in Figure 9.

The MVUX framework builds upon the aim of Selling the Idea which contributes to efficiently communicating the product idea through an early product version. The three other main elements, i.e. Attractiveness, Approachability, and Professionalism, enable the user to be interested in the product, and to begin using it. Selling the Idea offers the startup a possibility to get good quality feedback as users understand the product idea. Also, it aims to attract the right audience for a product. For a user to be interested in a product and to start using it, Attractiveness, Approachability, and Professionalism are enablers. The elements of MVUX can also be seen affecting the user in different phases of interaction and usage of the product. Moreover, the first impression of a product is influenced by making the early product version attractive. Furthermore, approachable elements

facilitate the usage and provide a comfortable experience so as to not make the user abandon the product. Finally, a well-functioning, efficient product facilitates giving a professional image of a product, and of a startup itself. Which can also contribute to long-term usage.

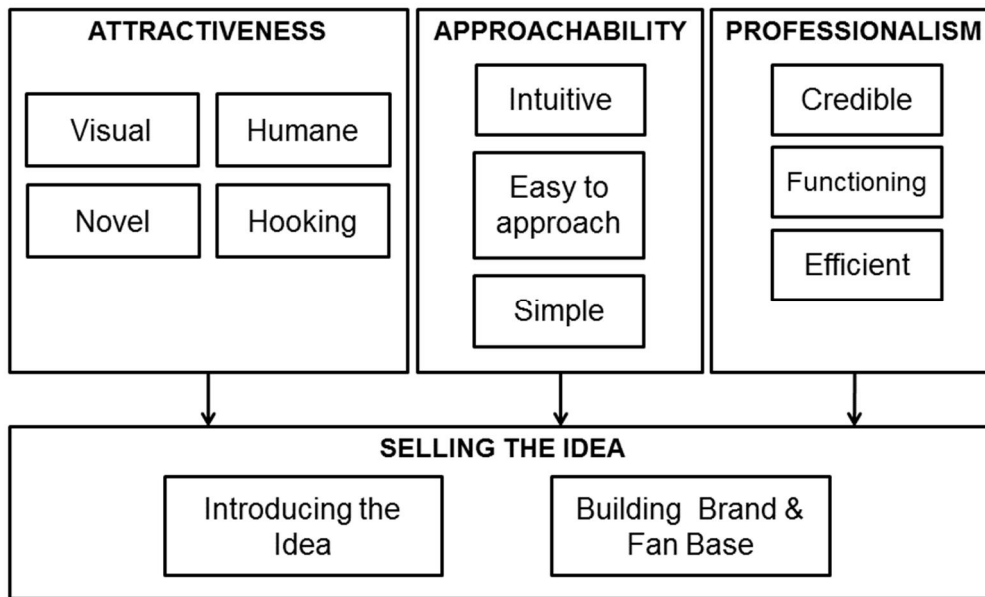


FIGURE 9 The MVUX framework to support product design in startups (P4).

The MVUX framework aims to enable startups to find focus for UX while covering both the pragmatic and the hedonic aspects of UX, as proposed by Hassenzahl (2004). The framework seeks to help startups build positive experience that is connected to non-utilitarian aspects of UX, enabled by the lack of problems in pragmatic aspects (Hassenzahl 2004). Attractiveness contributes to hedonic aspects of product qualities and contributes to creating a positive experience. Moreover, approachability and professionalism regard more the utilitarian aspects, related mainly to usability and lack of problems in usage.

For business models' value creation and capturing, regarding the economic, pragmatic, and emotional value supports a holistic view of the product offering. Thus, developing a business model and recognizing both the pragmatic and the hedonic value of UX as part of the product offering enables a startup to create additional value (P5).

4.4.2 The UX strategy model

In this section we present the UX strategy model to support NBD in software startups. The model was constructed as part of S4, where three software startups were studied over a period of six

months. The study S4 consisted of multiple data collection rounds, while UX creation in startups was followed. The results of previous studies were also utilized together with existing literature to create the model. The UX strategy model was created by first establishing four main themes for multiple case study data, including Goals, Design, User, and Resources. The assumption was that startups need to establish and align *goals* of different areas of work - including UX - for them to support the NBD. Moreover, *Users* and *Design* are central elements for creating UX. Finally, *Resources* were investigated as lack of them is characteristic for software startups and they set limitations for utilized practices. By analyzing and coding the data based on these four main themes, the initial UX strategy model was created, and then reviewed with S4 participants. The UX strategy model was then iterated based on the study participants' comments.

In Figure 10, the complete UX strategy model to support NBD in software startups is presented. The model has five UX strategy actions related to *goals*, *user involvement*, and *design decisions*, that contribute to the user centered design approach of product development (ISO 9241-210: 2010). Moreover, the model contains elements to support the different needs of UX creation in startups' validation of their product and business idea, and scaling the business, stages (Ries 2011). Since startups are known not to follow established processes (Sutton 2008), the UX strategy model provides guidance for UX creation in startups on high level.

The UX strategy model is framed to support the stages of the Lean startup method (Ries 2011) and Customer development (Blank 2003), namely validation and scaling. During the validation stage, a startup tests product ideas and hypothesis related to it with real users or customers. Product versions developed at this stage are implemented for testing purposes but need to communicate the nature of the product idea effectively. For the scaling stage, the product needs to be well functioning and attractive as resources are used to market it with the goal of fast growth. As the stage of a startup's lifecycle crosses the validation stage, uncertainty in product development should decrease through gained validated learning. Also, value creation increases together with the validated business model, and the increasing need to gain, and satisfy, customers. As the startup moves forward towards the scaling stage, more value is created also with UX according the two-dimensional value creation. The more sophisticated practices in the later stage are enabled by the team learning to work together. Also, more robust practices can be implemented to bring more value as knowledge of the business domain has been gained, and such activities can be planned more effectively. (P6)

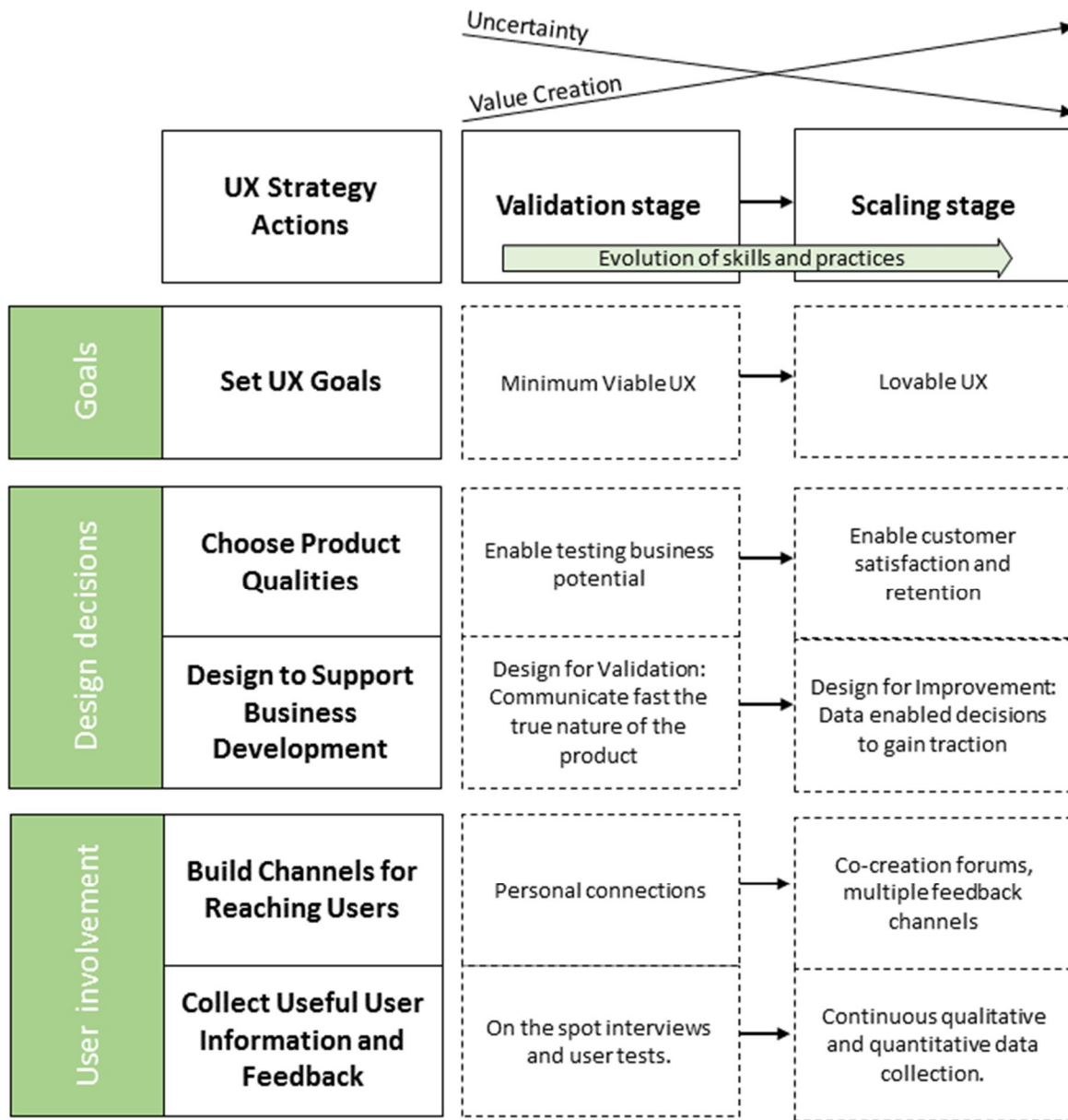


FIGURE 10 The UX strategy model for supporting startups' NBD (P6).

Goals. While startups operate under uncertainty, setting goals for UX can help in startup teams to share their vision and thus move forward in a more united manner. For validation purposes, it is proposed UX goals aim at the MVUX. Later on startups need to provide a competitive UX to enable growth of business and hence aiming to lovable UX. The changing nature of goals is presented in the model as a startup moves between stages. Furthermore, as startups learn more about their business domain they need to review and update goals even while staying at the same lifecycle stage. (P6)

Design decisions. Early design decisions made in startups include a great amount of uncertainty of product qualities. Furthermore, early versions should enable testing the product idea and business potential. Design activities should aim at producing a product for this purpose. For scaling however, the design decisions should be aimed to improvements that enable customer satisfaction and retention. Moreover, UX goals can guide creation of a design rationale together with input from user involvement. Being able to create a lovable UX can be achieved by regarding more on the hedonic aspects of UX, as they influence more the positive experience. (P6)

User involvement. Involvement of users in the product development is a prerequisite for successful UX design. However, resources for involving users in the development process may lack in startups as even established companies struggle to prioritize such activities (Ardito et al. 2014). For the validation stage, a startup can benefit from very light-weight methods such as quick interviews and user tests. To motivate user participation, personal connections are effective and also compensate for lack of quality of prototypes and early product versions. As the volume of the customer base increases, user involvement activities can utilize data and different forums to reach users. Furthermore, the startup should be more aware of their target users when they have established the product/market fit. Moreover, more thorough understanding of users' needs can be attained, complemented with more user testing, when the target market is not as likely to change. (P6)

Summary of the UX strategy model. The UX strategy model for supporting NBD in software startups offers guidance for UX creation in startups. It presents a model that is framed based on the current knowledge on software startups, and their needs for UX. The UX strategy model regards the important aspects of UX creation in terms of user involvement and design. However, it also proposes a strategic UX goal setting that supports startups' NBD, mainly in the phase of validating a product or business idea, and in the phase for scaling the business once a lucrative business idea has been validated. The UX strategy model is intended to be utilized in startups for focusing UX work, and for setting efficient UX goals, appropriate for the startup lifecycle phase. Regarding the definition of UX strategy in section 2.1 and the strategy aspects of perspective, plan, and position (Mintzberg 1987), the UX strategy model provides a *perspective* – shared by the members of the organization – by UX goals that members of the startup team share and commit to. Moreover, the UX strategy model provides a high level *plan* for UX work during the phases of validation and scaling. The UX strategy as *position* – how a startup sets externally and allocates resources internally – is regarded in the model by providing guidance on where to focus resources for UX creation.

5 Discussion and Conclusions

The contributions of the thesis are first discussed, relating to theoretical and practical implications. Second, the research validity is discussed relating to the qualitative nature of the studies. Then, in the third section possible directions for future work are presented. Finally, conclusions for the doctoral thesis are made.

5.1 Contributions of thesis

Contributions of this thesis include both theoretical and practical implications.

Theoretical implications. This doctoral thesis contributes to adding knowledge to the UX literature relating to new business development in software startups. As literature on UX and startups remains very scarce, this thesis provides valuable results in describing startups as a context for UX creation. Moreover, the thesis presents new results on the role of UX for software startups as well as beneficial practices for UX creation in startups. The thesis contributes mainly to the field of human-centered design while also adding to the scientific literature relevant to software engineering and new business development in startups.

The main theoretical contribution of this thesis is the UX strategy model for supporting NBD in startups. The model is based on acknowledged startup lifecycle stages (Ries 2011) as well as principles of HCD (ISO 9241-210: 2010) including involving users during different phases of development as well as an iterative approach for ensuring answering to users' needs. Moreover, the model proposes a view for UX creation by explicitly including aspects of value creation for both users and business development. Also, the MVUX framework presents a set of UX elements recognized to benefit the early business validation needs of startups. Moreover, the MVUX framework can contribute to UX strategy as it provides a tool for focusing early UX goals to support the idea validation phase. While the UX elements of the MVUX framework correspond to startups' needs for

UX that support advancing product and business development activities, the framework also aims to result in product versions that provide meaningful experiences to users. Through addressing the elements of MVUX framework, the startup will build an early product version that enables users to understand the true nature of the product. This will further ensure that the user feedback is realistic and trustworthy. Furthermore, users have a possibility to gain a sufficient level of value to be satisfied with the product and use it again.

To further develop the theories of NBD and software startups, this thesis adds to the literature by presenting factors affecting UX work in software startups, and also beneficial practices of UX work in software startups. As software startups need to regard and prioritize all aspects of NBD with limited resources, understanding the different practices of UX work enables more efficient prioritization in startups. This thesis connects UX to creation of new products and business in startups and recognizes the value that can be achieved through efficient UX work.

Practical implications. Practical implications of this thesis are in providing insights to UX work in startups. As the role of UX for startups is understood better, startup entrepreneurs can make more informed decisions to include or exclude activities of UX creation. Moreover, this research also recognized unsuitable practices for startups, and avoiding them saves time and resources from software startups.

While UX design practices for startups have been presented in non-scientific literature (Klein 2014, Gothelf 2013), this thesis provides an overview on the matter in the form of the UX strategy model. The strategy model provides insight for focusing the UX activities in a way that provides benefits for both product and business development in startups. The model can be utilized together with practices of user involvement, user tests, and design, proposed for startups in the literature. Moreover, the MVUX framework can be used to set UX goals but also as a “check-list” to evaluate product versions within startup teams.

5.2 Usage of the UX strategy model

In this thesis, a UX strategy model for supporting new business development in software startups has been proposed. The UX strategy model was developed based on the results of the empirical studies amongst a number of startups. Startup entrepreneurs had a vision for UX of their products and services but lacked plans and strategies for creating a meaningful UX. Moreover, focusing the scarce resources on conducting UX work that provides the most value to startups at their current business development stage was found challenging. For example, applying robust methods for gaining information on users and their needs required time while providing little value due to changes occurring in product or market focus.

Developing a UX strategy model for startups advances the literature on UX creation in software startups. However, the model is also intended to be of use for practitioners. Because startups are known to often operate in a reactive manner without established processes (Sutton 2008), the model does not propose a strict process for UX creation. Instead, the model presents high level targets for focusing on selected UX goals as well as activities of user involvement and design. Based on the initial validation of the model with the S4 participants, the proposed UX strategy actions can provide clear and sensible advice to the entrepreneurs.

In its current form, the UX strategy model may require facilitation of a UX expert for efficient planning of UX strategy activities. One option would be developing a tool based on the strategy model to support startups' UX creation. Furthermore, for easier utilization of the UX strategy model, additional information on conducting UX strategy activities could be provided together with the model. For example, as startup teams may not possess skills or previous knowledge on effective interviewing, some guidelines could be given to achieve better results. Moreover, to support reaching UX goals, information on visual components or interactions that support the creation of specific experiences would also be helpful. On a general note, educating startup teams to be more user-centered, and being able to conduct light-weight UX methods could also be beneficial, as reported from more established company by Liikkanen et al. (2014).

5.3 Discussion on research validity

The research quality is assessed in terms of credibility, transferability, dependability, and conclusions confirmability due to the qualitative nature of studies (Guba 1981).

