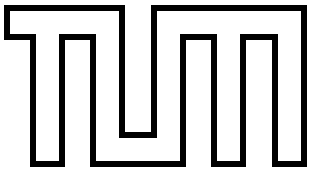

FAKULTÄT FÜR INFORMATIK

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Master's Thesis in Information Systems

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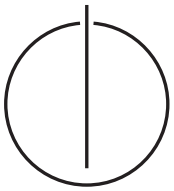

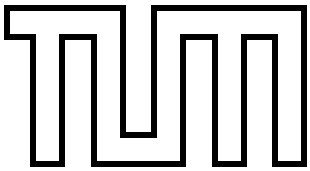

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Development of Design Guidelines for the IT Support of the Entrepreneurial Process

Entwicklung von Gestaltungsrichtlinien für die IT-Unterstützung des Gründungsprozesses

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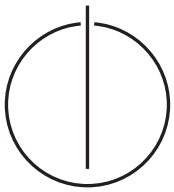

I confirm that this master's thesis is my own work and I have documented all sources and material used.

Munich,

(Pascal Stegmann)

Abstract

Innovation is an important driver of economic growth. Still, a significant portion of established companies fail to innovate in order to reinvent themselves and do not move beyond incremental innovation. At the same time, startups often face challenges in striking roots in their target markets because of a lack of sustainable business models with long-term profit potential. Therefore, companies in general try to search for methodologies and support to increase the success rate of their innovation process.

Lean Startup (LS) is a framework for the entrepreneurial process, combining existing concepts like Agile Development, Customer Development and Lean Thinking, that promises to overcome the main reason startups fail, i.e. building a product that nobody wants. Given the popularity and structured approach of LS, it could serve as the basis for an IT support of the entrepreneurial process. The goal of this thesis therefore is to build a foundation for such a support. Besides a literature research on the experimental approach of LS, the main contribution is to provide insights into how startup founders conceive LS and how they currently implement different aspects of the entrepreneurial process that are relevant to LS. Based on those observations, the thesis aims at providing high-level design guidelines that should shape an IT support of the entrepreneurial process.

Different research methods were applied to get a holistic view of the object of study. First, a literature research was performed to evaluate the experimental approach of LS. In a second step 11 semi-structured interviews were conducted with people involved with incubators, startup founders and an LS expert to gain insights into the entrepreneurial process. Further to achieve a certain level of representativeness, an online survey amongst potential LS practitioners, i.e. founders and product managers, was conducted with 36 participants.

The results show that there is an ambiguous understanding of LS amongst founders ranging from a very broad interpretation of a mere mindset to a very strict interpretation of a clear process. This is resulting in diverse ways of implementing LS. On a high level it is therefore difficult to distinguish the approaches of LS practitioners and Non-LS practitioners. Moreover, the results show that there is no need for a support specifically for applying LS. However, given the findings, the focus was widened to the entrepreneurial process in general and three main areas of support were derived: 1) enable flexibility, 2) provide knowledge and 3) foster social exchange. As a result 14 high-level design guidelines for an IT support of the entrepreneurial process are proposed. Finally, an agenda for further research is suggested to develop the idea of IT support further.

Contents

List of Figures

List of Tables

Abbreviations

BML	Build-Measure-Learn
BMC	Business Model Canvas
DMAIC	Define, Measure, Analyze, Improve and Control
IT	Information Technology
LS	Lean Startup
MVP	Minimum Viable Product
OODA	Observe, Orient, Decide, Act
PDCA	Plan, Do, Check, Act

1. Introduction

1.1. Motivation and Research Question

As pointed out by Schumpeter (1942, p.82), innovation is the main driver for long term economic growth in capitalism. Former startups like Facebook, Google, AirBnB and Uber have risen to a significant size in terms of market capitalization in a short amount of time. They have become important players in the economy, influencing industries and thereby disrupting incumbent companies by being the driving force of innovation. Every incumbent company and newly founded startup is trying to innovate by creating new products/services and business models for an unserved market or trying new approaches for an existing one. Still, 90% of newly founded companies fail for various reasons, number one being that there is no demand for the product (CB-Insights, 2016). Failing in itself is not the problem, but it is important to evaluate the viability of an idea early enough to avoid wasting too many resources in the form of time and money on an idea that is not viable.

One main reason why achieving success is so difficult seems to be the extreme uncertainty regarding the product and the addressed market, i.e. the potential customers, that new product development initiatives are facing. Given the uncertainty and dependence on external factors influencing the success of a startup, it is difficult to determine how to effectively increase the odds of success. One aspect of venture creation and new product development that can be influenced is the processual aspect, i.e. how do you approach validating your idea and building your product.

Commonly used methods for innovation management and new product development like stage-gate processes, mainly developed for established companies and incremental innovation, do not necessarily work for disruptive innovation and startups (Bers et al., 2014). The high uncertainty for disruptive innovation requires more flexibility and adaptability of the process. There is less structure and organizational requirements the process has to fulfill and additionally startups have a higher constraint on resources like time and money.

Lean Startup (LS) provides a methodology to approach the venture creation process in an iterative and experimental way. Being based on already existing concepts and principles like Agile Development, Customer Development and Lean Thinking, LS is nothing entirely new but integrates existing concepts into a framework that gives guidance in the innovation process (Ries, 2011, p.4).

The concept, first introduced by Eric Ries around 2008 in Silicon Valley, gained popularity and the number of supporters grew to a large community, now having meet-ups and local communities around the world with a significant number of people interested in the approach.

While there is research about experimental and iterative processes being a better approach under uncertainty (see Silberzahn and Midler, 2008; Wiltbank et al., 2006), research focusing specifically on evaluating the LS methodology is just gaining attention in recent years. Ghezzi et al. (2015) could for example confirm that the LS approach is superior to a traditional business plan based approach. Further, Ladd (2016) could support that an

experimental approach has a positive impact on success, but that too much experiments can actually have a negative impact and that other factors like having a strong strategy might be more important.

The motivation for this thesis is to gain insights into the venture creation process with a specific focus on the LS approach. The idea is to understand how people interpret the concept and how they try to implement aspects relevant for the approach. From these empirical insights implications and guidelines for a possible IT support of the entrepreneurial process are derived.

Given the presented motivation, the thesis intends to answer the following research questions:

1. What is the state of research on the experimental approach of LS?
2. Practical view on LS
   - 2.1 What is the practitioners' understanding of the LS approach?
   - 2.2 How do founders implement aspects relevant to the LS approach?
3. What are implications and recommendations for a potential IT support of the entrepreneurial process?

1.2. Contribution and Research Approach

This thesis contributes to research as it gives insights in the behavior and practices of startups. By drawing on the experience of founders and people involved with startup incubators, information about the venture creation process in general is gathered but also more specifically the LS approach is evaluated, i.e. how it is perceived and implemented in practice. The main contribution is to propose a set of high-level design guidelines for an IT support of the venture creation process based on the empirical findings. These guidelines should serve as a starting point for further research and a possible implementation of an actual system.