No major threats to **credibility** were identified. *Triangulation* was utilized in comparing data from multiple startups within each study. Also, study participants possessed a variety of different backgrounds for both education and work experience. However, background in technology and engineering were the most common as in technology startups in general. Moreover, multiple research methods – interviews, surveys, observations – were utilized to provide rich data. In studies S2 and S4 the participants, themselves wrote down e.g. mind maps for UX vision and goals, thus the studies are less prone to interpretation error. In S4, a *prolonged engagement* was used for the author to build trust with the participating startup teams. Moreover, the author became acquainted with team composition as well as the business domain of each startup, and could thus appreciate startups' specific needs.

Regarding the **transferability** of the results to other contexts, this doctoral research was conducted mainly with small Finnish software startups. Furthermore, majority of startups in S1 and S2 were involved with the same incubator ecosystem. Moreover, these startups teams had received training and advisory from the same people which can affect their views on entrepreneurial practices. The

descriptive findings are considered transferable to similar startups. However, the personal characteristics may reduce the transferability of the results as entrepreneurs personally affect how startups operate. In addition, when transferring the resulting UX strategy model to other contexts, business domain, product type and the user must be considered. Transferability of the UX strategy model to other than software startups should be further analyzed and validated with other startups.

Threats to **dependability** include that the studied startups of all four studies did not form a random sample, but instead a convenience sampling was utilized. However, in studies S1 and S2 open sampling method was utilized and new participants were recruited after interviewing the previous one to increase variation in the sample. While the majority of studied startups were of Finnish origin, this doctoral research increases the richness of related research that has been conducted, for instance, in Ireland (Coleman and O'Connor 2008), in Italy (Giardino et al. 2016) and in Ecuador (Sánchez-Gordón and O'Connor 2015).

Finally, threats to **confirmability** include that only one person – the author of this thesis – planned, conducted, and analyzed all studies. The author, however, reflected with other researchers in each of the studies in planning, execution, and analysis phases. Results and their respective analysis process of each study were also audited with other researchers. This continuous triangulation over the course of the whole research enabled multiple views in forming the results.

This research provided new knowledge for the area of UX creation in software startups. To establish validity of the MVUX framework and the UX strategy model, further research is needed. The MVUX framework was used as part of S4 and it offered guidance for goal setting and regarding UX design decisions in startups. The main benefit of the framework was to enable discussion and setting shared goals for the startup team to use. Moreover, the model emphasized focusing on the most important UX elements as achieving even them was challenging in startups even though entrepreneurs first wanted to set more goals. Furthermore, the benefits of UX goal setting would require returning to them and refocusing as needed. However, the framework is based on data from mainly Finnish startups, and thus can contain cultural limitations that did not hinder its usage as it was utilized by Finnish startups. In addition, the elements have not been defined unambiguously and thus require the startup team to discuss how they perceive the meaning of each element.

5.4 Future work

Scientific literature on UX creation in startups remains scarce and thus this doctoral research could not build directly on existing theory. However, this doctoral research provides new knowledge on the subject and can be used to further advance research aiming to better understand how good UX can be effectively utilized in creating new business in software startups. The future work on themes of UX creation in startups requires studying larger sets of software startups. Furthermore, research

should be extended to multiple geographical locations. Based on this research, two main areas of future work were recognized. First, the established UX strategy model requires further validation, including validating the MVUX framework. Secondly, research for further understanding the role of UX in the success of startups is needed.

The validation of the UX strategy model requires further studying. The relating literature regarding UX, software engineering, and NBD was used in building the UX strategy model. However, more validation is needed to conclude if it contains all necessary elements, and to establish its usefulness for practitioners. Testing the strategy model in multiple startups over a period of long time will be one of the future research activities. Moreover, the UX strategy model could be tested in company ventures or internal startups that utilize a lean approach but can have access to more resources. Developing further tools and methods that complement the high-level strategy actions presented in the model would be beneficial. To further improve the usability of the strategy model, guidelines for practical deployment of each element should be defined. Initial validation with entrepreneurs however resulted in positive reception. As UX depends on the cultural background of users, cultural dependency of the model needs to be assessed. This is also relevant for further validating and possibly developing the MVUX framework. Furthermore, methods for defining elements of lovable UX that provide competitive advantage were out of the scope of this thesis, and require further research. More data from different cultures and business environments would enable seeking to generalize the results to further develop methods and practices that are suitable for startups

The Lean startup method (Ries 2011) was embraced by incubators and university entrepreneurship programs (York and Danes 2014). However, the level at which it was implemented remains uncertain as well as benefits gained through the Lean startup method. As the startup ecosystems mature, it is natural that the means for building new business change. The model we presented adopted some ideology from the Lean startup, and it should be changed as the startup ecosystems change and practices evolve.

The role of UX to startups' success is difficult to measure. Research for investigating startups in retrospective of their success or failure could reveal the role of UX in different ways. Also, long term follow-up studies would provide useful data to better map the different needs for UX in different business domains or when adopting different business strategies for NBD. Understanding the role of UX for successful new business development in startups would enable better strategic decision making in startups.

Future work should also include developing practical tools for startups to reach a meaningful UX. The possibility to provide guidance and strategic perspective for UX work could improve the performance of startups, especially if they do not have any expertise in their team for it. Useful tools or ways to provide affordable guidance through a platform with UX professionals could be further studied and developed.

5.5 Conclusions

The four studies of this doctoral research provided new knowledge on UX creation in software startups. All together data from 40 software startups was used to answer three research questions on the role of UX in startups, beneficial practices for UX creation in startups, as well as defining what UX strategy would be suitable for startups. The main contributions of this thesis are the added knowledge of UX creation in startups – specifically the beneficial practices for UX creation and understanding the role of UX for startups, the Minimum Viable UX (MVUX) framework to guide early design decisions in startups, and the UX strategy model for supporting NBD in startups.

Software startups have specific challenges due to the lack of resources and time pressure while building highly innovative products and services. Startups benefit from successfully creating UX that provides value to their nascent business as well as for their newly formed customer base. However, in early phases of business and product development startups need to focus their resources in activities generating the most value to develop a startup further. The role of UX in startups is characterized by enabling effective testing of business ideas with real customers and users, thus the Minimum Viable UX needs to be ensured rather than creating delightful experience over long time usage. As startups find a promising product concept, developing UX can start bringing value with more satisfied customers. Moreover, when a startup seeks to grow exponentially, being able to create lovable UX brings competitive advantage. The UX strategy model developed in this doctoral research guides UX creation in startups for actions related to UX goals, design decisions, and user involvement. The added knowledge of UX creation in startups contributes to fields of HCI and software engineering. It provides insights for both academics and practitioners to better understand the nature of UX work, and needs for it, in software startups. The results can also be used to support startups' entrepreneurship and new business development.

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P1.

**UX WORK IN STARTUPS:
CURRENT PRACTICES AND FUTURE NEEDS**

by

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UX Work in Startups: Current Practices and Future Needs

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Abstract. Startups are creating innovative new products and services while seeking fast growth with little resources. The capability to produce software products with good user experience (UX) can help the startup to gain positive attention and revenue. Practices and needs for UX design in startups are not well understood. Research can provide insight on how to design UX with little resources as well as to gaps about what kind of better practices should be developed. In this paper we describe the results of an interview study with eight startups operating in Finland. Current UX practices, challenges and needs for the future were investigated. The results show that personal networks have a significant role in helping startups gain professional UX advice as well as user feedback when designing for UX. When scaling up startups expect usage data and analytics to guide them towards better UX design.

Keywords: user experience, startup, lean

1 Introduction

A startup is a team of people that try to find a scalable business model, and is also defined to be only a temporary organization [3, 17]. Startups are getting a lot of attention and are seen as a way to create new opportunities for work and business. Startups offer an interesting domain for research to understand what methodologies and ways of working are helping the success of these small teams with limited resources. Startups work in a fast-changing environment and what matters to UX work is that they do not have the possibility to spend a lot of time working on design when the whole product might still change significantly.

Software development practices in startups have gained some attention [16] but research on UX practices is lacking. The traditional approach to UX design based on the principles of human-centered design [10] has a lot of upfront work before starting the implementation. Some books [12, 8] have been written to offer tools for UX design in lean startups but the past academic research is limited to some case descriptions with UX practices [15, 18].

Research that would recognize the best practices for UX work in startups is missing. It could offer valuable information on how startups could optimize the

resources put to UX work for creating UX that would enable growth. It is also of interest to understand if these ways of working are transformable to be used in established companies when they need to innovate fast. This paper presents the results of our research that aimed to understand the role of UX work in startups developing ICT products. UX work includes user needs gathering, designing UX and user tests for feedback collection. Designing UX covers both choosing the right functionality and designing the user interface for the product. In this research we wanted to understand (1) what practices startups currently have for UX work, (2) what challenges startups have in UX work and (3) what kind of needs the startups expect to have regarding UX research and design in the future when they scale up.

To address these questions, we conducted an interview study with eight startups on their approaches to UX work. As a conclusion, we will propose implications for startups on how they could incorporate UX practices in their product development. The results can be used to further investigate and develop UX practices that would help startups succeed.

2 Related Work

Previous research on the specific topic of UX work in startups is very limited. In this section we briefly go through the related work on UX practices in industry, lean UX and product development in startups.

2.1 UX Practices in Industry

Practical work towards good user experience – often also referred to as usability – is rooted in human-centered design (HCD) approach, as defined for example by the ISO standard [10]. This approach emphasizes upfront user research and design activities, strong user involvement, iterative design and multifunctional design teams. While such approach has been well adopted in the research of user experience, industrial product development projects have often used more limited practices.

In their survey of user-centered design practice in industry [20], Vredenburg et al. found out that iterative design is a widely used approach and that usability evaluation is the most commonly adopted user-centered method in industry. Analyzing user tasks and conducting field studies were also often used in user-centered design. A survey by Gulliksen et al. [9] conducted in Sweden revealed that usability professionals appreciated low-fidelity prototyping, field studies and think-aloud tests with end-users the best methods to use. The survey furthermore indicated that management support is essential for the usability professionals and that user involvement often has low priority in the projects. In a more recent study in Italy, Ardito et al. [1] found out that that several companies still do not conduct any form of usability evaluation, because they require a lot of resources in terms of cost, time and people. The advantage of usability work for the usability of software was still clearly recognized in the studied companies.

In summary, while the value of user experience work is in general well understood also in industry, it is still often neglected when other pressures of product development are considered to be more important.

2.2 Lean UX

Lean development is used to describe a philosophy that concentrates on removing waste from the process while delivering value to customers. It started with manufacturing but has since been adapted to many other fields as well. One of these adaptations is the concept of Lean Startup that emphasizes fast learning with small risks while building new businesses [17]. Academic research on the topic is very scarce.

Lean UX book [8] identifies three parts for the Lean UX philosophy: the design thinking movement, Lean startup method [17] and Agile software development. Lean UX aims to produce a product extremely fast and with little resources but without compromising the customer satisfaction. According to Gothelf [8], Lean UX applies the four principles of Agile development to product design [2] and 15 principles for Lean UX. The Lean UX Manifesto [19] was published in early 2014. It was composed by collecting ideas from UX professionals including and forming them into a list much like in the Agile manifesto [2]. The Lean UX manifesto [19] has six principles: (1) **Early customer validation** over releasing products with unknown end-user value, (2) **Collaborative design** over designing on an island, (3) **Solving user problems** over designing the next “cool” feature, (4) **Measuring KPIs** over undefined success metrics, (5) **Applying appropriate tools** over following a rigid plan and (6) **Nimble design** over heavy wireframes, comps or specs.

The use of lean principles in UX work has been reported by [15], [14], [5]. [14] and [5] report positive overall experiences when adapting lean philosophy in established companies. May [15] reports a case of a startup where experienced UX designers were involved. She emphasizes as one of the lessons learned the early planning of UX, design and customer validation. May [15] also stresses continuous testing in every step of business idea and product development.

Agile-UX methodologies have been studied more thoroughly [11] than Lean UX. The academic research on Agile-UX serves as a basis for Lean UX research. Different aspects such as making the UX work more efficient while also paying attention to management and sales aspects [13] should also be understood in startup context.

2.3 Product Development in Startups

The term startup is used inconsistently [16] but some characteristics have been recognized to be common in describing startups. Giardino et al [6] have listed recurring themes in software startups such as lack of resources, innovation, rapidly evolving, small and low-experienced team, and time pressure. The product development is there by effected by these factors. The constant change makes the processes in startups evolutionary and software development practices are adopted only partly and in later stages [16]. Members of a startup team are often able to have

different roles and affect significantly the outcome of product development. The background of persons involved in creating the software development process influence the most the adopted process [4].

The Lean Startup method [17] suggests startups should base their activities on validated learning with constant cycles of Build-Measure-Learn (BML). Experimenting ideas with little risk involved helps the startup reach a sustainable business model. With experimentation, a startup should be able to find the right problem/solution fit. Giardino et al [7] report that the learning seems to slow down when awareness of competitive environment increases.

3 An Interview Study of UX Work in Startups

The aim of this research was to gain insights of the current practices and future needs of startups in their UX work. We interviewed 11 participants from eight startups. The qualitative research was conducted in Finland over a period of two months (October-November 2014). In this section we first describe the startups that participated in the interviews and then the research methods used.

3.1 Participating Startups

Eight startups operating from Finland participated in study. Two of the startups had team members also in other countries. Altogether 11 persons were interviewed - in three startups two persons participated in the interviews. The interviews were semi-structured. We aimed at having startups at different stages, and with different products and markets. The participating startups were required to have a software component in the product or service they were developing. The startups were found through a local startup community by advertising the interview request them and by asking the participating startups to recommend other teams that might be willing to take part in the interviews. A summary of the startups is presented in Table 1.

Table 1. Summary of the startups

Startup	Interviewees	Company established	Size of startup	Product
SU1	H1 (CEO), H2	2014	3	Web service
SU2	H3	2014	3	Mobile app
		(To be established)		
SU3	H4 (CEO)	2013	3	Mobile app
SU4	H5	2013	5	SaaS
SU5	H6 (CEO), H7	2014	3	Web service
SU6	H8 (CEO), H9	2014	3	Web service
SU7	H10 (CEO)	2014	4	Software
SU8	H11 (CEO)	2013	3	Mobile app

We interviewed CEOs from six startups (SU1, SU3, SU5, SU6, SU7, SU8). From SU4 we interviewed the person responsible for online marketing, user analytics and

customer acquisition. SU2 was not yet officially founded and we interviewed the inventor of the business idea. Four startups had people with experience or training in human-centered design (SU3, SU4, SU6, SU8). The size of startups varied between 3-5 people and five startups (SU1, SU4, SU5, SU6, SU8) had had someone leave the company since they started. Startups were small enough for everyone to know what others were doing and interviewees were able to answer questions about all the activities of the startup, not just about their own.

All the startups but SU8 had started with a different product idea than the one they were currently developing. Startups SU2, SU3 and SU8 had a mobile application as their product. Startup SU7 offered a technical solution that did not yet have a visible user interface. Other startups (SU1, SU4, SU5, SU6) were offering SaaS or web applications.

3.2 Method

The semi-structured interviews consisted of three parts. The first part was about understanding the business and product ideas, the team structure and the current stage of the startup. The second part of the interview was about the practices involving understanding the end user, user data collection and designing UX. This part also covered the challenges they had in these fields. The last part of the interview was about the future of UX practices and needs when scaling up. The interviews lasted 45-90 minutes. The interviews were done by one researcher and they were all recorded. One of the interviews (SU3) was conducted over Skype using a webcam. The recordings were then transcribed for analysis. Altogether, the data consisted of 71 pages of transcribed interviews. The analysis was done by iterative thematic coding of the qualitative data. The themes were formed into the main sections of the results, and populated with subtopics and individual findings from the data.

4 Results

The results are presented in three parts. The first part describes the current practices the startups have regarding understanding user needs, collecting user feedback and designing UX. The second part presents the challenges the startups have faced when collecting meaningful information about end users and designing for them. The last part addresses the needs that startups have for future and their plans for UX work.

4.1 Current Practices

Understanding User Needs. Interviewees from five startups described the product to be a direct solution to their personal needs (SU1, SU3, SU4, SU6, SU8). One startup

(SU5) based their design on what they assumed the average user of the product to expect.

Startups used personal contacts and unofficial discussions to gain feedback about the product idea and the product design. Friends were mentioned as a reliable source of feedback (SU2, SU3, SU4) since the interviewees believed them to give honest feedback instead of only complimenting out of courtesy. The problem with testing the product and seeking feedback from friends was that they were not always the real users of the product so their opinions of the content were not seen as important. Other startups, investors and experts of various fields, including UX design were part of the local startup community and were used to get feedback and ideas. Discussions about how other people perceived UX of competitors' products also motivated some startups (SU1, SU2, SU5) to put effort in differentiating with better UX.