Two common research approaches in information systems are behavioral science and design science (Hevner et al., 2004).

Behavioral science originates from the natural science domain and is aimed at understanding reality. Therefore the main activities in behavioral science are discovery and justification. Discovery is about generating or proposing scientific claims, whereas justification tries to test those claims for validity. The main outcome and goal is to come up with new theories or models to explain reality (March and Smith, 1995).

Design science is rooted in engineering and the science of the artificial (Simon, 1996). The main objective is to create and evaluate new artifacts to solve organizational problems. An artifact is defined as a construct, model, method or instance and is represented in a structured form that can vary from software to informal natural language descriptions (Hevner et al., 2004).

Those approaches are not dichotomous but as proposed by Hevner et al. (2004) create two sides of the information systems research cycle (see figure 1.1).

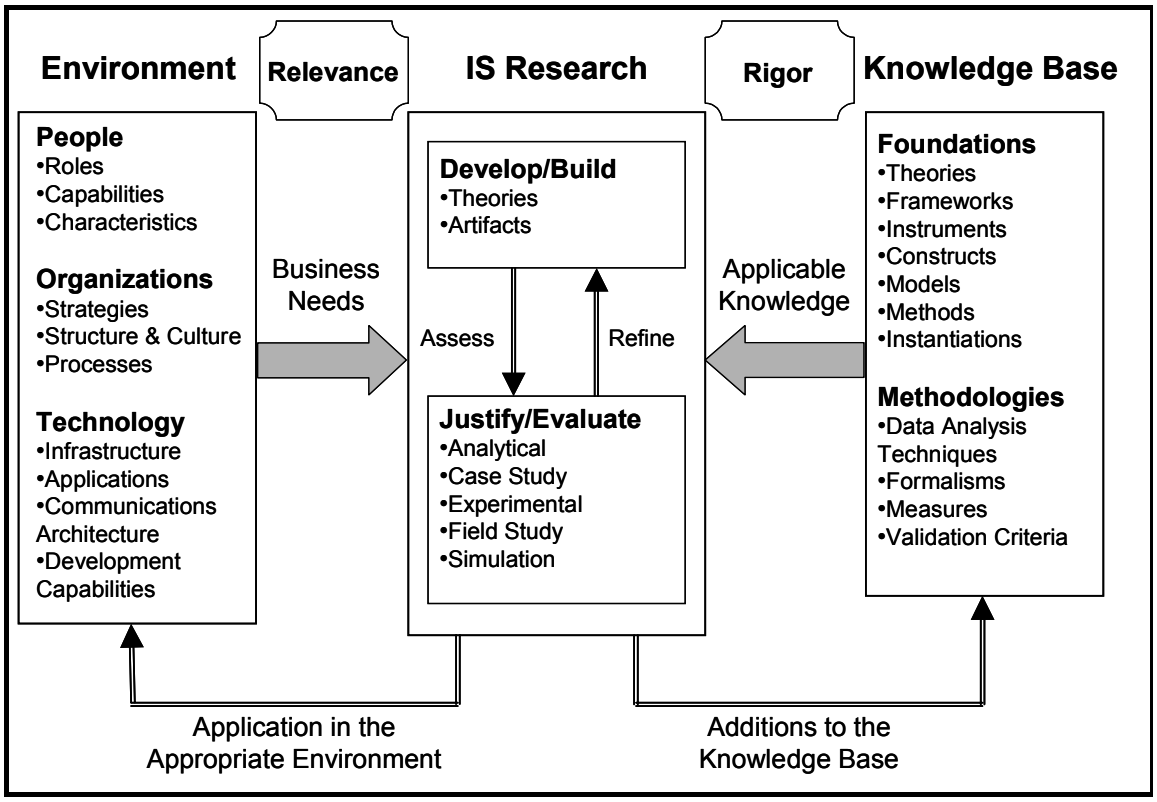

Figure 1.1.: Design Science Model (Hevner et al., 2004)

To ensure the relevance of the performed research, one first has to understand the environment created by the people, organizations and used technology, and identify a business need. Further, one has to include knowledge from the existing knowledge base, i.e. foundations from former research and methodologies, to ensure the rigor of research. As mentioned, the idea of information systems research is then to develop theories and justify them or, taking the design science approach, build artifacts and evaluate those.

In this thesis I focus on the design science side of the research cycle. The relevance is given through the popularity of the LS approach amongst startup founders. Rigor is ensured through the preliminary literature research conducted and used research methodologies as specified in chapter 3. The set of high-level design guidelines represents the considered artifact of the design science process. However, due to time restrictions, the guidelines are still up for further evaluation to complete the design science cycle.

A common trend in applied research, like information systems research, is to use a mixed method approach. As Kuckartz (2014) defines it, it is a mix and integration of qualitative and quantitative methods with different possible combinations of order and weight of the different methods used. The idea is to get a holistic view of the object of study and mitigate the individual shortcomings of both types of methods. More specifically, I followed the *exploratory sequential mixed methods* approach as described by Creswell (2014, p.220). In

this research design a qualitative form of data collection precedes a quantitative form of data collection in order to inform the development of the quantitative instrument. The idea is to be able to develop a better measurement instrument if it is based on a qualitative approach first.

Prior to the empirical part of the research I conducted a literature research to build a better theoretical foundation about the LS approach and the venture creation process in general. Further I searched for support of the experimental approach of LS to address possible differences between theory and practice. As a qualitative method semi-structured interviews were used to explore the space of venture creation. This was achieved by gathering the experience and opinions from people working in incubators, founders and LS practitioners with different backgrounds and levels of experience. The results of the interviews and literature review informed the development of the quantitative method, where I developed and conducted an online survey amongst founders and possible LS practitioners like product managers. In the last step, overall findings were synthesized and observations in this context were collected out of the empirical data. These observations were used as the basis for deriving the design guidelines for an IT support of the entrepreneurial process.

The different steps are summarized and illustrated in figure 1.2. A detailed description of the used methodology can be found in the respective chapter 3, presenting details about the implementation of the methodology in section 3.1 and 3.2.

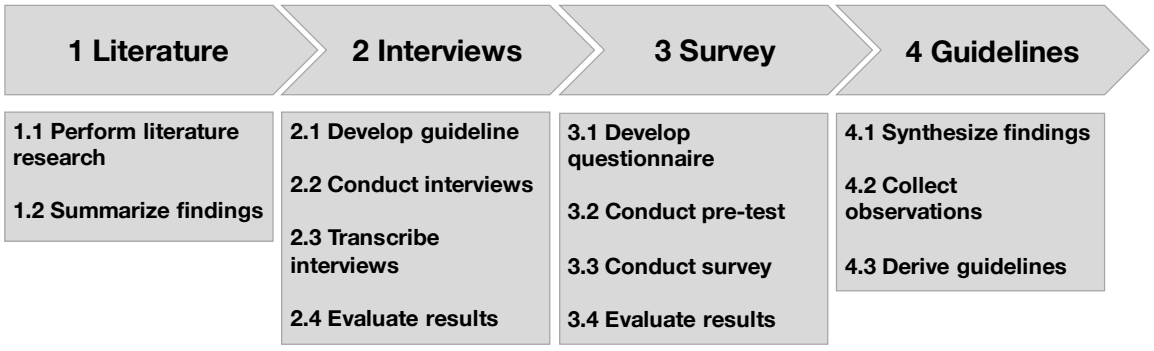

Figure 1.2.: Research Approach

1.3. Outline of the Thesis

Besides the introduction, the thesis consists of five parts: Theoretical background, methodology of empirical study, empirical findings, implications and guidelines for the IT support of the entrepreneurial process and the conclusion.

Chapter 2 focuses on the theoretical foundation. Starting by covering definitions like entrepreneurship and startup, general concepts are presented for further reference like different models for the phases of the entrepreneurial process (see section 2.2). The following section then focuses on LS, giving an overview and covering the foundation of LS (Lean Thinking, Agile Development, Customer Development) followed by a more detailed explanation of the different concepts (Build-Measure-Learn (BML) cycle, Minimum Viable Product (MVP), Innovation Accounting). Further covering more information systems related aspects of proposed artifacts and tools to be used in this context. The section finishes by addressing possible limitations and criticism of LS.

Answering research question 1, section 2.4 covers the results of the literature review, presenting the identified concepts of risk vs. uncertainty, effectuation vs. causation and value of planning vs. non-predictive approaches for venture creation. For more context, potential influencing factors of the venture creation process are covered that have to be taken into consideration in addition to processual aspects. Chapter 3 focuses on the used methodology of the empirical study. The different research methods (interviews and survey) are explained in detail in the corresponding sections (see section 3.1 and 3.2).

Chapter 4 focuses on presenting the empirical findings thereby answering research question 2.1. and 2.2. First, the findings of the interviews with incubators and startups are presented (see section 4.1 and 4.2) following the results of the survey (see section 4.3 and 4.4). Based on the empirical findings, implications and guidelines for a potential IT support are derived and presented in chapter 5, answering research question 3. Finally, chapter 6 concludes by presenting summarizing remarks, addressing limitations of the research and providing an outlook for further research.

2. Theoretical Background of Lean Startup

2.1. Entrepreneurship and Startups

2.1.1. Entrepreneurship

Central to the research topic is the concept of the entrepreneur and entrepreneurship. Different associations and understandings what defines an entrepreneur exist and will be presented in the following. According to dictionary.com a definition for an entrepreneur is "a person who organizes and manages any enterprise, especially a business, usually with considerable initiative and risk". Although covering important aspects this definition is too broad.

One of the first concepts of entrepreneurship was introduced by Schumpeter. He introduced the idea of creative destruction, or in other terms innovation, as the driver for sustained long-term growth in capitalism (Schumpeter, 1942, p.82). Creative destruction means replacing inferior products or services thereby destroying existing companies, however, the new companies compensate for the loss and ultimately more value is created for the economy as a whole. This creative destruction is achieved through entrepreneurship and is performed by entrepreneurs.

Innovation or "carrying out of new combinations", how Schumpeter (1934, p.66) describes it, can be achieved in five forms:

- Launch a new product or a new species of already known product
- Application of new methods of production or sales of a product
- Opening of a new market
- Acquiring of new sources of supply of raw materials or semi-finished goods
- New industry structure such as the creation or destruction of a monopoly position

In order to innovate, the basic tasks of an entrepreneur are to recognize an opportunity and pursue it. This means evaluating an idea and if it is worthwhile pursuing, finding and arranging the necessary resources in the form of a team with complementary skills and the required capital.

Most of entrepreneurship research analyzes the traits that constitute an entrepreneur, e.g., need of achievement, locus of control, risk taking, values or age (Gartner, 1989). However, this trait based approach is not sufficient to explain entrepreneurship. Therefore, Gartner (1989) suggests to view entrepreneurship as the creation of organizations, which is also supported by Bygrave (1997, p.2). The creation of an organization is what distinguishes entrepreneurship from regular self-employment. Gartner (1990) further tried to identify different research themes and came up with eight aspects that define entrepreneurship research

and thereby give a hint at a possible definition of entrepreneurship: the entrepreneur, innovation, organization creation, creating value, profit or nonprofit, growth, uniqueness and the owner-manager. These themes support some of the former concepts of innovation, organization creation and growth as an important part of entrepreneurship.

Despite various attempts, research is still trying to find a common definition and consensus about what constitutes entrepreneurship theory (Alvarez, 2005; Gartner, 1990) and this is a main reason no generally agreed upon theory of entrepreneurship has emerged yet.

2.1.2. Deriving a Definition for Startups

Not every newly founded company or business is automatically a startup. The best definition, though very practical oriented, is a combination of the definitions by Blank, Graham and Ries that picks up some of the earlier presented concepts about entrepreneurship.

A startup is defined by Blank (2013) as a "temporary organization designed to search for a repeatable and scalable business model" that defines how a company creates, delivers and captures value. By being in a state of search, the aspect of innovation is addressed, i.e. a startup is not just copying an existing model but trying to do something new. This search also implies a form of uncertainty about the outcome. Finally, this state ends with reaching product/market fit[1] and, according to Blank, is the distinction between a startup and an established company. He also introduces the concept of growth and scalability, i.e. the ability to grow, as an important characteristic of a startup. This definition separates a startup from a small business like a restaurant, that is just executing a known business model in an existing market and has a limited scalability. Also in contrast an established organization usually has found its business model and now has the main goal to execute efficiently.

According to Graham (2012), being newly founded is not enough to define a startup. Simply working in technology or taking venture funding is not sufficient either. His definition supports the growth aspect and states that everything one associates with the idea of a startup is based on the objective of growth and scalability. Ries further defines a startup as "a human institution designed to create new products and services under conditions of extreme uncertainty" (Ries, 2008b, p.8), thereby addressing the organizational and innovative aspect by referring to new products and services. One of his main additions is the emphasis on the uncertainty in the process, which will be addressed in more detail later (see section 2.4.2).

Given the existing but fragmented definitions, for this thesis the following aspects are considered relevant for defining a startup:

- Trying to achieve innovation
- In search of a repeatable and scalable business model, i.e. before product/market fit
- Aiming for growth
- Operating in a situation of uncertainty

[1] Definition of product/market fit can be found in section 2.2.3

2.2. Phases in the Entrepreneurial Process

In the following section different concepts for how to define the phases of a business are presented to give a framework for later reference. Overall, the common way is to describe the process in stages or phases. The models should give guidance what to focus on at the different stages, but the detailed priorities and activities are very much dependent on the product, business model, etc. (see Gartner, 1985).

2.2.1. Organizational Life Cycle Theory

The concept of organizational life cycle theory was developed to describe the whole life cycle a company goes through. The theory gives a very broad description comparing a business to a biological organism that passes through different phases in its lifetime. Different forms of this theory exist in terms of number of stages and definitions of those stages and implications. However, a common version is presented by Lester et al. (2003) with five distinct stages: *Existence*, *Survival*, *Success*, *Renewal* and *Decline* (see figure 2.1).