Interviews to understand the needs of users and the context of use were conducted by five startups (SU02, SU04, SU05, SU06, SU08). The interviews were done for different purposes. Startup number SU2 had interviewed friends in a very light way to understand their current use of possible competing products whereas startups SU4 and SU8 had done thorough interviews with 15 potential users. Startups SU6 and SU7 had interviewed possible business partners but had not reached end-user customers before starting the implementation.

Gaining Feedback. Startups used a wide variety of practices to gain feedback. The summary of used practices is presented in Table 2. Three startups (SU3, SU4, SU8) had **test users** for their prototype or beta version. Test users used the product the way they wanted or with some instructions but specific tasks were not given to them. Startup SU3 used friends (15 people) and potential end-users (15 people) found by visiting Meetup.com group meetings as test users. Startup SU8 had two test users who had the health condition their application was designed for. They were found from a support group. Startup SU6 had made a pilot with a partner that provided users for their online training. They collected feedback of the content with a survey but were not able to interview the participants. They also did a pilot with a master of psychology thesis worker who did research with real users and provided more qualitative feedback with open answers of a survey.

Startup SU4 had started by creating a **paper prototype** of their product that other startups could use in the common space the startups worked in. When they had a working prototype had made a campaign on betalist.com, a site for finding new startups. Through their campaign they got 500 signups for their beta version. Also startup SU6 had used paper prototypes to present their idea when interviewing potential business partners. Startups collected feedback from test users by email, surveys, Facebook page created for test users and informal discussions.

Log data and statistics collection was implemented in the product by startups SU1, SU4 and SU6. They all used Google analytics. Startups SU4 and SU6 used also Mixpanel. Analytics was used to understand from where people came to their site and how they interacted with the product. Startups SU4 and SU6 utilized data systematically during their product pilots. SU4 also followed how the behavior changed when the product version changed. SU6 had analyzed what kind of behavior lead to a positive feedback from users. Startup SU1 followed analytics occasionally.

Startup SU5 used **market research** to understand the target market and the expected users. They had read about statistics from other countries on services that were similar to theirs. The assumption was that Finland, as a market would be following the same trends. They did a survey with potential partners about the concept they had planned. They estimated the average user to be similar to whom it was in other countries' markets but did not conduct any user research. *“Until we have a working prototype of our product no-one is interested in us and we can't get useful feedback.”* (H6)

Table 2. Practices used to gain user information and feedback

Practice or method	Startups utilizing the practice
User interviews	SU2, SU4, SU5, SU6, SU8
Surveys	SU4, SU6
Paper prototypes	SU4
Personal need for the product	SU1, SU3, SU4, SU6, SU8
Test users	SU3, SU4, SU8
Expert advice	SU6
Online user communities (eg. forums, Facebook groups)	SU7, SU8
Log data and analytics	SU1, SU4, SU6

Startup SU6 had strong background in research on interactive technology and online training from which the product idea had come from. They also had experts of psychology working part time in their team. Experts gave advice and reviewed the product from a non-technical viewpoint.

Startups SU1 and SU8 had people who were very interested in their product and wanted to help them in making it better. SU8 had recently created a Facebook page for these people to share ideas on features and give comments on design ideas. SU1 was planning how to connect with these people and make it possible for them to help improve the product but also market it.

Practices for Turning User Feedback to UX design. The roles of team members were mostly described to be vague and that they evolved. Tasks were divided among team members based on skills and personal interests. The product development processes were different and not systematic for the startups. Startups SU4 and SU6 described having a leader for the product development. Two startups described having two week sprints. Four startups (SU1, SU3, SU6, SU8) described using a backlog to collect their ideas and tasks. The startups did not have a specific process for making design decisions or transforming user feedback into design rationale.

Startup SU4 was the only startup that had clear UX goals. They had used the information gained from interviews to create user journey maps. They had defined emotions that the user should get from the product and design was made to meet those goals. Other startups could describe a vision for the UX they were aiming at but had not written them down. The common idea was to build something and then collect feedback or log data to see if the product was good. *“Now we try to only do the things that either totally make sense or that people are complaining about.”* (H1) Startups SU1, SU2 and SU5 used UX designers from outside the startup to get feedback and

ideas for the user interface. These UX designers were acquaintances of startup founders and helped them for free. *“We are such a homogenous team that we need to seek advice from people from other fields.”* (H7) Interviewee H7 mentioned that even though not all the ideas from designers were realistic to implement they helped in thinking differently and in gaining new perspective.

All the startups had had a lot of ideas for the product they were developing. They needed to decide what they would be able to implement with the current resources. Prioritization of features was discussed with the whole team. Ideas and issues that were commented on repeatedly by users caused four of the startups (SU1, SU3, SU4, SU6) to modify the product. Interviewee H11 said that in the end he decided what was implemented to the product based on what was important to him as a user. Startups SU6 and SU8 described the qualitative data from interviews and surveys to be very valuable although they did not use it continuously when developing the product. They described returning to it occasionally.

Startups SU3 and SU4 were implementing in their pilot only the features that enabled the user to do two core actions while leaving everything else to later versions. Prioritization was done by intuition and not by systematically evaluating which features produce most value to users. *“Basically what we’re working for now is the launch. And anything that gets us closer to that is our priority. Unless there’s a fix or a fire we have to put out.”* (H4)

4.2 Challenges with Gaining Feedback and Using It

All startups told they had had challenges in collecting meaningful information from users or customers. Interviewees from startup SU4 said that they would not know what to ask from people. Startup SU4 was receiving positive feedback from discussions with users but they were not gaining many new users. *“I don’t know what data we need and I don’t know how to ask questions. So I think there is a bit of challenge.”*(H1) Interviewees from SU6 wondered if they were getting overly positive feedback since their product was the first one to help the users with the specific problem. They would have wanted constructive feedback to be able to improve the UX. Startups SU3, SU4 and SU5 said that they needed more users to be able to collect meaningful feedback and data about their current version of the product. SU8 told that they had gained 80 people signed up to be interested about their product but they were not prepared for it and could not utilize this user pool due to being so busy with other things. Limited resources affected all the startups and they needed to divide their time to balance between product development and business creation while still trying to learn if their focus was on the right product and market.

The product concept had changed for startups SU4 and SU6 after they had already conducted user research. The target market and end-users changed which resulted in them having user information that was not valid anymore.

Reaching the potential end-users in the planning phase was difficult for startups SU4, SU6 and SU7. Startups SU4 and SU7 were aiming to B2B markets so they were mainly discussing with customer representatives. Startup SU6 had problems to reach end-users because the product was targeted for people suffering from social anxieties

and they did not want to be interviewed. Even though SU6 could not directly reach the end-users, they managed to get feedback with a survey and through people who worked with the people from the challenging target group.

Startup SU3 described having major technical challenges in getting test users to download their application. The tool they used to distribute the application that was not published required multiple steps from them and from users. The interviewee H4 estimated having lost hundreds of test users due to technical difficulties after having personally asked them to become test users. He also described that while some users gave in depth feedback with some test users he had to remind them to keep using the application and give feedback more than once. *“Especially the friends, they use it once and then I have to prompt them to try it again.”* (H4) SU8 mentioned that if they had found the online forum where their users interacted earlier it would have saved a lot of time.

The use of log data and analytics was challenging for startups SU1 and SU6. They had implemented the collection of statistics but were not gaining as much insight from it as they would have wanted. Startup SU4 was using data systematically to evaluate the behavior of users but they still found it difficult sometimes. *“The most challenging part is finding the meaning of data when it does not explain the reasons [behind actions]. And if we make wrong guesses then we won’t learn.”* (H5)

The challenges included finding relevant users for user research and testing, and having the right methods to get meaningful information. The interviewees did not mention having special difficulties in the actual UX design. In user tests, the product and UX need to be good enough for people to get some value. Startups SU1, SU2, SU3 and SU4 needed users and user-generated content in their product or service for it to bring value to users. This proposed a problem on how to generate enough content for the launch so that even the early adopters would gain enough value to keep using the product or the service. When the product relies on user-generated content it makes user testing difficult since the users might not be patient enough to wait for content to be created. Startups may not have enough resources to drive the creation of such content in the early phases of product launch.

4.3 Needs for UX Work when Scaling Up

Startups that participated in the interviews were in different stages in their business and product development. When talking about the needs for UX work they would have in the future the answers varied. Startups SU3 and SU5 were preparing to launch the first public version of their product within a month and it was their first priority. They both mentioned that having perhaps one more person working on development and UX would be helpful but that they could also manage without one. They trusted that they would get enough user data after the launch which would then help them to improve the product. However, they did not have a clear plan on how to collect and analyze the feedback and data. *“The challenge with end-users might be that they just leave the site if they don’t like it. We would need to know what made them leave.”*(H6)

All the startups that currently did not collect log data and analytics (SU2, SU3, SU5, SU7) were planning to collect it from the upcoming versions of their product.

They believed that it would enable them to understand users and react to it by improving the product. None of them had clear plans on how to gain insight from data but they trusted the tools available to help in it.

Startups SU4 and SU7 were preparing for a pilot with a B2B customer. They were expecting to get a better understanding of their customers and the user groups with the pilot. Since they had no direct contact to the end-users, the collection of usage data was seen as the best way to learn from the users. Startup SU7 hoped to build trust with customer so they could later be in contact with end-users.

Startup SU6 was next planning to build a product for a new market outside of Finland. They estimated needing more background information of their users to understand them in the new market. This information would be, for example, the socio-economic background, how they heard about the product and what motivated them to come to the site.

The most common future vision regarding understanding users was collecting log data and analytics. Primary reason to collect data for SU3 was creating revenue with it by selling the data. As for feedback channels, SU4 was planning to implement a user support portal. SU1, SU3 and SU8 wanted to better utilize the people interested in developing the product with them. None of the startups mentioned currently having plans to conduct end-user interviews. Surveys were seen as a possible way to collect feedback in the future but none of the startups had planned them for now. In general, the startups did not have a clear strategy for future UX work.

5 Discussion and conclusions

The eight startups that were interviewed provided valuable insights of UX work practices that can be useful and feasible to conduct in the startup context. The startups that had human-centered-design knowledge used a variety of ways to collect information on end-users. Some of them had conducted interviews, surveys and experimented with paper prototypes. This is in line with Coleman's [4] observation of software development processes which concludes that the background of people inside the startup has the biggest influence on how processes are formatted. These startups sometimes felt that they were not using the information as systematically as they could have but it still provided them support when they needed it. According to the interviewees, going back and reading the qualitative data was a good way to find ideas. Startups with no knowledge of human-centered design reported having difficulties in collecting meaningful information about users due to not knowing what to ask from users. Since the developers in startups are empowered to affect the UX design, one option could be educating them to basic user research methods like in [14].

UX work in startups needs to balance with different aspects. On one side, user research and testing need to be done as early as possible while at the same time the product, users and market might still change. In addition, the product that is tested should be minimally implemented but have enough features and UX design to keep the test users motivated to use it. This is relevant especially in products that require many users or user-generated content to provide value.

The limited sample of startups in this study does not represent all kinds of startups. From the interviewed startups, four had an international team working for them but they were still operating from Finland. Also, all but one (SU3) were interacting and exchanging ideas with the same experts and investors within the local startup community. For more thorough understanding and generalization of the results, more startups should be investigated from different market sectors and locations. Further research with a larger number of startups over a longer period will help determining more profoundly what kind of UX practices best serve startups. Still, this study has provided new knowledge on how the startups approach different aspects of UX work and what challenges they face.

Startups should recognize the importance of UX when they are planning to enter markets with new, innovative products. Based on our research we suggest that startups would benefit from:

1. Having skills for user information gathering and analysis. This enables them to get more meaningful information and see past the generic feedback.
2. Applying lightweight methods for quick interviews, surveys and user tests that address questions arising in different stages of the startup's product development.
3. Putting effort in finding the right users for research and testing purposes, beyond the personal networks. This user base should be heterogeneous enough to present the user group and not just the early adopters. The size of the user base should be manageable to keep contact for a longer period of time and different product versions.
4. Preparing for the feedback and data that they will get. Log data and statistics might be challenging to analyze. Resources should be targeted in collecting what can be used afterwards, and for the analysis itself.
5. Creating UX strategy that would help keep focus and steer the product towards the wanted UX.

Addressing these issues from the very early phases of the product design and development will help startups create successful products with delightful user experience.

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P2.

THREE PATTERNS FOR USER INVOLVEMENT IN STARTUPS

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Three Patterns for User Involvement in Startups

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Creating products in software startups consists of a great deal of uncertainty combined with little resources. Rapid validation of created solutions with the potential customers is essential to startups. However, often startups lack people with skills needed for the validation. We present three patterns that help in involving users to gain meaningful feedback and learning. First, the feedback has to be gotten from the right people and the right questions have to be asked. Furthermore, if the feedback is collected with a prototype, often called a Minimum Viable Product, users should be able to give feedback of the actual idea, not to any roughness caused by the immaturity and the prototypishness of the product.

Categories and Subject Descriptors: **K.6.3 [Management of Computing and Information systems]:** Software Management – *Software process, Software development*

General Terms: Software Engineering

Additional Key Words and Phrases: Startups, Lean, User eXperience

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1. INTRODUCTION

One of the essential things that a startup needs to do from early on is to validate that their business idea is worth of continuing with. People in a startup usually already believe in their idea as they have seen it as worthwhile to spend some effort on. However, the outside world may hold a different view. Thus, a startup needs to get feedback and measurable proof of the value of the idea from outside of the startup.

However, startups are usually a small team of people that forms based on familiarity, common background, pure chance, but usually not by a rational selection of a balanced set of talent. Yet these startups are trying to create new business and tackle all aspects of it. Research shows that team members' background has the biggest role in how processes are formed in software startups (Coleman and O'Connor 2008). After being introduced in 2011, Lean startup method (Ries 2011) has been adopted by many incubator and university entrepreneurship programs as well as practitioners worldwide (York and Danes 2014). Lean startup suggests that validated learning in iterative cycles offers help to combat the uncertainty of entrepreneurship in smaller portions, ultimately leading to success. Even though startups may utilize the Lean startup methods (Ries 2011) which emphasize getting out of the building and validating with real people, it might be worthless if they lack skills to gain meaningful feedback like stated in (Hokkanen and Väänänen 2015). In this study, it was found that having people with training or experience in human-centered design (HCD) or user experience (UX) design helped the startups in getting meaningful feedback. People with HCD expertise were able to use different ways to collect information about their potential users.

However, many startups lack this kind of people. To make matters worse, the people in startups are usually living under constant pressure to rapidly develop their product and business model and, thus, people have very little or no time to learn new skills, such as the ones related to HCD and UX. To mitigate this problem, we describe three patterns for user involvement in startups in this problem. The patterns are

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meant for entrepreneurs and employees of startups that need strategies to efficiently involve end users to experimental product development and business idea validation.

In the next section we will describe the background of this work along with related theory. In section three the three patterns are presented: ONLY REAL USERS, MEANINGFUL USER FEEDBACK and HAPPY TEST USERS. Finally, in the last two sections we recap the paper in Conclusions section and give Acknowledgements where due. Throughout the paper, we will follow the convention that all pattern names mentioned in this paper are written with SMALL CAPS. All patterns follow a certain format, closely resembling well known Canonical Form with some sections omitted. Following the pattern name, our format starts with the context, and then problem is described with bold font face. The problem is followed with forces which are resolved with the solution, which is the next section. The solution is complemented with consequences and related patterns. The pattern is closed with an example of a known use where the pattern has been encountered in the real world.

2. BACKGROUND

This paper has its roots in two studies in which we conducted 16 interviews in startups operating from Finland. The goal of the first interview study with eight startups was to understand the current practices and future needs for UX work in startups. The results on the practices and needs have been reported in (Hokkanen and Väänänen 2015). Later, eight more startups were interviewed to further understand the role of UX when startups are creating their first product versions to launch. Here, we present three patterns about user involvement in startups. These three patterns were formulated based on the recurring themes in the 16 interviews.

Startups have different phases in their lifecycle. Blank has described the four stages which are customer discovery, customer validation, customer creation and customer building (Blank 2003). Marmer's stages add two more to this (Marmer et al. 2011). Also Runhka and Young (1987) describe a funding stage model used by venture capitals. Lean startup has described three phases that are finding the problem/solution fit, then the product/market fit and finally the Scaling up phase. The patterns presented here are largely based on the Lean startup model and we present in Figure 1 a general outline of the phases. Our patterns concentrate in the phase after the startup has validated that a problem exists and solving it has potential for new business. This means that the startup is looking for the product/market fit and starts to build the product.