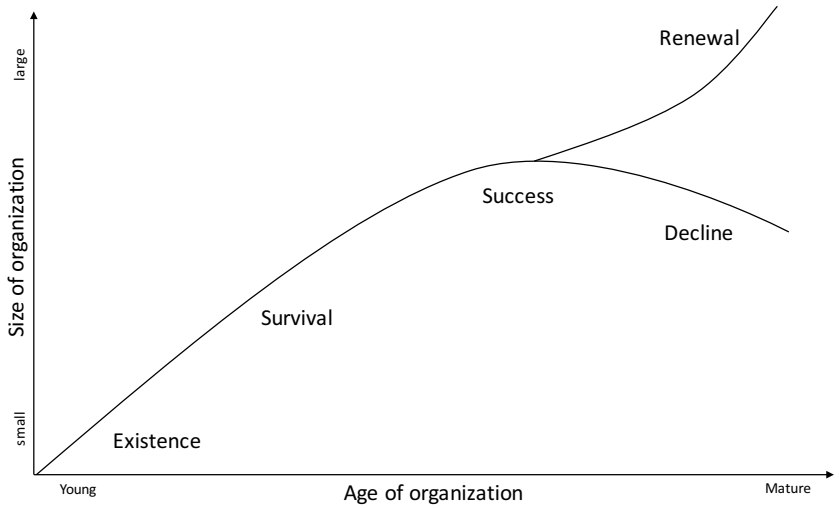

Figure 2.1.: Organizational Lifecycle (Own Illustration, Inspired by Lester et al., 2003)

As presented by Lester et al. (2003) the stages are broadly defined as follows:

- **Existence:** Defines the start of an organization and marks the beginning of organizational development.
- **Survival:** Firms in this stage seek to grow and start developing some formalization and structure.
- **Success:** This stage is defined by bureaucracy and thereby created formalization and control. Instead of fighting for growth and survival the organization is trying to protect what has been gained so far.

- **Renewal:** Renewing organizations try to return to a leaner time and place the needs of customers above those of organizational members to foster innovation and creativity.
- **Decline:** The decline stage is often the trigger for demise. Politics and power is important and personal goals become central above organizational goals. This desire for power often erodes the viability of the organization.

Lester et al. (2008) empirically confirmed the first four stages of the model but could not find a company in the last stage of decline. Further they found that innovation plays an important role in the first and fourth stage, i.e. Existence and Renewal, supporting the importance of innovation for the long-term sustainability of a company.

2.2.2. Process Model of Entrepreneurial Process

Compared to the lifecycle model the entrepreneurial process is covering more of the earlier stages in the lifecycle of a company. Multiple models of the entrepreneurial process have been developed over time focusing on various aspects of the process (Gelderen et al., 2005, p.366). As an example for a traditional model covering the most common steps of the process of entrepreneurial venture creation, I want to present the model introduced by Bhave (1994). He developed a process model that describes an "iterative, non-linear, feedback driven, conceptual and physical process" (Bhave, 1994, p.223). It is separated into three stages: *Opportunity Stage*, *Technology Set-Up and Organization Creation Stage* and the *Exchange Stage*.

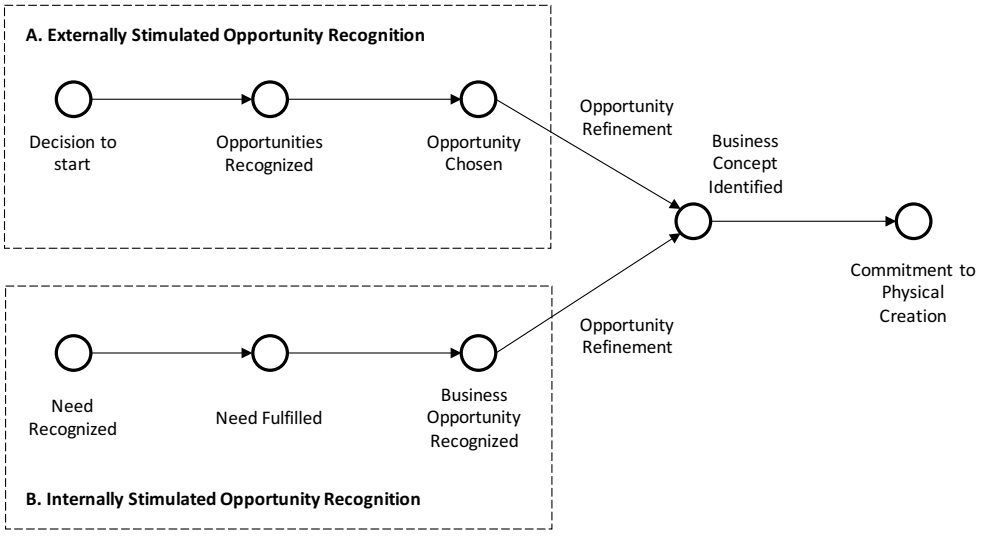

Figure 2.2.: Opportunity Recognition Sequences in Entrepreneurial Venture Creation (Adapted from Bhave, 1994)

According to Ardichvili et al. (2003) opportunity identification and opportunity development are some of the most important abilities of an entrepreneur in the entrepreneurial process.

In the model presented by Bhave (1994) two possible triggers for opportunity identification or recognition are identified (see figure 2.2):

- **Externally stimulated opportunity recognition**: The decision to start precedes the actual opportunity recognition. This is the case if someone wants to start a company on his own while still in his current job, so he does not necessarily have made a decision which opportunity to purse.
- **Internally stimulated opportunity recognition**: The decision to start follows the opportunity recognition. For example, someone recognizes a need, fulfills it and afterwards realizes that this could be a business opportunity.

However, as illustrated in figure 2.2 both paths end up with an identified business concept and a commitment to physical creation.

The further process with the three mentioned stages is illustrated in figure 2.3.

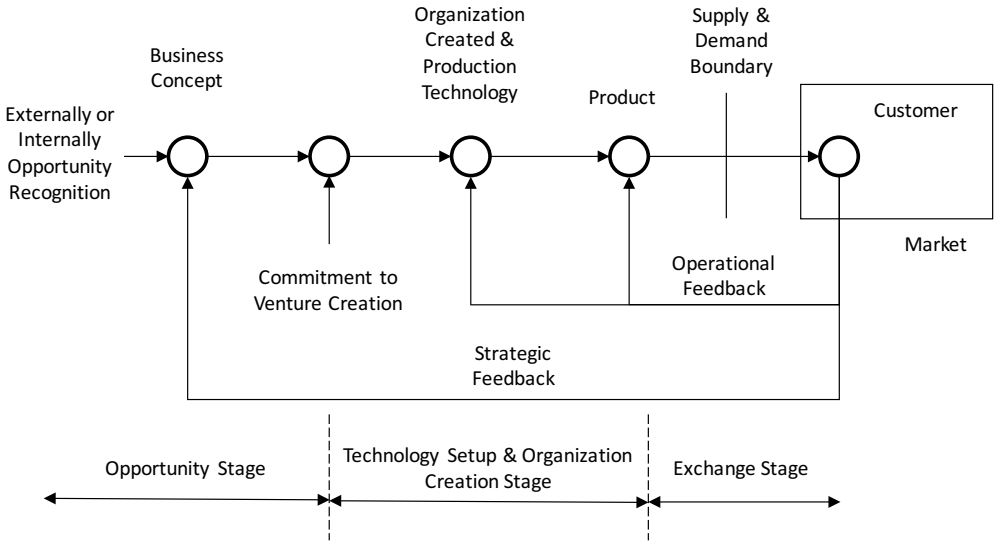

Figure 2.3.: Process Model of Entrepreneurial Venture Creation (Adapted from Bhave, 1994)

After the commitment to physical creation, the needed organization and production technology is set up to create the actual product. After this step the exchange stage is entered where the supply & demand boundary is crossed and the market is entered by selling to the customer. Bhave (1994) points out that the reality is not as linear as the model suggests. As an example some respondents of his survey already had customers set up before building the product.

He also introduces feedback loops and distinguished between strategic and operational feedback making the whole process iterative. For strategic feedback there is a wide gap between the entrepreneur's perception of customer needs and the actual need, so a very fundamental change of the business concept is required. In contrast, operational feedback mainly focuses on quality or missing features. This kind of feedback does not threaten the business model as a whole, but suggests a change in product or production technology.

This model is significantly different to the newly proposed LS or hypothesis-driven model of venture creation as further described in section 2.3.

2.2.3. Startup Development Phases

The framework for the different phases of a startup provided by StartupCommons is a good point of reference for a more recent approach of a startup as I have defined earlier. Compared to the earlier presented models, it puts more emphasis on LS ideas like the validation and scaling aspects of a startup (see figure 2.4).

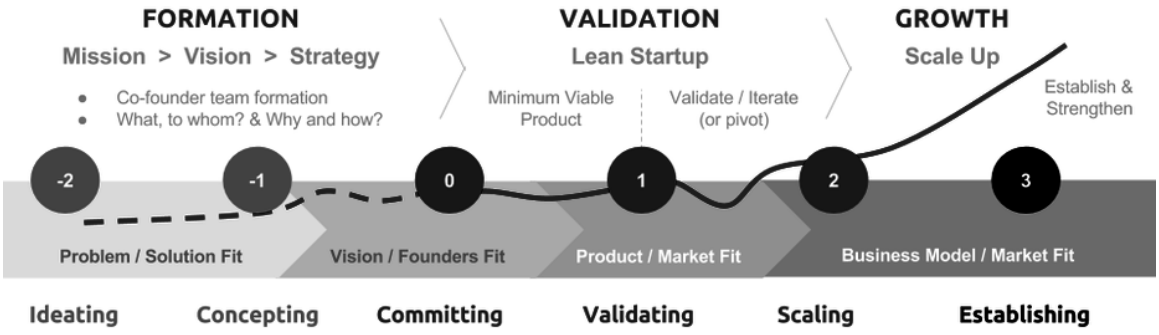

Figure 2.4.: Startup Development Phases (StartupCommons, 2016)

Focusing on the earlier phases, StartupCommons (2016) defines the different phases or stages a startup normally passes as follows:

- **Ideation**: An entrepreneurial ambition and/or a potential scalable product or service idea exists. There should be an initial business idea on why and how this product or service would create value. At this stage the team may consist of only one person or a vague set of people. The involved people are not 100% committed and there is no right balance of skills in the team structure yet.
- **Concepting**: This phase is about defining the mission and vision with an initial strategy and key milestones for the next three years on how to get there, divided in various steps and detail. The team should have been established with complementary skills and a balanced ownership plan.
- **Commitment**: The team should commit to the concept and have a shared vision and attitude. It should be able to develop the product or service in form of a MVP without dependency of uncommitted external resources. The commitment is supported by a

signed shareholder agreement between co-founders with the developed milestones and plans defined in the concepting phase.

- **Validation**: The main task is to iterate and validate assumptions until a validated solution is found to demonstrate initial user growth and hopefully revenue. Key performance indicators should be identified so the team is able to attract additional investment.
- **Scaling**: As soon as the product is validated the focus shifts to growing the users and revenue. The product needs to show market traction in a big or fast growing market, so the team can prove that it is able and willing to grow fast. Funding is already established or needs to be established by now to support the growth.
- **Establishing**: As growth is achieved and can be expected to continue it is no longer difficult to attract financial and people resources. Depending on the situation and vision the company will continue to grow and founders and/or investors may exit the investment or stay with the company.

For later reference, two important milestones for a startup are defined. When they need to be achieved is illustrated in figure 2.4.

Problem/solution fit is when the startup found an existing and relevant problem that a possible customer has and a possible solution to solve that specific problem. This is an important milestone as a startup needs to make sure to offer something that is filling a need. However, problem/solution fit is not enough to make a startup successful.

Product/market fit is the most important milestone for a startup to reach. At this point the product the startup is offering is validated in the market by paying customers, so not only is the product solving a relevant problem, but the complementing business model is working too. This is a pre-condition before the startup should think about scaling and growing the business.

2.3. Lean Startup

2.3.1. Lean Startup Concepts Overview

LS is a framework to guide product development and create continuous innovation created by Eric Ries (Ries, 2011, p.4). He can take credit for the name as he first mentioned it in 2008 on his blog "Startupslessonslearned", but the underlying principles are not entirely new. Combining these into a comprehensive framework and promoting this approach was the major contribution of him. According to Ries (2008b) the idea of a LS was enabled by major trends in the startup and technology space and is characterized by:

- the use of platforms enabled by open source
- the application of agile development
- ferocious customer-centric rapid iteration

His definition of a startup is "a human institution designed to create new products and services under conditions of extreme uncertainty" (Ries, 2011, p.8). As a student of Steve Blank and out of his own experience with his startup IMVU he developed the concept of Customer Development further and borrowed ideas from the Lean Thinking and Agile Software Development. These main building blocks are presented in the next sections. The result of this combination is a framework for product development under extreme uncertainty. The idea is to look at product development not from the technology side, i.e. push a product on the market because you have a certain technology, but from the customer side, i.e. pulling according to a specific need and demand in the market.

The main principles of LS according to Ries (2011) are:

- **Entrepreneurship is everywhere**: Due to the broad definition, it not only covers the classic image of a young startup to be applicable ("You don't have to work in a garage to be in a startup" (Ries, 2011, p.8)). It also spans across industries and different company sizes, i.e. new product development efforts in established companies.
- **Entrepreneurship is management**: "A startup is an institution, not just a product" (Ries, 2011, p.8). Therefore, it needs some form of management, which is different to management in an established company. Given that management is mostly about efficiency in an environment that is to a certain degree predictable, most entrepreneurs reject the idea of traditional management approaches in the early phases of a startup and return to a more chaotic approach of improvisation. However, this tendency needs to be overcome.
- **Validated learning**: Startups' main goal in the beginning is not to make money but to learn about their business and find a sustainable business model. Given the uncertainty, every startup starts with a set of unproven hypotheses. Following a scientific approach those hypotheses should be validated through experiments to derisk the business over time on the way to a sustainable business model.
- **Build-Measure-Learn**: This principles describes the feedback loop to achieve the validated learning. By building a product and then testing it with customers, the entrepreneur gains insights and learns whether his hypotheses are right and he can continue on the current path (persevere) or should adapt his business model (pivot).
- **Innovation accounting**: In contrast to traditional financial accounting, which is not applicable in the early phases of a startup, innovation accounting gives the entrepreneur a better way of measuring progress, setting up milestones and prioritizing work.