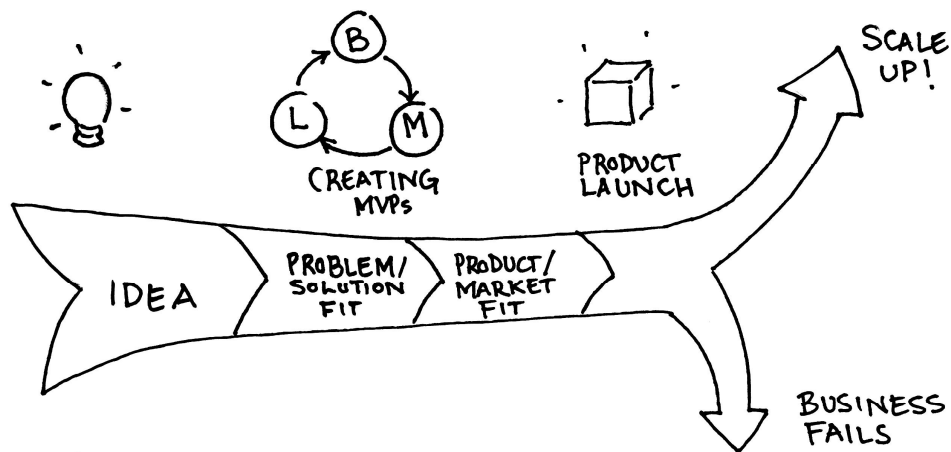


Fig. 1. Possible phases of startup's lifecycle adopted from Ries (2011)

A typical startup should try to find a scalable business model by implementing new ideas as products, letting them to be assessed by the actual (potential) users. From their feedback, the startup organization

should learn how to adjust their original idea or to make a business pivot and abandon the original idea altogether. This process is usually called Build-Measure-Learn (BML) cycle and startups should utilize it aggressively (see Fig 2).

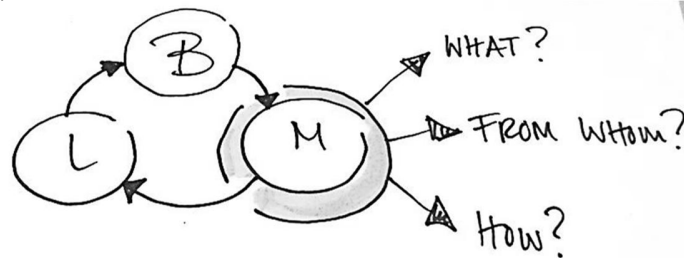


Fig. 2. Build-Measure-Learn cycle introduced by Ries (2011)

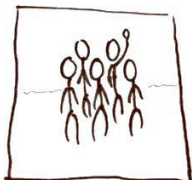
However, validation is some kind of a dark art as the implemented idea, or the potential product might have several different market segments and, to complicate things further, the concept of “typical customer” will change over time. This also makes the process iterative. The diffusion of innovations theory (Rogers 2003) states that new ideas spread through the consumer mass in phases. These phases are: innovators, early adopters, early majority, late majority, and laggards. These groups have different drivers for them to adopt the new technologies and ideas. The early adopters include usually technophiles, or people just having fringe interests which this new innovation may serve. Laggards are not usually interested in the technology itself, but only give in when the culture has changed due the new technology. One such example might be robotic vacuum cleaners, which have been first adopted by certain user profiles and are now becoming a commodity for the majority of the western homes (Sung et al. 2008).

Furthermore, HCD approach (ISO 2009) has introduced the iterative process for designing by learning from users and in the end validating if the decisions made satisfy them. More modern approaches to UX design, such Lean UX manifesto (Viviano 2014) does not require a lot of upfront user research and suggests understanding users is not only UX designer’s job. In startups, this is even more important since in small teams everyone has to understand the big picture. In addition, especially in the beginning there might not be anyone with background in HCD among the founders. Thus, these patterns presented here should help the startup to focus their efforts in the right market and not to fumble in trivialities. These trivialities include getting only bad feedback due to horrible user experience or to just conveniently validating the idea with those people who are already enthusiastic about the product prospects or are not willing to “keep you down” by giving honest opinion about the idea. Due to the iterative nature of gaining knowledge, the patterns presented here should also be used in an iterative way whenever a startup needs to validate their hypothesis or gain more knowledge from end users.

3. PATTERNS

In this section we present the three patterns about involving end users to startups’ idea validation and product development.

3.1 ONLY REAL USERS



Context

In startups, the product idea can change rapidly. Even when the problem has been recognized and evaluated to be worth solving there are still multiple ways to solve the problem.

Problem

When the product idea is still vague it can be hard to estimate who are the key persons to get feedback from, and how can you reach them.

Forces

Startups need to get feedback from potential end users, customers and other stakeholders to make decisions if their evolving hypotheses are valid or not.

Going Out Of the Building (GOOB), as is suggested in the Lean startup method, needs to also aim at finding the relevant people. Startups should carefully target interviews, surveys, and other information collection to people that are a representative sample of the market they aim at.

Early adopters and enthusiasts are just that, enthusiastic about your product. They may be generic technology buffs or just excited about to finally get a solution to a long-ignored problem. Thus, asking them provides feedback that does not represent the majority of targeted customers or users (critical mass).

On the other hand, early adopters can be more willing to provide comments and feedback.

Finding the relevant people without any connection to them can be hard.

Asking from friends, family, or the guy next to you is easy but they might not represent the real end users or customers. To make things worse, they might consciously give flattering feedback just to encourage you. On the other hand, asking trusted friends can also give honest feedback since they might be more prepared to tell you what you don't want to hear.

Continuous change in the product focus results in changing market segment, and feedback collection should be aimed accordingly.

It is attracting to use old feedback channels even after major changes in the product but they might not be relevant anymore.

Recruiting test users for a product can be done through agencies but it costs. A cheaper way to get people to test software products can be through online services such as Mechanical Turk. The problem is that the quality of feedback is not guaranteed and it is not possible select only the relevant test users.

Solution

Startup needs to select their initial target user group and create a channel to communicate with them. The focus needs to be on users that create business potential and need the product. It is a waste of time and resources to listen any others for feedback on the product. After the startup knows who the key users to their product are, the challenge is to reach the identified individuals.

Possible channels for finding the right people can be for example using a landing page for attracting interested people, social media groups and forums around the topic, or entities that have connections to potential users. Going out to present the idea in public enables interested people to approach the startup, If the product and market change, the pool of users used for gaining feedback should be updated. Also, startups should continuously keep building their network to suit their business goals. These are ongoing processes since the focus of the product and business strategy may shift at any moment.

Consequences

- Startup has effective channels to gain feedback instead of building the product alone.
- Startup has a relevant pool of users that they can use to collect feedback from, and with whom to test their ideas.

- Startups still need to established ways to contact other stakeholders that can help them in learning more about their field of business and how to deliver the value to users most efficiently.
- Startup is alert and prepared to find new users for feedback collection if the product changes to serve another group of users or customers.

Related patterns

SEGMENTED CUSTOMERS (Kelly 2012), CUSTOMER UNDERSTANDING (Kelly 2012)

Known Uses

Startup A was creating a product around the topic of social anxiety. They were looking for ways to help people overcome their social anxiety but had a hard time reaching these people. To circumvent the lack of contact, they started by finding the current organizations that were helping these people and asked their experts for advice in product development. Through various organizations, they were able to get the people to answer surveys even though interviews were not possible. Once they had the first implementation of the product, they started collecting feedback online as well as following user behavior from log data. While collecting meaningful user information from the organizations they also learned about the business environment so that they could improve their business model.

3.2 MEANINGFUL USER FEEDBACK



Context

Once the startups have found the right people to get feedback from they need to make sure the feedback they get is usable.

Problem

Getting constructive, meaningful feedback about business and product ideas is difficult since asking directly about if people would use a certain product does not give reliable answers.

Forces

Hype around startups can result into people being very positive about startup's ideas even when they are not good. All in all people rather give positive than negative feedback.

An initial idea or an incomplete version of a product only partly communicates the vision. Asking opinions about those can result into answers that are partly based on the respondent's imagination.

People are bad at estimating their future behavior, so asking them directly if they would use a product is not trustworthy.

Product ideas start as vague and change along the way. Learning from users should be aimed at understanding the big picture and forces that affect.

Startups usually consist of people who believe in their idea and may feel that spending their scarce resources on idea validation is waste. To save precious time, the time spent on collecting feedback should be minimized.

Solution

Apply user research methods to collect meaningful feedback when building the early product versions. Startups need at least one team member or an advisor that knows the basics of user research methods. User research aims at understanding the real needs of users as well as the context that affects

the use. Interviews, surveys and user tests can give actionable results when conducted properly. Conducting even light weight versions, such as informal discussions about a paper prototype or asking someone to test an early version, help in validating the hypotheses on what users think and want.

Having skills to collect user information enables a startup to gain wider understanding of users. In addition, startups can adapt to different situations and use different user information collection methods more efficiently. In some cases, a startup can outsource parts of user research. Outsourcing works too but might not be as fast as having someone inside the team with needed expertise.

User research methods suitable for startups have been proposed by Klein (2013), and lean approaches to UX by Gothelf and Seiden (2013). Once it is possible to test a working prototype with real users, the usage should be monitored if the team is capable to analyze the results.

Consequences

- The startup collects meaningful information at different phases of business and product development.
- Startup is capable to filter the feedback and find the essential parts by analyzing it.
- Startup adjusts to the changing situations by changing the means of feedback and user information collection.
- Entrepreneurs do not have a significant amount of time to study about user research methods. Also, it takes time and effort recruit a suitable person for a startup.

Related patterns

CUSTOMER UNDERSTANDING (Kelly 2012)

Known uses

Startup B had was looking for a way to help people share their ideas and talk about them further with others. They developed the idea further by collecting feedback and observing people's behavior with test versions. Observations started by creating a paper prototype for sharing ideas that they placed into an office room. When they build the first prototype they implemented log data collection as well as asked frequent feedback from their users. After this version of the product the startup noticed that they needed to aim at a different market since their initial segment was not proving to create revenue even they had users for the test version. They decided to conduct interviews to redesign the product for the other customer segment. From the interviews they were able to prioritize the critical features for the first new version. This startup was changing the direction of their product but was able to collect the needed information to do it successfully.

3.3 HAPPY TEST USERS



Context

Once startup has built something, they should measure and learn from it. Measurements can involve metrics to evaluate business potential and interest for specific parts of the product. When a minimum implementation of a product is launched, it needs to be assured that product is used enough to gain meaningful feedback or to create log data. To enable this, UX needs to be at a sufficient level. This means that 1) the limited set of features needs to be chosen carefully and 2) the UX needs to be proven not to hinder the product's value creation.

Problem

If the product has an insufficient set of features, or UX is very poor, users might abandon the product before giving meaningful feedback. This can happen even if the product idea itself is good, and lead to wrong conclusions regarding the business potential of the product idea.

Forces

The startups have only scarce resources and are in a dire need for speed when creating early prototypes or beta versions.

Early adopters are usually less demanding about quality since they are interested in new things. Skillset in a startup is limited and may not include design and usability related matters.

Prioritization of features that should be implemented needs to be done fast without thorough understanding of users' needs.

Startups need people to use their product versions to gain validated learning. In order to do this they need to keep people interested in their product while they make it better.

Finding new people to try the product requires time and effort.

Solution

Startup implements usability tests before moving to measuring part of the Lean startup cycle. The suitable number of people that are needed for a usability evaluation can vary from 5 to 13 (Hwang and Salvendy 2010) so using more people for finding problems in the user interface creates waste. On the other hand, to validate a product idea a mass of tens to hundreds of people are needed. If the startup releases a product with major usability issues for a bigger mass the release can turn into a big usability test that creates feedback from only the UI. Startup that needs validation for the product idea needs to create good enough UX in order to communicate their vision of the product with the early versions. In Figure 3 we present the modified BML cycle. Early test users need to be happy before a startup can move to measure business potential and traction in their target market.

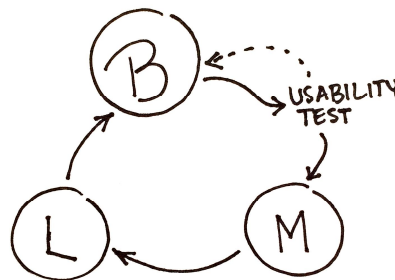


Fig. 3. Build-Measure-Learn cycle included with usability test and possibility to iterate before moving on to measuring.

Consequences

- Startup releases early prototypes or beta versions that they know will validate the product idea and not the usability. Users of the early versions see what value it produces using the product.
- Users will keep using the product if it answers to their real needs.
- Potential users use the product more than once which enables the creation of log data and collection of feedback for further development purposes.
- Startup can iterate fast before launching to masses because they get relevant feedback on the UX early on.
- It takes time to test and analyze if users had significant problems.
- Determining when UX is good enough is still not simple and needs to be evaluated separately in every case.

Related patterns

SIMPLER PRODUCTS (Kelly 2012)

Known use

Startup C that we interviewed had a UX designer as a part of their founding team. They had moved fast with the idea to develop the first working version. They had involved potential users in the process by presenting alternative paper prototypes. They also had done extensive literature search to understand how they would make it with their social mobile app when others had also tried a similar idea without success. The design was done by mimicking some common solutions made in modern smart phone applications. They were planning to make a local launch, meaning that they would advertise their application only to local people. Before going to make this effort they decided to have user tests to be able to fine tune the application. This enabled them to get the biggest bugs and UI problems fixed before losing any interested customers.

4. CONCLUSIONS

In this paper we presented three patterns to guide in involving end users in startup's product development. The patterns are targeted for startups which have already found out that there is an unresolved problem and they might have a solution for that. The people who encounter this problem in their lives form the potential market or customer segment. However, the startup still needs to validate the actual product. In order to achieve that, they need to communicate with real users, gain meaningful user feedback and have the minimum viable user experience to avoid getting feedback that is irrelevant whilst assessing the validity of the actual product.

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P3.

**EARLY PRODUCT DESIGN IN STARTUPS:
TOWARDS A UX STRATEGY**

by

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Early Product Design in Startups: Towards a UX Strategy

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Abstract. Startups often begin with minimal product versions to test and validate their product ideas as early as possible. Therefore, the first versions of the product need to be able to communicate the product idea to users in order to receive meaningful feedback. However, if user experience (UX) of the product is poor, users tend to concentrate on the disturbing user interface instead of the actual product idea. Thus, we suggest that startups should have a UX strategy from the beginning in order to understand their goals related to UX at different stages of product maturity. To this end, we conducted an interview study with eight Finland-based startups and 13 participants. Our results contribute towards understanding both needs for early UX design in startups as well as the restrictions for UX work that the scarce resources of startups induce. This work contributes to creating a UX strategy model for startups.

Keywords: User experience · Startup · Lean · User interface · Design

1 Introduction

Startups are known for their small resources and highly innovative products. The possibility to create software products for global markets seems to be open to everyone who has ideas and perseverance. Customer development model [1] as well as Lean startup method [10] have been introduced to help startups to find scalable business models. Aforementioned approaches suggest having close co-operation with potential customers while experimenting rapidly. Such practices aim at ensuring that the resulting product is profitable instead of building a product first and then trying to sell it. For design and development of products, processes and ways of working need to be adapted to the startup context which is characterized by scarce resources, time pressure and uncertainty [9].

The ability of delivering good user experience (UX) from the earliest product version can enable positive word of mouth advertisement [3] and keep interested people as users for longer. Regarding the UX design, the traditional major upfront user research and design that aims at a complete product design is not suited to the needs of startups: Due to the scarce resources, startups need to do “just enough” to test their idea without creating waste in the process. A startup might change the product drastically based on an experiment with end-users. This means that also the targeted user group can change which can make the conducted user research and other upfront work futile. While

startups should minimize the time invested in the design work for early product versions, the UX design of the product still needs to have an adequate quality level to enable testing of the product idea [5].

In this paper, we present results of an interview study conducted to gain understanding of how startups approach UX design in their early product versions in eight startups in Finland. All the startups were building, or had recently built, first versions of their products. Through the interviews, we answered the following two research questions: (1) how startups start the UX design of their early product versions, and (2) which skills and resources help startups in achieving the desired UX in the first publicly launched products.

The rest of this paper is structured as follows. Section 2 presents related work considering startups, their development styles, and UX practices. In Sect. 3 we describe our study context and methods. Section 4 presents results including approaches, practices and resources for early UX design in startups. Section 5 gives discussion over the results and presents the final remarks for the paper.

2 Related Work

Software startups are characterized by both engineering and business concerns to a more extensive degree than established companies [11]. Those concerns include being young and immature, having scarce resources, operating with novel technologies in dynamic markets, and being influenced by divergent stakeholders such as investors, customers, partners, and competitors [11].

Customer development [1] and a continuation of it, Lean startup method [10] have been gaining attention as new entrepreneurial practices. Academic research on how well Customer development and the Lean startup method work is scarce but they have been widely adopted by incubators, accelerators and university entrepreneurship courses [12]. The Lean startup [10] suggests that by validating hypotheses of customer's problems startups find a problem/solution fit. After this the startup should validate what product would suite to the solution. Validation should be done by building minimum viable products (MVP) and measuring the key performance indicators when "getting out of the building" with the MVPs. This means validating with real potential customers.