The following sections cover the theory and concepts of LS to create a common understanding. Starting with the foundation LS is based on like, Lean Thinking, Agile Software Development and Customer Development, I further explain the BML cycle and overall process of LS. Following, the concept of an MVP and how innovation accounting works is explained. To cover how LS can be supported, possible artifacts and tools are presented, concluding with voiced limitations and criticism of the approach.

2.3.2. Foundation of Lean Startup

Lean Thinking

One important pillar of the LS approach is the influence of Lean Thinking, originating out of the Toyota Production System created by Taiichi Ohno in the context of Lean Manufacturing/Production (Womack et al., 2007, p.48). The basis of Lean Thinking is the overarching idea of muda, which is the Japanese word for waste. Waste exists throughout processes and organizations and is defined as everything that is not producing value for the customer. The main goal of Lean Thinking is therefore to reduce the different forms of wastes that occur to work towards creating a perfect company. Instead of starting with a clear slate in a startup situation, lean approaches are normally used in established organizations to improve existing processes.

The main principles and general steps of the Lean Thinking approach to achieve this waste reduction according to Womack and Jones (2013) are:

1. **Value**: In order to identify waste you have to specify what value is as perceived by the customer.
2. **Value Stream**: Next, the company has to identify how the value streams through the organization, thereby often already recognizing unnecessary steps of a process.
3. **Flow**: If the stream is identified the next step is to make the value flow through the value stream, referring to a balanced utilization of the different involved parties, basically addressing the waste that is generated through a functional oriented organization rather than a process oriented organization.
4. **Pull**: After having an efficient process, the next principle is to change from a push to a pull based system, where the products are pulled by the customers when there is demand instead of being pushed out by the company when they are produced.
5. **Perfection**: Ultimately, through the mentioned principle, the last principle of perfection is achievable as striving to implement the other four principle is generating a reinforcing effect.

The idea was generalized from a production oriented concept to a more general Lean Thinking approach. Over time these concepts were adapted for various other applications like software development (Lean Development), management of services instead of products (Lean Service) or the management of IT services (Lean IT).

Through years of experience with implementing these abstract concepts a very extensive stream of practices and methods were developed. Often these methods are too formalized and only applicable for established organizations. However, some are still applicable in the startup context. Possible examples that were taken out of the Lean Manufacturing toolkit are the 5-whys analysis (Ries, 2010) or Kanban based systems to implement the flow principle.

Agile Software Development

To achieve the needed speed and agility of the LS approach, one foundation to follow is to use Agile Software Development, which is explained in the following.

In traditional approaches of software engineering, like a waterfall approach, the assumption was that all necessary requirements could and should be anticipated and elicited upfront as the cost of change grows through the software's development life cycle. So any change that occurs later in a project is significantly more expensive than an earlier recognized one. Change was perceived as negative and needed to be eliminated. Unlike an assembling process of a car that is able to be defined, the software development process is an empirical or non-linear process, as much change happens during the time of implementation (Williams and Cockburn, 2003). Therefore, a linear approach is not working in a complex environment. Surveys showed that in reality conforming to a plan is not the ultimate goal of a project. In order to be successful in the end the customer needs to be satisfied (Highsmith and Cockburn, 2001).

Instead of avoiding change the alternative needs to be to embrace the change and trying to drive down the cost of adaption. Nowadays, software development is less about individual projects but transformed into a continuous development process as long as the software is in use (Subramaniam and Hunt, 2006).

The main principles of Agile Software Development were written down by a group of practitioners representing the different approaches of agile development in the form of an agile manifesto (Beck et al., 2001):

- Individuals and interactions over processes and tools,
- Working software over comprehensive documentation,
- Customer collaboration over contract negotiation,
- Responding to change over following a plan.

Agile approaches focus on the people. In order to be more effective a team has to reduce the cost of moving information between people by focusing more on interactions, talking face to face as opposed to writing and reading documents. Further the time between making a decision and seeing the consequences needs to be reduced. This can be achieved through involvement of user experts and working in an incremental way (Cockburn and Highsmith, 2001). This incremental and iterative way of working with short feedback loops is further justified by recognizing the empirical or non-linear nature of the software development process (Williams and Cockburn, 2003).

Another significant concept of Agile Software Development methods was introduced by Highsmith and Cockburn (2001, p.121) and described as the "unforgiving honesty of working code". Instead of extensive planning and discussion over theoretical ideas, working code helps in the decision making and collaboration process as it tells you what you really have, instead of promising what you will have in the future, which bears the potential of different interpretations by the involved parties.

Summarizing, traditional approaches like the waterfall method are useful if both the problem and the solution is well understood and not subject to change. The most efficient way in this situation is to plan the different sequential steps and execute those. Agile methods are useful when the problem is generally understood but the implementation steps are difficult to determine. However, in a startup environment often also the problem space is subject to change as it is not necessarily clear which problem needs to be solved in the beginning. Therefore, besides Agile Software Development, which focuses on the technical aspects of implementation, Customer Development tries to address the change on the business and customer side, as described in the next section.

Customer Development

According to Steve Blank, the biggest risk of a startup is not in building the product, but in finding people to pay for your product. The traditional product centric or "build it and they will come" approach of most companies is flawed, as customers are considered too late in the process. To counter this approach Blank developed a concept called Customer Development. The idea is that in parallel to the product development process it is important to develop the customer so the product actually solves a problem that customers have and you do not end up with a perfectly built product after your product development process and no one buys it. According to Blank a startup is a "temporary organization designed to search for a repeatable and scalable business model" (Blank and Dorf, 2012, p.22). Therefore, the emphasis is on learning and discovery in the early phases before executing a proven model. Entrepreneurs need to avoid premature scaling until they know that the model is working and scalable.

In more detail, the concept consists of four phases (see figure 2.5), where the first two phases can be summarized as the search phase and the second two as the execution phase (Blank and Dorf, 2012, p.22).