UX, defined as "*a person's perceptions and responses that result from the use or anticipated use of a product, system or service*" [6], has become an important competitive advantage in e-commerce [2]. UX is commonly divided into practical-oriented and hedonic dimensions [4]. Basically, UX development consists of activities related to gaining understanding of the user and the context of use, designing and developing for good UX, and evaluating the resulting outcome [6]. UX design has roots in human-centered design (HCD) [6]. HCD starts with thorough user research and design activities which are followed by design iterations. Similarly to software processes, startups generally do not afford to follow rigorous methods for UX development. However, little is known about UX development in startups. May [8] describes lessons learned from applying lean methodology in a startup and recommends planning the UX activities from early on. Klein [7] presents lean startups light weight methods for UX work. Finally,

Hokkanen and Väänänen-Vainio-Mattila [5] reports that lack of UX expertise hinders the startup from collecting useful feedback from users.

3 Methods, Research Context, and Participants

To gain insights of startups' approaches on UX design for early product versions, we conducted a semi-structured interview study with eight startups. One to three entrepreneurs from each startup took part in the interview. The eight interviews were conducted by one researcher and they lasted between 50–90 min. Each interview session consisted of questions aiming to understand the state of the startup after which their current goals and work practices were discussed. The focus of interviews was on UX related practices and motivations. However, activities such as product and business development were also covered on a high level to understand their effects on UX design. The interview data was analyzed from written transcripts of voice records. The analysis was done by iterative thematic coding. Main themes were first established based on interview questions. Sub-themes emerged from the data.

All the eight startups were small, employing one to six persons, and creating one single software product. Table 1 presents characteristics of both the startups and the interviewees. The startups are numbered from ST11 to ST18, to differentiate them from the startups in our previous study [5].

The interviewees were all working full time in their startups. The majority of them (H04, H05, H07, H08, H09, H10, H13) had a university degree in ICT related subjects. H04 and H13 had majored in Human-Computer Interaction (HCI). Two of the interviewees had their educational background in design, H01 in visual arts and H06 in visual design. H11 and H12 were finishing their bachelor's degree in mechanical engineering at the moment of the interview. H02 had a bachelor's degree in international business. H03 had not continued studies after the secondary school. Regarding the gender of the interviews, all were males except H01.

All the startups except ST15 were currently actively developing a product version. ST15 had completed a pilot project with a customer. ST14 had launched their first product version over a year ago and it was building a renewed version of their product for which they were redesigning the UX. Other startups were in more similar states. Startups ST13, ST16, ST17 and ST18 were preparing a release of an early product version for users. Startups ST11, ST12 and ST14 were currently collecting user feedback of their early product versions. Two startups (ST15, ST17) currently had no UX related expertise in their team. Other startups had at least one person with expertise on HCI or design. Despite all the startups had found people interested in their product, none of the companies had steady revenue streams. Proof of scalability of the business model was still unestablished.

Table 1. Summary of the participated startups and interviewees. CEO = Chief Executive Officer, UXD = User Experience Designer, B2B = Business to Business, B2C = Business to Consumer, SaaS = Software as a Service.

Startup	Interviewees	Company established (year)	Size of startup (persons)	Product	Market
ST11	H01 (CEO)	2013	1	Online market-place	B2B, B2C
ST12	H02 (CEO), H03	2014	6	Online market-place	B2C
ST13	H04 (UXD)	2014	4	Online community and market-place	B2B, B2C
ST14	H05, H06 (CEO)	2014	2	SaaS for pet owners	B2C
ST15	H07 (CEO), H08	2011	2	Automation software	B2B
ST16	H09 (CEO)	2014	5	Mobile sports application	B2B, B2C
ST17	H10, H11, H12	-	3	Mobile personal finances application	B2C
ST18	H13 (UXD)	2015	3	Mobile social application	B2C

4 Findings

4.1 Approaches to Early Product Versions

All interviewees described that they had started with an early product version that was minimal and restricted or very restricted on functionality compared to their vision of the product. Startups were familiar with the Lean startup concept of MVP but only ST16 used the term to describe the product version they were currently building. All the startups approached product development in a lean way: They implemented only the core functionalities to gain feedback instead of building the complete product at once.

ST14 had built a product version first for their own use only. ST15 developed a safety critical product that needed a certain level of quality to be usable and they had started with building a simulation of their product. At the time of interviews, startups ST13 and ST16 were preparing for a closed trial of their product with invited users. Startups ST11, ST12, ST17 and ST18 were building or currently had a version accessible to anyone.

All the startups were endeavoring towards achieving various goals with their early product versions. Via early product versions startups expected to receive overall feedback (ST11, ST16, ST17), get better understanding of their potential customers or users (ST16, ST18), and see how users would use their product (ST18). Startup ST14, which was replacing the underlying technology mainly for improving UX, considered it very important to test the technical viability of the product. Other goals were to get a proof of interest in the product to convince potential partners or customers (ST15, ST16) or to start receiving revenue (ST14). Testing the product idea was the major concern for startups when building the early product versions. Startups looked for validation of the product idea but also for specific features and visual design.

4.2 Design Practices for Early Product Versions

Decision-Making Process. The question of what to include and what to exclude when building an early product version is crucial. Startup team's vision combined with their skillset defined what was done. ST12 had made a feature list for the whole product. Priorities were decided together with the whole startup team by choosing "*the minimum ones so [that] this service can work*" (H02). Also, in ST14, ST15, ST16, and ST17, the interviewees described using their own vision while deciding on the contents of the early product version. In ST14 and ST17, the startup team iterated user interface (UI) ideas by exchanging ideas and sketching them, after which one of the members implemented the sketches as working software. ST16 had approached the design decision by what they need to communicate with the product and then thinking of how to realize it. ST11 consisted only of one person (H01) and she alone designed and implemented the early product version based on her ideas and skills.

The products of ST11, ST12 and ST13 had customers in B2B and B2C markets. All of them prioritized the B2B customers' needs in the early product versions and wanted to get feedback from them. H07 showed images of UI to their pilot customer to gain feedback on their UI design and then developed it further. ST18 had an idea of what their product would be in five years and H13 described the first early version to be the smallest possible core part of it: "*Well, this [product version] that we are building now is as simple as it can be. Basically you can't even do anything with it.*" (H13). ST17 was mainly concerned about the functionality at the time of the interview and the plan was to make the product visually more attractive later.

Practices for Understanding Users. Talking with people was the most common way to gain feedback for product improvements but it required finding the right people to talk with. Four of the startups (ST12, ST13, ST15 and ST16) had contacted potential customers and users face-to-face to show the UI design and ask questions of it. H13 had conducted a major user research study on their product as part of his thesis work, and

the startup had utilized those results in their product development. ST11 and ST17 had little or no contact with end users. H01 had discussed with her acquaintances about the product idea but she mainly trusted on her own experiences on working with people who are potential users. In ST17, the team had discussed with their friends but they had not gained much value for product development from these discussions since their idea seemed to be too vague for their friends to relate to it. ST12 had eight test users that they contacted directly to get feedback on improvements in the early product version. ST14, that had had the first product version available for users for some years, had received feedback by asking their customers and web page visitors to answer surveys. ST12 had recently been contacted directly by people who had difficulties using their product.

Interviewees from startups ST11 and ST12 said that the quality of UX had an effect on collecting user feedback: If UX was poor, each user had to be explained that the product is incomplete. In such cases startups gained feedback mostly by asking feedback and comments from users personally, which required plenty of resources. Startups ST13, ST17 and ST18 considered that UX is important when validating the product idea. Startup ST14 believed that good UX would create competitive edge and that they should put effort on it before investing on marketing.

4.3 Relevant Skills and Resources in UX Work in Startups

Table 2 presents skills and practices that had helped the startups to design and implement UX of their current or earlier product versions. Finding the minimal implementation that would communicate the product idea and provide value to users was seen to be most important. This included choosing only what was necessary for the early product version.

Table 2. Skills and practices that startups found useful in creating UX for first product versions

Skill or practice	Startups
Graphic design skills	ST11, ST12, ST13, ST15
Feedback collection	ST12, ST15, ST17
Producing minimal implementation that brings value to users	ST12, ST13, ST15, ST16
User testing	ST12, ST13, ST14
Usability theories or heuristics	ST12, ST13, ST14
Recognizing good UI solutions from other products and mimicking them	ST13, ST14, ST17, ST18
Social skills	ST17
Iterative process	ST16

Startups ST13 and ST18 had all the necessary skills and resources to do UX work so far since they both had UX experts in the founding teams (H04,013). H02 would have

acquired services to evaluate and improve UX if they had had money for it (H2). Interviewees from ST14 believed that having had skills to do user tests would have helped them. In ST17, they considered that their team had coped with UX so far but they were not prepared to analyze and utilize user feedback they would receive in the future. In ST11 the lack of implementation skills caused problems in providing desired UX.

5 Discussion and Conclusions

All the startups had adopted an approach of starting with a limited product version based on some studies and own hypotheses, and then iterating the version with real users and customers. Good UX was considered important for the product's success. None of the interviewees said that the innovation and uniqueness of the product alone would make the startup successful. Instead, the way in which the startup was able to deliver the solution was what mattered. The process of getting from an idea to a great product was perceived to require experimentation and feedback outside of the company. Of the interviewees, only H04 and H13 who had background in HCI were able to compare different means of gaining understanding of users and evaluating the UX.

As our study is based on interviews of 13 entrepreneurs from eight small software startups based in Finland, it naturally is limited to a narrow part of startups. However, considering that the related research on startups in general – and especially on UX work in startups – is very limited, our study offers new insight both for the academia and for startups. Future work on the topic of UX work in startups is required to build better practices for startups to design UX for early product versions.

Creating good UX from early on enables startups to collect meaningful feedback and gain positive attention even with restricted implementations. In addition to this, startups need some expertise for collecting and utilizing feedback. The limitations in resources and skills in a startup could be overcome by developing a feasible strategy to understand users and design UX that communicates the product idea and desired UX from early on. Based on our results we will start to form a UX strategy model to guide startups in gaining user information and designing UX.

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P4.

**MINIMUM VIABLE USER EXPERIENCE:
A FRAMEWORK FOR SUPPORTING PRODUCT DESIGN IN
STARTUPS**

by

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Minimum Viable User EXperience: A Framework for Supporting Product Design in Startups

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Abstract. Startups operate with small resources in time pressure. Thus, building minimal product versions to test and validate ideas has emerged as a way to avoid wasteful creation of complicated products which may be proven unsuccessful in the markets. Often, design of these early product versions needs to be done fast and with little advance information from end-users. In this paper we introduce the Minimum Viable User eXperience (MVUX) that aims at providing users a good enough user experience already in the early, minimal versions of the product. MVUX enables communication of the envisioned product value, gathering of meaningful feedback, and it can promote positive word of mouth. To understand what MVUX consists of, we conducted an interview study with 17 entrepreneurs from 12 small startups. The main elements of MVUX recognized are Attractiveness, Approachability, Professionalism, and Selling the Idea. We present the structured framework and elements' contributing qualities.

1 Introduction

Global markets are being infiltrated by small startups with their innovative new products and business models. Software startups are characterized with scarce resources, little to none operating history, and time pressure [1]. One competitive advantage with startups compared to large organizations is their ability to move fast and adapt to changing circumstances [2]. However, as founding teams of startups often consist of only a few individuals, the team's skills are naturally limited. For the same reason, the primary business objective of startups is to survive [3]. To survive, startups need to make the most out of their limited resources. Customer development [4] and Lean startup method [5], that have been widely adopted and taught by accelerators and entrepreneurship programs [6], emphasize gathering fast feedback from customers, and testing product ideas with minimal product versions or Minimum Viable Product (MVP) as referred by Ries [5]. While Lean Startup has no scientific evidence for effectiveness in business creation, the method is influencing how entrepreneurs approach product development [6, 7].

While validating business potential with minimal product versions and real customers to minimize unnecessary risk, gathering useful feedback with early product

versions can be challenging. One challenge is that insufficient or disturbing user experience (UX) might reduce the user feedback and make the users concentrate mainly on the appearance of the user interface [8]. At the worst, poor UX can lead the user only to criticize the UX even if the product idea itself was good. [8] Benefits of delivering good UX from the earliest product version can be positive word of mouth advertisement [9], and users using the product for longer.

The goal of this paper is to identify and structure the UX elements that are essential when building early product versions in small software startups. To understand the elements of desirable UX of early product versions, we introduce the concept and framework of Minimum Viable User eXperience that aims at providing UX that enables users to understand and gain value already from the early product versions. Correspondingly, startup is then able to collect more meaningful feedback from potential customers over a longer period of time since users do not abandon the product.

In this paper, we report results of a two-phase interview study we conducted in Finland. In the first phase we interviewed 13 entrepreneurs from eight startups. All the startups were building, or had recently built, first versions of their products. Based on the analysis of these interviews, we created the initial MVUX framework. The framework is based on the assumption that MVUX is realized in the software being under development when (1) user can perform the core use cases to gain value, (2) basic hygiene factors for usability and appearance are in place, and (3) the startup is able to get enough of feedback and data to validate and further develop the product idea. To evaluate the MVUX framework, we then interviewed four entrepreneurs of four more startups, all having expertise in UX. Through the interviews, we answer the following research questions: (1) what are the goals and key elements of MVUX from the startups' perspective and (2) how can MVUX design framework help startups at the early phases of their product and business development.

The rest of this paper is structured as follows. Section 2 presents related work on characteristics of software startups and their ways of working, and UX practices. Section 3 presents context and methods of our study. In Sect. 4 we present the results of our study including the UX elements considered important by startups, as well as the results of the evaluation of the MVUX framework. Section 5 discusses the results and Sect. 6 presents the conclusions for the paper.

2 Related Work

2.1 Characteristics of Software Startups

Engineering and business concerns in software startups are more extensive than in established companies [2]. Those concerns include having scarce resources, being young and immature, operating with novel technologies in dynamic markets. Software startups are also influenced by divergent stakeholders such as investors, customers, partners, and competitors. [2] Also, customer-focused approach seems to be more crucial for small companies [2]: When the customer is happy with the software, it literally means more work and increased business opportunities for the small company

as the happy customer wants more and is willing to recommend the software to others [10]. Because of unestablished customer base, such positive word of mouth and keeping the existing customers satisfied is essential for startups.

The professionalism of the entrepreneurs themselves often acts as a primary information source for startups due to unestablished stakeholder networks and customer base [3]. Moreover, people factors tend to be even more crucial for startups than for larger companies in the success or failure of the software [2]. Thus, the entrepreneur team is in a key role in keeping the startup focused and moving ahead [2]. For startups, short time to market is one of the most critical process goals [2]. Since a fundamental goal of a process is to describe the way an organization develops its software in a predictable and repeatable fashion, benefits of an established process do not meet essential needs of software startups [2, 3]. Therefore, startups require more informal and lightweight approaches.

New entrepreneurial practices Customer development [4] and Lean startup method [5] have been gaining attention in recent years. These practices emphasize that startups should concentrate on producing customer value and avoid wasteful activities, i.e. non-value adding activities. Although academic research on how well Customer development and the Lean startup method work is scarce, those methods have been widely adopted by incubators, accelerators and university entrepreneurship courses [6]. The Lean startup [5] suggests that by validating hypotheses of customer's problems startups find a problem/solution fit that indicates there is business potential in solving a specific problem with a particular solution. Once the problem/solution fit is established, the startup should validate what product suites to deliver the solution. For finding validation, startups should build minimum viable products (MVP) that are then tested with potential customers. An MVP should be built with as little resources as possible yet it needs to enable testing the current hypothesis. Furthermore, Ries [5] emphasizes that the key performance indicators need to be measured when "getting out of the building" with the MVPs. From these experiments, startup should gain validated learning [5]. This Build-Measure-Learn (BML) cycle should be continued until a product/market fit is found and startups should also be prepared to discard the MVPs if they do not measure up to validating sustainable business opportunity [5].

2.2 User Experience Work

UX is defined as "*a person's perceptions and responses that result from the use or anticipated use of a product, system or service*" [11]. Also, UX is often divided into practical-oriented and hedonic dimensions [12]. The first dimension includes aspects related to ease of use, productivity, and usability while the latter concentrates on users' emotions such as enjoyment and motivation. Regarding UX development in industry, companies in general tend to focus more on the practical qualities of UX while paying less attention to the hedonic ones [13].

UX design has roots in human-centered design (HCD) [11] that starts with thorough user research and design activities which are followed by design iterations. All in all, developing UX involves gaining understanding of the user and the context of use, designing and developing for good UX, and evaluating the resulting outcome [11].

While understanding users is considered important for startups [7], startups generally do not afford to follow rigorous methods for UX development. Research on UX development in startups is scarce. May [14] describes a case from applying lean methodology in a startup and recommends planning the UX activities in from early on. Klein [15] presents lightweight methods for UX work in lean startups. Finally, Hokkanen et al. [8] report that lack of UX expertise and time constrains hinder the startup from collecting useful feedback from users.

3 Methods, Research Context, and Participants

3.1 Course of the Study

To address our research goal of understanding which UX factors are essential when building early product versions in startups, semi-structured interviews were chosen as the data gathering method. The study was conducted in two phases. In the first phase we interviewed 13 entrepreneurs from 8 small startups in order to establish the MVUX framework. In the second phase, four entrepreneurs with UX expertise were interviewed to evaluate the created MVUX framework. Altogether, 12 interview sessions with 17 interviewees were conducted. All the interviews were conducted by one researcher and they lasted between 50–90 min. Interviews were audio recorded and transcribed for analysis. Participants were searched by going through Finnish startup incubator and accelerator programs. Some startups were recruited through directly contacting them based on their web page while others were recruited by advertising in the premises of one incubator program.

In the first phase, eight semi-structured interviews were conducted to understand the early design decisions and UX goals in startups. Initial results from these interviews, describing how startups start UX design, and what practices are beneficial at that stage, are reported in [7]. During the interviews, we introduced the general concept of MVUX to each interviewee. Participants were then asked to write down on a paper their goals and central elements for UX of their early product version intended to be deployed to users. Differences in UX goals between the earliest and complete product version were also shortly discussed. In all the interviews, focus was on UX related motivations and practices. However, activities such as product and business development were covered superficially to understand their impact on UX design.

In the second phase, four semi-structured interviews were conducted to evaluate the MVUX framework established based on the results of the first phase. The concept of MVUX was first discussed with the interviewee after which we presented them the initial MVUX framework. Then we asked questions about the interviewee's perception on the ability of the MVUX framework to cover the necessary UX elements without including unnecessary elements. In addition, we studied the usefulness of the framework by discussing with the interviewees how startups could utilize the MVUX framework while creating early product versions.

In both phases, analysis was done from the written transcripts utilizing iterative thematic coding. Main themes were established based on the interview questions while sub-themes emerged from the data. Terms the interviewees used to describe the goals

and central elements of UX of the early product version were collected to construct the MVUX framework. Those terms were used as low-level elements on which the main elements of the framework were created using a bottom-up approach as follows. In total, 43 unique low-level elements were abstracted from the interview data. These low-level elements were divided into groups based on similarity to form mid-level elements of MVUX. Finally, mid-level elements were grouped based on similarity to determine the main elements of MVUX. In the grouping of elements both the term as well as the context in which the element was discussed was taken into consideration.

3.2 Participants

First Phase. Startups participating the first phase consisted of one to six person teams each creating one single software product (Table 1). In this paper, we number the startups from ‘ST11’ to ‘ST18’, to differentiate them from the startups that participated our previous study [8].

Table 1. Summary of startups and interviewees participating the first phase. Legend: CEO = Chief Executive Officer, UXD = User Experience Designer, B2B = Business to Business, B2C = Business to Consumer, SaaS = Software as a Service.

Startup	Interviewees	Company established	Size of startup	Product	Market
ST11	H01 (CEO)	2013	1	Online marketplace	B2B, B2C
ST12	H02 (CEO), H03	2014	6	Online marketplace	B2C
ST13	H04 (UXD)	2014	4	Online community and marketplace	B2B, B2C
ST14	H05, H06 (CEO)	2014	2	SaaS for pet owners	B2C
ST15	H07 (CEO), H08	2011	2	Automation software	B2B
ST16	H09 (CEO)	2014	5	Mobile sports application	B2B, B2C
ST17	H10, H11, H12	–	3	Mobile personal finances application	B2C
ST18	H13 (UXD)	2015	3	Mobile social application	B2C

Second Phase. In the second phase we interviewed four entrepreneurs of four other small startups to evaluate the MVUX framework created in the first phase (Table 2). H15 and H16 worked full time in startups, while H14 and H17 were employed also outside their startups. Interviewees H14, H15 and H16 worked as UX designers. H16 was the CEO of ST21, and worked also on product development. All the interviewees had been developing software products or services in startups.

Table 2. Participants of the second phase interviews.

Startup	Interviewee	Experience in entrepreneurship (Years)	Education
ST19	H14	3	Bachelor of Interactive Technology
ST20	H15	3	Bachelor of Arts and Media
ST21	H16	3	PhD, Interactive Technology
ST22	H17	2	Master of Science student, majoring in UX

4 Findings

4.1 Elements of MVUX

Those startups participating in the first phase were creating or had recently created limited versions of their product. UX goals of these product versions varied among startups depending on what they sought to achieve with the product version. Table 3 presents the hierarchical categorization of low-level elements mentioned by interviewees and then grouped to form mid-level elements, and how mid-level elements were further grouped to form the main elements of MVUX.

The most common goal was that the product UX should be intuitive to use (with six low-level elements). Furthermore, it was considered necessary to create a UI that was simple (5) and easy to use (5) to enable smooth start for the user. For the B2B case of ST15, in which the acceptance of end-users was important for convincing the pilot customer, H07 commented: *“The product had to be so easy to use that everyone would agree to start using it. That was the first requirement.”* [H07] There was more diversity in how startups wanted the user to experience the product: humane (4), visual (5) or having a feel of novelty (3). Depending on the origin of the product idea, the early version of the product could also be built to fulfill the entrepreneur’s needs. H06 from ST14 explained that their first version was developed to serve their own interests: *“We thought technical looking graphs would be cool and bring a sense of high-tech. [...] Then we realized normal people don’t want to see that. You should have like soft high-tech. The high-tech Apple has, and not like laser beams.”* [H06]

Hooking, or making the user to stay and want to come back was mentioned three times as well. These were related to needs to gain data that proved interest in the product, or showed how users behaved with the UI. Goals related to the product being functioning or technically working were mentioned three times. Depending on the product idea, communicating that the solution and application was credible (4) or efficient (3) was considered important by some startups (ST11, ST14, ST17) while for others it did not matter. For example, in the case of mobile personal finances application (ST17), it was crucial the product would be perceived as something the user can trust from early on.

Table 3. Elements of MVUX

Main element	Mid-level element	Low-level element
Attractive	Visual (5)	Visual (ST14)
		Visual experience (ST16)
		Good visual appearance (ST11)
		Modern visual appearance (ST13)
		Not technical looking (ST14)
	Humane (5)	Likable enough (ST12)
		Storytelling (ST13)
		Personal (ST17)
		Easy to approach (ST14)
		Cozy and warm (ST14)
	Novel (3)	Fresh (ST12)
		Differentiation from regular services (ST13)
		Strong colours to differentiate (ST11)
Hooking (3)	Gamification (ST18)	
	Hooking (ST13, ST18)	
Approachable	Intuitive (6)	Familiar UI elements (ST13)
		Familiarity (ST14)
		Intuitive (ST17)
		No learning curve (ST18)
		Understandable (ST18)
		Explicit (ST16)
	Easy (5)	Easy to browse products (ST13)
		Easy to use (ST12, ST15, ST16, ST18)
	Simple (5)	Simple (ST12, ST14, ST15)
		Simple design (ST11)
		Minimal design (ST11)
Professional	Credible (4)	Premium (ST17)
		Reliable (ST11)
		Secure (ST17)
		Credible (ST11)
	Functioning (3)	Functioning (ST15)
		Smooth (ST17)
		Device independence (ST14)
	Efficient (3)	Compact (ST14)
		Fast (ST17)
		See by glancing (ST14)
Selling the Idea	Introducing the idea (5)	First impression (ST17)
		Introducing the idea (ST11)
		Example pictures (ST11)

(Continued)

Table 3. (Continued)

Main element	Mid-level element	Low-level element
	Building brand & fan base (4)	Lobbing (ST15)
		Solution (ST12)
		Traction (ST12)
		Exciting (ST12)
		Social (ST17)
		Word of mouth (ST12)

Being able to introduce the product idea and show the value in it was one of the mid-level elements abstracted from the low-level elements. Goals considering brand creation and getting fans for the product included four low-level elements. In case of ST11, starting to create positive word of mouth influenced how the UX was designed. H02 told that he would like users to see the product as exciting so that they would tell their friends about it.

4.2 MVUX Framework

The elements four main elements of MVUX are Attractiveness, Approachability, Professionalism and Selling the Idea. Classification of mid-level elements into these categories is demonstrated in Fig. 1. At the bottom of the Fig. 1 is Selling the Idea which is the main aim of MVUX since it offers the startup a possibility to get feedback from users who actually understand the product idea. The three other main elements

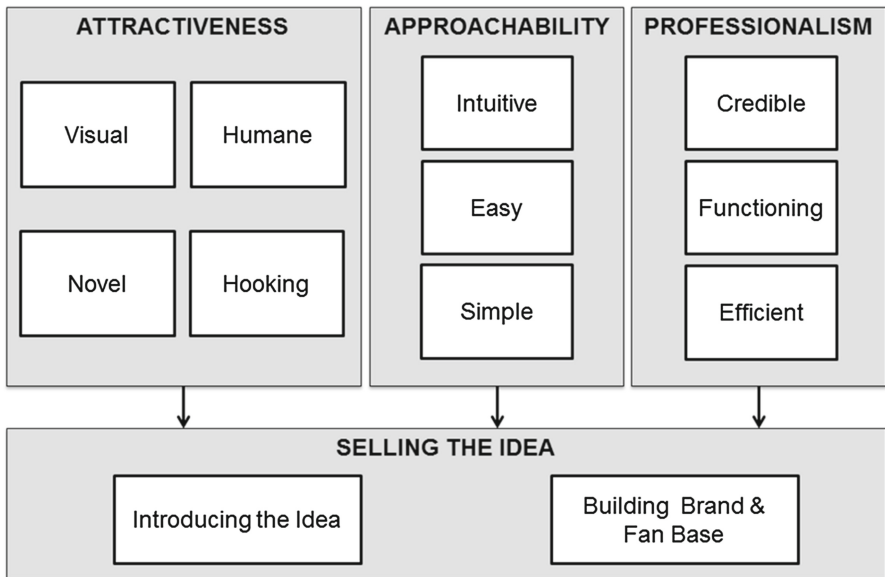


Fig. 1. MVUX framework for supporting early product development in startups.

(Attractiveness, Approachability, and Professionalism) create the foundation for the user to be interested in the product and to start using it. These three elements can also be seen affecting the user in different phases of getting to know the product. The first impression of the product is influenced by making the early product version attractive. With approachable elements, the usage is made easy and comfortable. Giving a professional image of the product, and the startup, is the result of a well-functioning, efficient product.

4.3 Validation of the MVUX Framework

Impressions on the MVUX Framework. Interviewees considered that the elements of the framework cover well the needs for UX in an early product version. H16 thought that having a framework to guide developing UX for new products in startups would be very useful. The importance of different elements was discussed with the interviewees. According to H14, the element Selling the Idea communicated that the attributes enabling to sell the product need to be taken into consideration also in UX design. In contrast, H15 felt that selling the product can be done by marketing it and thus it does not require having good UX or even the product itself in the beginning— even though building the planned product might then be too difficult for the startup team (H15). Optimization of internet marketing can help in introducing the idea and creating a (fan) community (H15).

Being able to communicate the value proposition of the company was mentioned by H14 as a critical part of the early phases of their startup, and this was mainly done with text on web pages. H16 mentioned that various means are required to convince different stakeholder groups since buyers and users can be in very different positions. However, in addition to being able to evoke buyers' interest, the importance of users accepting the new product was brought up by H14, H15 and H16. Attractiveness and Approachability were considered as important parts of an early product version. However, H15 commented that having too polished visual design can create false expectations for the completeness of the product. For Professionalism, H15 and H16 both thought that it can be achieved - and is strongly affected by - other functions of the company such as marketing or personal contacts to companies in B2B markets, or in the case of B2C market by who recommends the product to the user.

Usefulness of the MVUX Framework. The possibility to use MVUX framework when building the early product versions was discussed with the interviewees. H15, H16 and H17 said that startups could benefit from using a framework to remind themselves of where to focus in UX. However, the importance of each element depends on the product that is used. Also, the meaning and perception of each element is subjective. Furthermore, measuring users' perception of the product is necessary for understanding whether the intended UX was achieved in the product. While all interviewees regarded talking with users as the most valuable asset in creating good UX, H16 also stated that they could imagine using the framework to evaluate if the UX is good enough. Evaluation could be done by the startup team or with users by lightweight methods. To support the use of framework, H14, H16 and H17 thought that

practical advice and examples would be needed to design graphical elements that support the wanted UX. However, graphical style was seen as something that can be easily created with existing tools for UI development as well as by utilizing image banks (H14, H15). H16 wished that the MVUX framework should indicate the iterative nature of creating products in startups. Also H14 and H15 mentioned iterative process – starting from early releases – to be essential for successful product development in startups.

5 Research Validity

Since our study was qualitative, we assess our research quality in terms of credibility, transferability, dependability, and conclusions confirmability [16].

Credibility. We identified no major threats to credibility. Since the participants themselves wrote down the elements they considered essential for the UX of early versions, the study is less prone to interpretation error. However, we did not discuss the MVUX framework with participants of the first phase to evaluate interpretation issues.

Regarding the **transferability** of the results to other contexts, our study was conducted with 12 small Finnish software startups. We consider that our descriptive findings are transferable to similar startups. However, as startups – to a certain degree – reflect the entrepreneurs themselves; personal characteristics may reduce the transferability of the results. In addition, when transferring the MVUX framework to other contexts, product type and the user must be considered. Transferability of the MVUX framework should be further analyzed with other startups.

Threats to **dependability** include that the studied startups did not form a random sample, instead convenience sampling was utilized. However, we utilized open sampling method in which new participants are recruited after interviewing the previous one to increase variation in the sample. Despite concentrating on Finnish startups, our study increases richness of related research that has been conducted, for instance, in Ireland [3] and in Ecuador [10].

Finally, threats to **confirmability** include that a single researcher planned, conducted and analyzed the study. The researcher, however, reflected with other researchers in every phase of the study. Finally, the MVUX framework was audited in a group of three researchers.

6 Discussion

Our contribution is in proposing a framework of UX elements that are essential to the early product versions startups create. Considering that the related research on startups in general and especially on their UX work is very limited, our study offers new insight both for the academia and for startups. In startups, the elements of MVUX could be used to guide the UX design of early product versions. Especially in the early phases, startups benefit from lightweight methods – such as promoted by [14] – and could also use MVUX framework to support the design decisions. However, further research

should be done to understand and validate how MVUX can be used to support startups' UX strategy. Our initial validation shows that using MVUX framework with light-weight tools for implementing graphics design, and for measuring the perceived experience, would be beneficial in creating early product versions.

The goals and key qualities for UX of the early product versions had recurring themes from which we abstracted the elements of MVUX. Startups had different goals for what they wanted to achieve with their early product versions [7], and, accordingly, goals for UX varied. As reported in [7], startups also had different amounts of acquired understanding of their target users as well as previous validation of the product idea. This provided a wide scale of goals and qualities that reflected the different situations the startups were in. The four main elements of MVUX that we found are Attractiveness, Approachability, Professionalism, and Selling the Idea.

Based on our evaluation of MVUX framework with startup representatives that had expertise in UX, the MVUX framework covers the most important elements of UX in the early stages of startup's product development. However, the level of importance of different elements varies in products. Additionally, comparing the elements to our assumptions in the beginning of the study we can see how they are connected. We assumed that to communicate the product idea and UX well enough, the user should be able to perform the core use cases that answer to user's needs. Furthermore, we estimated the UX in these use cases should be at a satisfying level that does not disturb the user. These are in line with the elements Approachability and Professionalism that aim to provide trouble-free UX that shows the user that the product is trustworthy. Our third assumption for MVUX was that it needs to enable startup to gain feedback and data for validation and further development. This would be achieved through elements of Selling the Idea and Attractiveness. The element Attractiveness has a role in getting users interested in the product as well as hooking them to keep using the product. Selling the Idea part needs to be in place to raise interest in users, to communicate the product idea clearly, and to show how the product creates value to user so they will keep using the product. Implementation of elements of Attractiveness and Selling the Idea enables continuous data collection from longer usage as well as users being able to give feedback on the product idea while having no confusion on what the product is about. However, our initial assumptions did not emphasize the attractiveness and good visual design of the product, while the results of this study show that they are considered important in startups.

These results serve to create understanding of how UX should be taken into consideration when startups create their early product versions that are used by real user. Our study consisted of 12 Finnish-based companies so companies' motivations and goals are influenced by the Finnish business and startup culture. Furthermore, the end-users' preferred design elements may be influenced by the culture. Further research is needed to validate how well the discovered elements suit to the needs of startups and end-users in general.