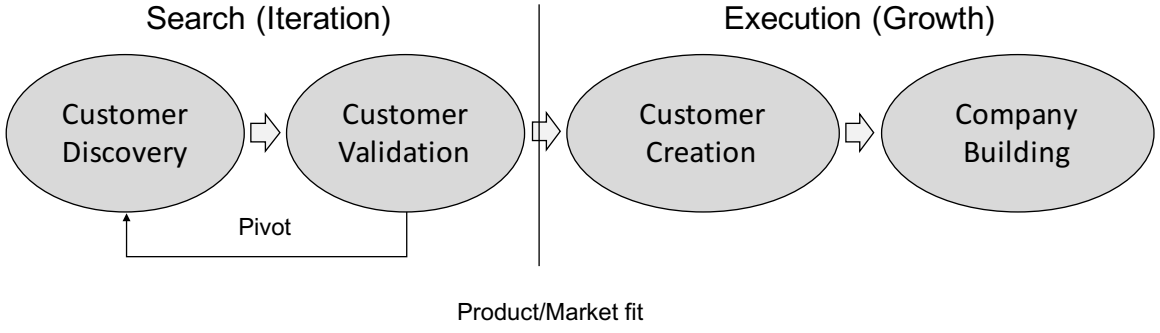

Figure 2.5.: Customer Development Phases

The **search phase** is an iterative feedback loop between customer discovery and customer validation.

- **Customer Discovery**: First turn the founders' vision into business model hypotheses and develop a plan to test those to turn them into facts. The focus is on finding and understanding your customers and their problems. Your goal is to get to a problem/solution fit and have a proposed MVP (see section 2.3.4 for further explanation) and sales funnels for customer acquisition to test in the next step.
- **Customer Validation**: Test whether your hypotheses can be confirmed and the resulting business model is repeatable and scalable. The goal is to develop a replicable sales process to be able to scale in the execution phase. Therefore, you need to achieve product/market fit, find a suitable business model and define a sales and marketing roadmap for the following execution phase.

The **execution phase** starts after product/market fit is achieved.

- **Customer Creation**: Based on the validated model of the search phase you start the execution phase by building demand and driving users into the sales channel.
- **Company Building**: Finally, you focus on building the organization and continue following your plan. The startup transitions to become a company executing a validated model.

The first two steps are the main pillars of the LS approach. They are about finding a problem with a possible solution and validating it, in order to achieve product/market fit before the company is actually created and scaled.

Summarizing important ideas about the Customer Development concept an excerpt of the main principles out of the Customer Development Manifesto (see Blank and Dorf, 2012, p.31ff) is presented:

1. There are no facts inside your building, so get outside.
2. Pair customer development with agile development.
3. Failure is an integral part of the search for the business model.
4. Make continuous iterations and pivots.
5. No business plan survives first contact with customers so use a Business Model Canvas
6. Design experiments and test to validate your hypotheses
7. Startup metrics are different from existing companies
8. Fast decision-making, cycle time, speed and tempo
9. Communicate and share Learning

2.3.3. Build-Measure-Learn and the Lean Startup Process

A central concept of LS is the BML loop, that defines the different steps of the iterative process someone has to perform to advance his startup in a systematic way. The concept is based on the OODA loop (Observe, Orient, Decide, Act) and was originally developed by John Boyd in the field of military strategy (Ries, 2008a). According to him "the key to victory is to be able to create situations wherein one can make appropriate decisions more quickly than one's opponent." (Ries, 2008a). The general approach is similar to what people naturally do, however, the value in form of agility and speed is in having awareness of this loop and the attempt to accelerate through this cycle as fast as possible.

Whereas the OODA loop is focused on *acting*, the central aspect of the BML loop is *building*. In order to know what to build one needs to plan in small steps and reverse the loop: First one needs to define what learning should be achieved by creating hypotheses, then a concept needs to be created of what to measure in order to validate or invalidate those hypotheses. Finally one needs to come up with a product or artifact, i.e. the MVP (see section 2.3.4), that needs to be built in order to create the required measure.

Similar concepts and formalizations exist as a continuous improvement process like the PDCA (Plan, Do, Check, Act) cycle, also referred to as Deming cycle, in frameworks like Lean Management (Zollondz, 2013, p.13) or the DMAIC (Define, Measure, Analyze, Improve and Control) cycle in Lean Six Sigma (Töpfer, 2004, p.70).

Eisenmann et al. (2012) describe this process in detail and more actionable, adding important aspects (see figure 2.6). One needs to start with an initial vision (1) which is then translated into falsifiable hypotheses (2). The main difference to a "trial and error" or "see what sticks" approach is that everything is guided by a strong vision. Next, MVP tests are specified (3) and prioritized (4) with regard to the greatest amount of learning, mainly specified by the most critical or high risk assumptions to your business model, further considering a low cost of the test if possible. In the next step the tests are run to produce the results to learn from (5). Here it is important to guard against cognitive biases when interpreting the results to draw the right conclusions as this is one of the deciding factors for the approach to be successful.

Depending on the outcome a decision has to be made to either pivot, persevere or perish (6). When pivoting the vision is adapted to incorporate the learnings as the old vision is not fully supported by the results anymore. Possible examples for a pivot are to transform a single feature into a product (Zoom-in Pivot), change the addressed customer segment (Customer Segment Pivot) or the channel those customers are reached (Channel Pivot). More examples are presented by Ries (2011, p.172ff). If the hypotheses were supported the startup should persevere and stay on the path, continuing with the next prioritized tests. If the vision is not viable at all because the most critical assumptions could not be validated the project should "perish" and be abandoned as a whole.

This is a very strict and formalized version of the process that serves as a guide for how to apply LS. One important aspect is to document hypotheses according to major business model elements and actively pursue experimentation. It is not enough to simply have a lean mindset if you are not guided by a vision giving you direction.

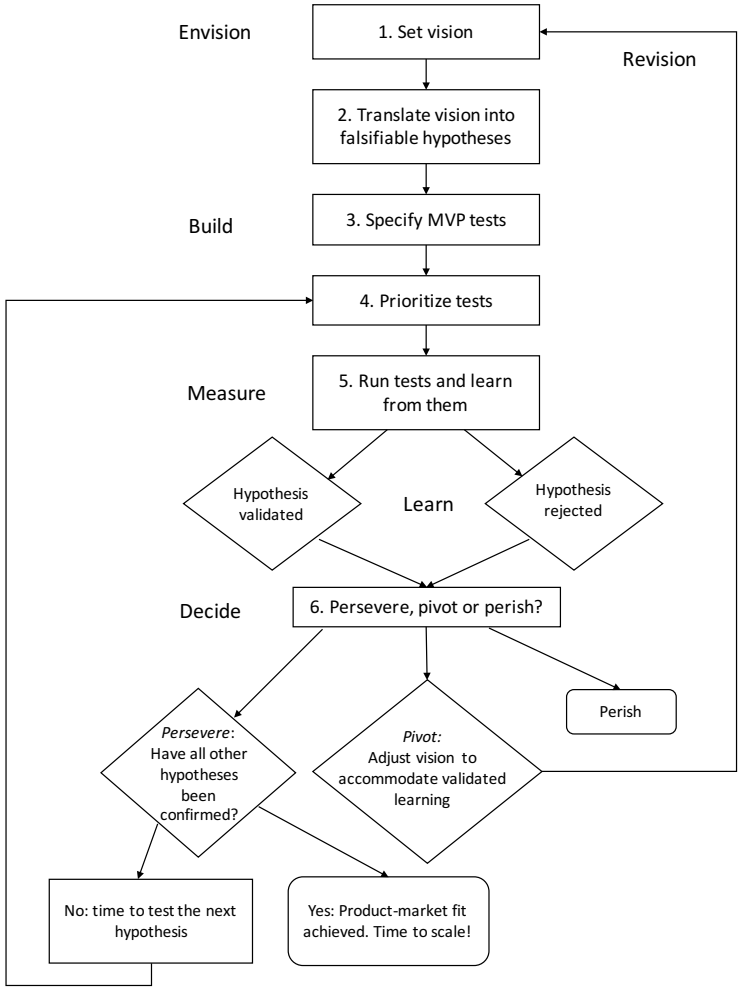

Figure 2.6.: Hypothesis-Driven Startup Process Steps (Adapted from Eisenmann et al., 2012)