7 Conclusions

In this paper we introduced the results of our two-phase interview study of 17 entrepreneurs from 12 startups. We presented the framework of Minimum Viable User eXperience (MVUX) that represents ways in which UX can be focused on already in early product versions. To gain value from building early product versions, MVUX enables the startup to collect meaningful feedback and data for validating and further developing the product idea. We abstracted the elements of MVUX through a bottom-up analysis of startups' goals and key elements for UX of early product versions. From these elements, a framework for supporting UX design in early product development was established. In the second phase of the study, the constructed framework was evaluated with experts of both entrepreneurship and UX. As a conclusion, we present the MVUX framework where the main elements of MVUX were defined as Attractiveness, Approachability, Professionalism and Selling the Idea.

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P5.

**FOCUSING ON USER EXPERIENCE AND BUSINESS MODELS
IN STARTUPS:
INVESTIGATION OF TWO-DIMENSIONAL VALUE CREATION**

by

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Focusing on User Experience and Business Models in Startups: Investigation of Two-dimensional Value Creation

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ABSTRACT

While good user experience (UX) can be seen to provide competitive advantage for the company and added value to users, resources for achieving UX may often be lacking in software startups. Furthermore, in different phases of business and product development process, concentrating on the focal things can be challenging. In this study, we investigated the factors affecting UX work in startups as well as UX goals startups set for their products. Furthermore, we reviewed the goals in terms of the Minimum Viable UX framework as well as value creation aspects. We present qualitative results of a survey study with 20 software startups as well as findings of a literature review. Our study suggests that while startups aim to provide products with good usability, the lack of a more comprehensive approach to UX can hinder their value creation; affecting both user satisfaction and business success. As a result, this may affect the successful implementation of startup's business model.

CCS Concepts

•Human-centered computing–User centered design

Keywords

user experience; startup; value; business model; software

1. INTRODUCTION

Tremendous changes have taken place in software industry in the past decade. Companies - especially startups - are struggling with ever increasing global competition in software business. Such change drive software firms to shift the attention away from the product, and focus on service offering [1]. In this volatile environment, many companies may aim at superior user experience (UX) as a differentiating factor [2, 3]. While it is beneficial for companies to invest in product R&D, the new technologies will become standardized and easy to replicate as these technologies move along the life cycle towards the maturity stage.

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On the other hand, efforts to improve UX can often create great value and provide companies with new growth alongside the technological development [4]. Thus, UX design is defined as one type of process innovation [5], and can be considered as an essential component to the core technology [4].

Meanwhile, software startups operate under great uncertainty while seeking scalable business models. With scarce resources on time, money, and employees, startups attempt to create products for global markets [6]. Startups are characterized to be temporary organizations that have little to no operating history [6]. Also, they lack formal processes [6]. While new entrepreneurial methods of the Customer development [7] and the Lean startup [8] emphasize the role of customer in the center of business development, prioritization can be hard. Startups need to balance between different tasks that help the company move forward as their primary business objective is to survive [9]. The Minimum Viable User eXperience (MVUX) framework [10] suggests that by assuring good enough UX startups gain direct benefits. Paying attention to UX from early on can give leverage for example by involving users to actively contribute to product development and to spread the word [11]. However, little work has been done to look at how UX creates value from the viewpoint of business models.

The role of UX in product success can not be defined precisely. Though UX has been long considered as an incremental improvement to the business, it is well-suited to be a disruptive (process) innovation as the society moves into the experience economy [12], [4]. In fact, [3] argued that UX can be deemed as another core layer of value, in specific the hedonic qualities of the offering supporting users' emotional values. The actual product functional layer and augmented service layer as defined in [4], are inherent contributors to the overall UX. However, one common issue preventing business practitioners from recognizing the value of UX is that they do not distinguish functional (or pragmatic) value from hedonic value [3]. A growing body of research acknowledges that paying attention to UX plays a major role in business competition [4], [3], [13]. Morville [12] stresses that formulating strategy without embracing UX can be costly, and practitioners can no long afford to neglect UX.

In this paper, we investigate factors affecting UX work in startups as well as the focus of UX in software startups in terms of two-dimensional value creation. Here, we refer to two-dimensional value creation as providing value to user and providing value to business. Our research questions are:

- 1) What affects UX work in startups?
- 2) What is the focus in UX goals in startups, and are they in line with the MVUX framework? and
- 3) Does UX startups aim at support the two-dimensional value creation?

To answer these questions, we conducted a survey study with 21 respondents from 20 startups. In this paper, we present our results and discuss them as well as existing literature. We also use the results to further validate the MVUX framework [10] and its possibilities to enhance the value creation through UX in startups.

The rest of the paper is organized as follows. Section 2 presents related literature on UX work in software startups as well as how UX is connected to business models through value creation. Research methodology is illustrated in Section 3. Results from the UX survey among startups and the analysis on the survey are given in Section 4 to present UX goals and factors affecting UX work in startups. Finally, the theoretical and practical implications arising from the study are discussed in Section 5, before the conclusions are presented in Section 6.

2. RELATED WORK

2.1 UX Work in Startups

Startups are characterized by working under great uncertainty and time pressure, with limited resources while lacking operating history [6]. Startups are usually expected to be only temporary organizations that search for a scalable business model. While the success rate of startups is not high, they are disrupting industries by efficiently using digitalization and opportunities in global markets. While working against the odds for survival, the Lean startup method [8] has gained attention among startups. Product development starts by testing hypothesis and seeking validation for product ideas before building anything. Getting out of the building and involving possible customers and users to gain validated learning brings entrepreneurs closer to end-users. The Lean startup also encourages to experiment a product idea’s potential with Minimum Viable Products (MVP) that are built with the smallest amount of implementation required to validate a product idea [8].

For developing good UX, startups are struggling with limited skillset of the team as well as with finding test users and light weight methods for user involvement [11]. Due to living with great uncertainty, startups need to carefully balance between value providing and wasteful activities. It is common for startup to start with very limited product versions or MVPs, for which UX plays a role in enabling communicating vision of the product in order to gain feedback for product and business development [14]. For startups to efficiently reach good enough UX, the MVUX framework was established to describe the beneficial elements of UX to implement by startups [10]. The MVUX framework – presented in Figure 1 – consists of main level elements (Attractive, Approachable, Professional, Selling the idea) that contribute to startup being able to effectively achieve their goals for product and business development [10].

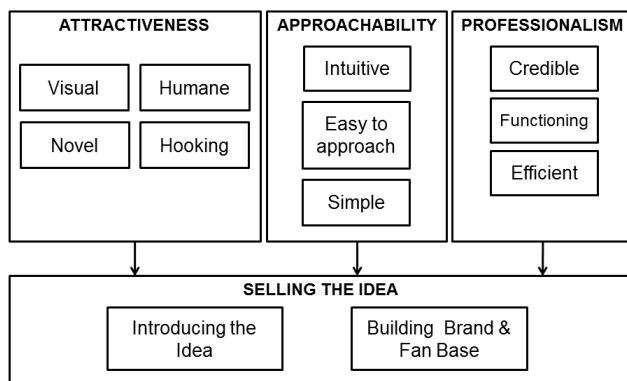


Fig. 1. The MVUX framework according to [10].

In general, scientific literature on UX work and its role to startups is scarce. While some knowledge from for example combining agile and user-centered design practices [15] may be relevant, understanding of how good UX can be achieved in startups is still lacking.

Long term user satisfaction may not be the most important goal for a startup, especially at the early phases when product and business model may still change. However, if neglected, poor UX can result in feedback purely on user interface if users abandon the product before understanding what the product is about [11]. Depending on the stage of startup, the goal for UX can be for example enabling collecting meaningful user feedback, gaining positive attention, having users contribute to product development, or providing data to convince important stakeholders. In the MVUX framework [10], it is indicated that elements Attractive, Approachable, and Professional contribute to the element of Selling the idea. For fast and light UX design, the MVUX framework can be seen as a tool in using UX goals as design drivers. The use of UX design goals may assist in designing for a specific goal [16] that may be sensible in startups that seek validation for a specific idea and vision.

2.2 Business Models Create Value through UX

2.2.1 Business models and value creation

The concept of business model has attracted significant attention and raised profound debate among the scholars regarding how to conceptualize business model. For instance, Chesbrough and Rosenbloom [17] conceive business model as a focusing device that explains how economic value could be extracted from a technology or business idea. Morris, Schindehutte and Allen [18] define business model as a set of decision variables, which are inter-connected to create sustainable competitive advantage. Other conceptualization may also include an architectural model [19, 20], a typological model [21], a narrative model [22], a design model [23], and a conceptual canvas tool [24].

Referring to several studies [25, 26], the origin of business model can be traced back to the idea of business: “what a company offers to whom and how”. It consists components such as resources and competences, internal and external organizational structure, customer value proposition as well as cost and revenue structure [23].

To uncover how business model links to UX, we have to go back to the basis of business model, which is creation and capturing of value [26]. As pointed out by [22], the notion of value is commonly accepted among the scholars within the business model domains. According to [27], integrating the aspect of value has tremendously influenced the existing streams of business model studies. One of the latest business model conceptualizations is also wrapped around value proposition [22], suggested by Zott, Amit and Massa [28] as a construct that conceptualizes the value creation and value capturing of a company. Thus, value creation and value capture activities and processes are considered to appropriately represent the essences of business model conceptualizations in majority of the definitions [29, 30, 31, 32, 33].

Based on marketing perspective, [34] proposed that value can come from demand (customer) and supply (business) sides, and five forms of value can be derived from value creation process, namely, the net value as utilitarian balancing of benefits and sacrifices, the marketing value related to product (or service) attributes, the derived value as outcome of use, the sale value related to pricing and the rational value that is associated with the benefits expressed in the exchange. By reconciling [34]’s view with typical business

model perspective, it can be conceptualized that business model involves a dual creation process, that is creating value for customer (normally as value creation) and value for business that adopts a specific business model (normally as value capturing). The following sections show how UX is connected to the two sides of value creation.

2.2.2 *UX and customer value creation*

“Value for customer” is defined by Woodall [34] as “any demand-side, personal perception of advantage arising out of a customer’s association with an organization’s offering”. Sawhney [35] describes three types of value that a business can create. The first type is functional value, which refers to features, performance and reliability. Another type is economic value regarding the time and money that customers are willing to spend in exchange of product or service. The last type is emotional value, referring to the feeling or self-expression that a customer experiences during acquisition and utilization of a product or service. Barnes, Blake & Pinder [36] introduced a benefit and cost perspective on value creation, suggesting an assessment of how customers perceive the value in terms of benefit gained and cost reduced.

To connect the value creation concept of business model with customer experience, Osterwalder et al. [37] developed the “value proposition model” to enable a structured way of elaborating the value created by business model through designing “value proposition” for product or service [37]. The value proposition model involves an assessment of value from the customer side and offering side. The customer side provides an assessment of customer needs or “job to be done”, exploring what makes them satisfied as gains and dissatisfied as pains [24], [36], [37], [38]. While a customer may not always be a user, end-user’s experience affects how well a product or service enables “a job to be done”, and value to be gained.

The field of UX deepens the notion of value creation associated with business model. Referring to Hassenzahl’s [39] model of UX, users usually construct product attributes with a mental model that combines actual features with personal value, expectations and/or standards. With this concept, product attributes comprise content, presentation, functionality and interaction style, which all affect users’ perceptions of value from value proposition and actual product or service offerings [39]. Two categories of user value are defined as pragmatic value (user-perceived usability) and hedonic value that is defined as pleasure-producing qualities [39], [3].

Contrary to the conventional product development logic that places product as the core, Hassenzahl’s view [39] suggests that user experience should be the center of an offering, while the product or service is designed around it. The value of an offering is actually realized by users or customers during an experience of engaging with the product or service [3]. This logic presumes that customers do not passively receive the value, but rather interacting and co-creating their own experience of value derived from a value realization process [40, 41]. As determined by [42] and [43], companies can not design the experience, however, they can design prerequisites of the desired experience, enabling customers to experience the offering by giving representational artifacts and constructing contexts [44]. This new paradigm points out what a value realization process really is, thus explaining how UX and actual offerings are interwoven to create value for customers.

Overall, the convergence of value concepts in UX and business model studies gives a holistic view on customer value creation. A customer’s “job to be done” can be a pragmatic type, representing such factors that fulfil the essential purpose of employing a product or service; or it can be hedonic factors that connecting with feelings

and customer’s inner perspective. Gains and pains can also be divided in the same way. Functional factors that represent pragmatic value come from functional outcomes, while hedonic value is connected to arousing certain emotions [37], [45].

2.2.3 *UX and business value creation*

Though UX can create multiple categories of customer value, the costs of UX development can be significant. Nielsen’s [46] research suggests that approximately 63% of large-scale software projects went beyond budget due to costs associated to usability engineering. Software development managers often consider UX costs as added expenses [47]. Thus, UX should align with company goals [48], and create value and benefit to business [47], since [48] estimates that first 10% of the software design process, can determine 90% of the end product’s cost and performance.

In spite of the variety of literature on how UX creates value for users and customers, how UX creates value for its creators or developers is comparatively under-explored. However, in practice, UX creating superior business value appears to be a common denominator of successful startups that became large enterprises (i.e. Amazon, Google) [49]. From usability engineering perspective, Marcus [47] identified three categories of business value from usability engineering: 1) costs reduction (involving lower development cost, development time, maintenance cost, and redesign cost); 2) sales growth (including increased purchase and transaction, retaining customers and attracting new customers); 3) use effectiveness (reducing user error, increasing productivity and user satisfaction).

From strategy and business model perspective, Sward and Macarthur [50] suggest that capturing business value via competitive advantages through delivering desirable UX is in alignment with a company’s strategic intent. The resource-based view of value capture arises from the argument that companies achieve a distinctive position or a competitive advantage by assembling combinations of resources that are scarce and difficult to replicate [51], whereas in UX, it means the UX and design resources that give software companies a unique position in the market. By incorporating engineering and business perspectives, this study proposes three categories of business value that UX can create, specifically for software startups.

One stream of UX literature suggests that value of product or service as perceived by customers can be a key to differentiate a company’s position [3], [2], which draws attention to UX design as a strategic intent. In other words, UX can create value to customers while allowing the firm to capture value with differentiation strategy. As identified by [52], providing an attractive consumer experience directly correlates to a firm’s competitive advantage. Sward and Macarthur [50] argue that certain elements of UX, for instance, the user interface (UI) is relatively easy to replicate. Thus, UI alone could not contribute to a firm’s differentiated position. However, the same study [50] discovered that a firm’s ability to provide superior and valuable experiences contributed to the firm’s success in remaining competitive. Thus, designing compelling UX becomes an effective strategy to maintaining competitive advantage and a key enabler for business value creation within business models.

In addition to giving differentiating advantage as a generic business value, a survey of literature provides clarity in how UX creates value on business dimension for startups, specifically by enabling mass-market adoption, and fostering customer loyalty and “word of mouth”. For startups to grow in a market where Information Technology (IT) is becoming a commodity input [50], focusing on UX is a trade-off that has to be made, which means a startup has to

steer away from being solely technology and product oriented, and realign itself with the experiences it aims to create for customers. From this standing point, UX provides the avenue to “cross the chasm” [53] and builds scalability into business model to be adopted by mass market.

Customer loyalty and retention is also identified to associate with positive customer experience [54], as the experience determines whether a company’s customers will ever come back. A firm (such as a startup) following a growth strategy is genuinely interested in expanding and growing customer base. However, as [53] argued, acquiring new customers is challenging, because the same category of product that was attractive and desired in its early stage can have stagnant demand at maturity. Hence, gaining customer loyalty to sustain growth means a firm must employ appropriate UX practice and create intriguing experience to attract and retain customers, and even motive customers to promote its product, service and brand [50].

Overall, when companies are driven towards the strategies that place UX at the core of their customer offerings [2], they could benefit from business value through differentiation, scalability to mass market and customer loyalty. This new way of doing business is described by [55] as the design revolution.

3. RESEARCH METHOD AND PARTICIPANTS

3.1 Course of Study

In our study, we investigated the focus of UX in startups, factors affecting UX work, and their effect on startups’ value creation. Course of the study is presented in Figure 2. Motivation for the study rose from need to validate the MVUX framework [10] as well as in gaining more knowledge on factors affecting UX creation in startups. A survey study was selected as the means to gather data from a variety of software startups. Based on thematic coding of survey results, a connection between startups’ focus on UX, and business models and value creation emerged. Consequently, more literature was reviewed to understand the current knowledge on connection between UX, business models, and value. After this, survey results and the MVUX framework were reviewed to understand the role of UX in startups for creating value both to users, and business development.

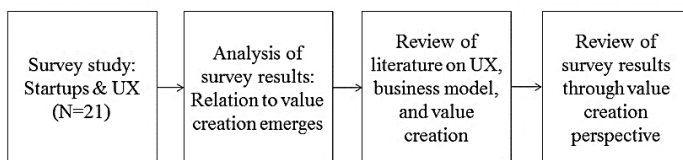


Fig. 2. Description of course of the study.

3.2 Survey study

We conducted a survey study among software startups to gain knowledge on their goals for UX as well as on issues affecting the creation of UX. The survey was designed by one researcher after which it was reviewed by two other researchers and tested with 4 startup entrepreneurs. Responses were collected between November 2015 and March 2016. Respondents were found at an entrepreneurship event and by advertising the survey online.

The survey consisted of three main open questions and seven scaled questions with a scale from 1 (Disagree) to 7 (Agree). In addition to these, background information on participants and their startup was collected.

The three open questions were:

- OQ1: Name three of the most important goals regarding UX of your product or service.
- OQ2: What skills and practices help your startup create good UX?
- OQ3: What challenges your startup has in creating good UX?

All respondents answered open questions from which one response to OQ2 and one response to OQ3 were discarded due to being incomprehensible.

Seven scaled questions (Disagree = 1 ... Agree = 7) were formed based on literature on UX work in startups [12], [15]. The aim was to understand how well startups were coping with different aspects found challenging in limited sets of startups.

The scaled questions in survey were the following:

- SQ1: We get user feedback that helps us to improve our product.
- SQ2: We collect and use log data to support our UX design.
- SQ3: We have the needed skills to collect meaningful information about users.
- SQ4: We have the needed skills to design for good UX.
- SQ5: We are able to reach our potential users to gain meaningful feedback.
- SQ6: We are able to effectively use the information we collect about users.
- SQ7: We have a clear strategy for how to create the UX we aim for.

SQ7 was answered by 20 respondents, all other questions (SQ1-SQ6) were answered by all 21 respondents. While the sample was limited, the responses were used to give insight and background from startups participating in the study.

Data were analyzed in two parts. First, 63 goals gathered from OQ1 were compared to elements included in the MVUX framework [10] and – when found compatible – categorized accordingly. Categorization was conducted by one researcher and then revised by another researcher. The second part of analysis was of data from OQ2 and OQ3 for which we used thematic coding. A bottom up approach was used where themes minor emerged from data after which they were grouped to form main themes. Again, coding was conducted by one researcher and revised together with two more researchers.

3.3 Survey Study Participants

We received 26 responses from which 5 were discarded due to the mismatch with our definition of a software startup - i.e. the company being founded less than 10 years ago and having less than 50 employees. From the remaining 21 responses, 2 were from the same startup resulting in data from 20 different companies. Startups’ country of origin was in Finland (14), Hong Kong (4), Australia (1), Armenia (1), and Belgium (1). Six of the startups were reported to be spin-offs from another company or research institution. Status of the startups was reported in regards of having received funding (7) and currently having paying customers (14). Also, six of these startups reported having both paying customers and external funding. Furthermore, six startups were in early phase of product and business development with no customers while majority of startups (14) had already established at least some revenue from paying customers.

Respondents’ roles in startups varied: They were CEOs (7), in technical or engineering roles (5), founders (4), managers or leaders (3), UX designer (1), and innovator (1). In addition to the varying roles, all but one (20) of respondents were working on multiple areas within startup. In Table 1, we present the areas of work that respondents specified to be working on in their startup.

Table 1. Areas in which respondents work in the startups

Area of work	Number of respondents
Business development	14
Marketing	14
Sales	12
Product development	16
Software development	10
UX design	13

It is notable that while only one respondent was a UX designer, 13 reported being involved in UX design. Respondents had educational background in information technology (14), management and commerce (8), engineering (6), natural and physical sciences (3), creative arts (2), and society and culture (2). The level of education of respondents was mainly bachelor (7) and master (12) level but included also one licentiate and one PhD. Age of respondents that provided their age (16) varied between 25-54 years with the average of 37,5 years. Respondents had an average of 15,3 years of relevant working experience.

4. RESULTS

4.1 Abilities for UX Work

Seven scaled questions were aimed for understanding startups' ability to collect meaningful user information, and conducting UX design. The means are presented in Table 2. Means for SQ3, SQ4 and SQ6 fall close to the indifferent option. Furthermore, we looked at how answers were divided and possessing skills for designing good UX (SQ4) received the most indifferent answers (9). The reasons for this can not be clearly explained based on the survey data, yet estimation could be that respondents do not have a clear understanding or measures of how they are performing with UX. Among surveyed abilities, respondents agreed the most – selecting 6 or 7 on scale – on SQ5 in being able to contact users (10) and SQ1 in getting feedback (11). However, in regards of having skills to collect meaningful information about users (SQ3), fewer respondents clearly agreed (4).

Table 2. Means of answers to scaled questions

Scaled Question	Mean (Standard deviation)
SQ1: We get user feedback that helps us to improve our product.	5,4 (1,36)
SQ2: We collect and use log data to support our UX design.	3,5 (2,16)
SQ3: We have the needed skills to collect meaningful information about users.	4,3 (1,39)
SQ4: We have the needed skills to design for good UX.	4,2 (1,36)
SQ5: We are able to reach our potential users to gain meaningful feedback.	5,2 (1,40)
SQ6: We are able to effectively use the information we collect about users.	4,0 (1,38)
SQ7: We have a clear strategy for how to create the UX we aim for.	3,3 (1,56)

Hardest areas in UX work based on our survey were the use of log data to support UX as well as having a clear strategy for reaching the wanted UX. Use of log data may not be suitable for needs of all startups hence we can not predict if they would benefit from better utilizing it. However, since majority of startups (14) had already paying customers, using log data to recognize user behavior could be beneficial in determining which parts of the product are used the most. This would enable the resource allocation for parts of the product that create the most value to user and/or customer, possibly leading to improved user satisfaction and more business.

4.2 Factors Affecting UX Work in Startups

Based on answers to the open questions OQ2 and OQ3, we extracted 56 factors. First, with the bottom up approach to thematic coding, seven themes emerged from data which were then used to form sub-categories. Then, the sub-categories were grouped to form three main categories of factors affecting UX work in startups: Strategy, Team qualities, and Interaction with users. Results of the thematic coding - including distribution of factors - are presented in Table 3. Next, we will discuss each main category.

Table 3. Categorization of factors affecting UX work in startups

Main category	Sub-category	Number of factors identified (N=56)
Strategy	Product qualities	6
	Resource allocation	8
Team Qualities	Expertise in UX	15
	Expertise of domain	5
	Mindset	6
Interaction with Users	Feedback	7
	User involvement	10

4.2.1 Strategy

According to our analysis, strategic choices on *Resource allocation* and *Product qualities* affect decisions - and actions taken - for creating good UX. Product qualities that complicate creating good UX were complexity of product and multiple user groups. Two startups reported having challenges in creating easy to use solutions to a complex product. In addition, being able integrate the use of product to existing workflow was seen as a challenge. However, when successfully implemented, integration was considered to contribute into creating good UX.

Lack of resources is considered a fundamental characteristic of startups. In our study, we also found the resource allocation affecting the creation of UX. Factors that startups struggle with in creating good UX include money, time, and general lack of resources. In this category we did not include human resources as they are discussed in the Team qualities section. Prioritization of adding features or “quick and dirty” solutions over using time for UX design were mentioned in responses. While this approach may generate short term benefit such as revenue from a specific customer, it may also result in creating need to re-design parts of the product later. More sustainable in terms of satisfying UX can generate wider interest in customers and also give a more professional image of the startup. Strategically, startups should consider the costs and value created in efforts aiming to good UX. Also, the cost of ignoring UX should be acknowledged.

4.2.2 Team Qualities

The startup team's qualities have a big influence on how and what kind of UX can be created. Three areas in which the team's qualities relate to UX were *Expertise in UX*, *Expertise of domain*, and *Mindset*. Not surprisingly, expertise in UX was reported as the main enabler for creating good UX by two respondents while seven reported the lack of knowledge, training, experience, or a designated UX designer, to be hindering creation of good UX. Specific UX related expertise that was reported as beneficial were visual design and gamifying experience. Also, use of design guidelines and following best practices was considered an advantage for UX creation.

The domain expertise was seen as an enabler for creating good UX. Understanding of and experience in domain where the product was targeted for, as well as technical expertise, were considered enabling creation of good UX in six startups. When considering startups, actively learning things related to their business gives good basis for the whole team to understand also their users. As a source of knowledge of domain, previous working experience was identified. This is in line with [11], where it is recognized that product ideas in startups often come from personal needs or experience in a specific domain.

The third theme rising from the data was the mindset. Instead of specific skills, the right kind of mindset was reported as influencing UX work. Having a too programming-centric mindset hinders creation of good UX while thinking from the user's perspective, having "common sense", intuition, and self-critique can help. The general mindset also affects to how important UX is perceived as: one respondent felt that UX was not an important factor when product idea was very appealing to people.

Skills and abilities of the team in startup plays a major role. When skills are lacking, the options to acquire them are to recruit, outsource, or educate a team member. All these require resources - money or at least time - which means that the return needs to be big enough. Startups need to perceive UX as creating business value in return of their investment in resources. With scarce resources to spend, startups may recruit new co-founders to fill the knowledge gap. Another option would be to seek for voluntary help in entrepreneurs' network as reported in [11].

4.2.3 Interaction with Users

Interaction with users was divided into two sub themes of *Feedback* and *User involvement*. Effective use of feedback was considered as an enabler in creation of UX in five different startups. Then, actively collecting and using feedback, reacting to it, and repeating this cycle came up in responses. One startup described feedback as the main driver in creating UX. Challenges regarding feedback were related to reaching potential customers. Also, dealing with feedback in a successful way was perceived challenging by one startup. However, means for collecting feedback did not come up from the responses. Successfully using feedback enables startup to better understand the needs of customers which benefits not only in development of UX but also business offering as a whole.

Respondents reported a wide variety practices for user involvement in product development. Such practices were observation, paper prototyping and user tests as well as use of usage data with analytics. Together eight startups reported using these practices, two of them in addition reported the use of feedback. Furthermore, different forms of interaction with users were mentioned by respondents from 11 startups as an enabler for creating good UX. Results imply that the rest of the participating startups (9) are not

actively involving users in their process of creating UX or respondents were not aware of the means for such activities.

4.3 Focus in UX Goals

We extracted 65 goals from the responses (open question OQ1) and compared them to the MVUX framework presented in [10]. Our findings show that for the major part (61), goals are in line with the framework. Goals that we found not possible to categorize in the framework were user-centric (2) and interactive (2). The conclusion was that an interactive user experience can aim at different goals – e.g. intuitive or hooking. Furthermore, user-centric a was regarded as such a general goal that it would not suit any of the elements.

In Table 4 we present division of extracted goals in terms of elements of the MVUX framework. The goals were mainly categorized in elements of Approachable (26) and Professional (23). Goals related to contributing to product being Attractive appeared (10) while only two goals were categorized to Selling the idea. The three most common goals were efficient (13), easy (11), and intuitive (8). Emphasis of goals was clearly on more pragmatic aspects and rather in usability than UX where as the MVUX framework suggests that considering all the main elements is beneficial for startups.

On theoretical point of view, elements Attractive, Approachable and Professional create value to user. However, business value is harnessed by being able to complete the last element, Selling the idea. If startup fails with one of the three elements contributing to Selling the idea, startup might not reach its full business potential. This might be due to not being able to keep customers for a longer period or not being able to attract new customers. For startups, keeping the early customers can be very beneficial also in terms of receiving feedback actively or co-creating with users as noted in section 4.2.3.

Table 4. Categorization of UX goals in terms of the MVUX framework

Main element (# of goals categorized, total N=61)	Sub-element	# of goals categorized to sub-element
Attractive (10)	Visual	4
	Humane	2
	Novel	0
	Hooking	4
Approachable (26)	Intuitive	8
	Easy	11
	Simple	7
Professional (23)	Credible	4
	Functioning	7
	Efficient	12
Selling the Idea (2)	Introducing the idea	0
	Building brand & fan base	2

5. DISCUSSION

In this paper, we have investigated the UX goals of software startups and the factors affecting startups when developing UX as either core or complementary to their essential offerings. We conducted a survey study with responses from 20 software startups and complemented the study with a literature review. Based on results from our survey, we identified that in certain cases, UX development is treated as consisting mostly of pragmatic elements. Furthermore, UX was affected by strategy, team qualities, and ability to interact with users. While some startups found UX not worth prioritizing, for estimating the value created by UX, startup should consider two-dimensional value creation: for users and for business development. Our findings bring new insights to the literature on startups, UX, and business models. Limitations of this study include a limited set of participating companies and thus it can not be generalized to all kinds of startups. Also, with an online survey study the responses can not be fully verified for authenticity.

The findings for the study are enabled by a thorough review on business model and value creation literatures. We identified that the core of business models is about value creation and capture, which is in line with the aims of UX in customer value creation [39], [3], that draws upon the various types of value which can be created through UX practices. On the business value side, the study utilized various business model literatures, and landed on Osterwalder et al.'s [37] value proposition framework to argue that UX should not be treated as UI design. Instead, UX could and should make business sense by creating the desired pragmatic and hedonic value for customers.

As part our study, we also sought to further validate the MVUX framework initially introduced in [10]. According to our findings, startups focus on a limited aspect of UX. In contrast, the MVUX framework emphasizes a more holistic – while focused – view to UX that would ensure further development of both product and business in startups. Based on our findings, the MVUX framework constitutes to the two-dimensional value creation by including the pragmatic and hedonic aspects of UX while also aiming to contribute to business value. For thorough validation of the MVUX framework, a larger sample of startups should be included to test the usefulness of the MVUX framework as a tool for design. The study does not only contribute to the theoretical development of UX and its business value for startups, but also the corresponding managerial implications on creating the awareness of UX-business model integration.

The academic contribution of this paper lies within the UX and startup literatures but also contributes to the business model literature, through expanding UX's value for users (as commonly discussed in UX literatures) to its value to business by discovering the common link, value creation on two dimensions (customer and business). The research identified the phenomenon of UX suggested as a critical component in business success, especially in the case of software startups from theoretical view point. In reality, it resides in the resource consuming and cost creating side of the business or is treated as a cost center in software startups. UX's revenue generating capability is rarely realized as a profit center. This study thus stresses the need to understand the true value of UX and how it can enable the realization of business value, especially for digital and hi-tech startups. The novelty of the research relates to integration of UX literature with business model conceptualization to explain why UX should be treated as an indispensable component of the startup's business and where UX's true business value lies. Future work includes studying larger

samples of startups as well as comparing performance between startups that allocate resources to UX creation and those that do not.

The practical implications of this paper relate to the possibility of identifying the misperception and challenges that hinder startups from truly harnessing UX to realize more business value. Recognizing factors affecting UX work, practices and tools can be developed to serve startups' needs. Furthermore, by aiming the focus of UX to acknowledging also the hedonic aspects, startups can find new ways to achieve business value. These include creating differentiated value, scaling up business as well as growing and retaining customer base. It brings the missing and hidden business value of UX to light, which is an indispensable step to unlocking the true potential of UX. In the paper, the most recent insights on value and value creation were used to reflect the connection between UX and business model for enhancing and structuring the UX building process more integrated into business process within startups. The study emphasized that startup and business practitioners in general need to understand the value and value creation as interactional and contextual. In addition to acknowledging the importance of UX, the paper proposes the MVUX framework to be used to developing managerial tools for building better UX practices.

6. CONCLUSIONS

The research discovered that UX is suggested as a critical component in business success, especially in the case of software startups from theoretical view point. However, in reality, it is considered by startup companies as resource consuming activities, or a cost center. The revenue generating capability of UX is rarely realized as a profit center. Hence, the study proposes the dyadic dimensions of UX, creating human value as embodied in usability and UX design, while realizing business value, especially for software startups. Moreover, the MVUX framework [10] was further validated with survey data and existing literature. It was concluded that the MVUX framework supports the two-dimensional value creation by emphasizing coverage of both practical and hedonic aspects that lead to gaining business value. Furthermore, the study recognized factors affecting startups' UX work to be related to strategy, team qualities, and interaction with users. For startups to be able to achieve the optimal UX, these areas need to be in line for supporting the UX work.

As argued by [3], a digital company which seeks to differentiate its products or services can not achieve the desired results by simply adding more features or services to the existing offering as incremental enhancement. Thus, for a software company, creating differentiating experience should carry as much weight as how product or service is created if not less. This means that if firms want to transition into the experience market [2], it is critical to realize and understand the new capabilities required. While aesthetics design and good usability is critical, and is commonly understood and considered equivalent to UX among the surveyed startups, on their own these UI elements are unlikely to be sufficient to provide desired business growth. Failing to recognize the gap between a firm's current UX design practices and those required for developing growth-driving UX is likely to cause the companies to replication or "doing-more-of-the-same" [3]. Thus, it is imperative for startups to utilize UX to create value that is desired and appreciated by the customers on one dimension, while the created customer value can be translated into business value, driving startup growth on the other dimension. Such process would re-enforce startups' emphasis on UX, creating a positive loop, or "virtuous development cycle".

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P6.

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A MULTIPLE CASE STUDY**

by

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