2.3.4. Minimum Viable Product

An important part of the LS approach is the concept of the MVP. Often there is the misconception that an MVP is simply a smaller version of your final product, which is not necessarily true. The difference to a classic prototype is that the purpose of an MVP is not just to answer product design or technical questions, but also to validate or invalidate fundamental business hypotheses (Ries, 2011, p.93). The main purpose of an MVP is to enable learning. According to Ries (2011, p.93), the MVP should help starting the learning process as quickly as possible and enable to go through the BML loop as fast as possible, with minimum effort in the form of wasted resources. It should enable the greatest amount of learning. The idea is that building a full product is time-consuming and wasteful if you end up building the wrong solution or implement unneeded features, thereby acting against

the lean principles (Maurya, 2012a, p.96). Regarding the quality and number of features the idea is to build just enough of the possible solution so you have something to test with customers and measure their reaction to further define the requirements of the product (Maurya, 2012a, p.96).

Ries even goes as far regarding the role of quality: "if we do not know who the customer is, we do not know what quality is" (Ries, 2011, p.107), thereby dismissing further discussions about quality. This contrasts the opinion of most people who don't want to damage their reputation by delivering a bad product or they see aspects like design and quality as an essential part of the solution and fear rejection although a better quality product might have been accepted. Besides this reputational risk, Eisenmann et al. (2012) also raise the concern about possible exposure to idea theft if the idea is revealed through an MVP too early to build some form of competitive advantage.

In general, MVPs can range from smoke tests like a simple advertisement to actual prototypes. A collection of possible MVPs is presented in more detail according to examples of Ries (2011, p.97ff):

- **Low or High-Fidelity Mockup**: Commonly used during initial concept and design of a product, mockups that visualize the features of a product can be used to discuss first feedback. This can range from very basic wireframes to high-fidelity mockups that already have the look and feel of a final product.
- **Video MVP**: This type of MVP is basically a product video explaining features of the potential product. This could be either a promotional video or to get more valuable feedback a video that is faking the final product.
- **Landing Page MVP**: For this MVP you create a simple landing page describing your product and product features and try to create traffic to your site. With a call to action you can already collect potential customers and get an idea about click rates and possible conversion rates. This MVP is good to establish baseline metrics and see if there is any feedback in the market.
- **Wizard of Oz MVP**: For this MVP you would create a product but handle parts of the backend manually before spending resources to build an extensive infrastructure and try to automate things before you know if it is worth automating. For example, before building a fully automated food delivery platform you would forward orders from customers manually to restaurants.
- **Concierge MVP**: In this MVP you would actually provide your product or service in person to learn more about the habits and patterns and potential problems of your customer, before you build the product. For example, before building an automated financial advisor you would advise in person and learn about the experience the customer has.
- **Prototype/Product with Reduced Functionality**: This MVP represents the classic prototype, i.e. a smaller version of your final product, with reduced functionality. The biggest challenge is to determine the right features so it is still useful and valuable to test your hypotheses.

Some of the MVPs are normally used in different situations and for different purposes, like mockups for the design process. You may need a video on your product page and finally a landing page if you already have the product. The deciding difference is the purpose for which the MVP is used and when you use it in the process as described above. Which MVP is suitable and necessary to use is dependent on the product and the circumstances thereby determining which hypotheses you want to test with the MVP.

2.3.5. Innovation Accounting and Metrics

In the early phase of a startup financial metrics are not necessarily the best way to measure progress as there may not be any revenues at all and even if, this may not be the right measure as it may be misleading. Usually products do not have zero traction (Ries, 2011, p.114) but a few customers and some growth, giving a wrong impression of success. Perseverance to follow a vision is important, but this should better be based on metrics telling you, that you are going in the right direction. In contrast to financial accounting, innovation accounting is about measuring progress, when there are not necessarily any financial metrics available.

The starting point is to derive a growth model as a reference for any further measurements, that is based on your assumptions and ideal/successful state in the future. You want to determine the key drivers for your business model to be able to focus on the right levers, what is often referred to as the "growth engine" (Ries, 2011, p.116).

As an example, a manufacturing company is presented that uses its profits to reinvest in marketing to acquire new customers. The basic drivers of the growth model are the following three: Profitability of a customer, cost of acquiring a customer and repeat purchase rate of existing customers. The main focus should be on improving those metrics, as an increase will enable the company to grow faster.

Based on this model one can use the innovation accounting process as described by Ries (2011, p.117):

1. **Establish Baseline**: You start off with establishing a baseline for your basic metrics by using the MVP concept.
2. **Tune the Engine**: After establishing your baseline everything you do regarding marketing or product development should be focused on improving your baseline if it is not at its optimum yet.
3. **Pivot or Persevere**: Depending on the outcome you achieved you want to keep doing and persevere on your current path or try something different and pivot.

The actual metrics may vary from company to company as they may have different growth engines. However, some concepts are often mentioned in relation to LS that give a framework about metrics in general: The three A's of metrics, cohort analysis and the pirate metrics framework by Dave McClure. These concepts are briefly explained in the following sections, to provide a basic understanding of how innovation accounting can be implemented.

The Three A's of Metrics

The three A's concept give a reference about what to consider when using metrics, i.e. what makes a good metric or metric system. These three A's refer to *auditable*, *actionable* and *accessible* as qualities of a metric and are further described in the following paragraphs (Ries, 2011, p.143ff):

- **Actionable**: According to Maurya "an actionable metric is one that ties specific and repeatable actions to observed results" (Maurya, 2012a, p.121), Ries further explains that actionable metrics "demonstrate clear cause and effects" (Ries, 2011, p.143). Actionable metrics can be seen in contrast to so called vanity metrics, that are usually gross metrics like number of downloads or number of users. Those metrics are not actionable as they can only increase over time. This makes it difficult to figure out the cause for an increase and determine if it is due to a change in features or a specific marketing effort or just organic growth.
- **Auditable**: It is important to ensure the veracity and credibility of the data. Otherwise it is not helpful as employees will have trouble using it as the basis for a discussion if they do not trust it and arguments based on those metrics can be easily dismissed.
- **Accessible**: This covers two aspects of accessibility, 1) to make the metrics easy to access by e.g., sending them around regularly or publish them centrally and 2) to make them easy to use and understand. Instead of using abstract concepts that can be interpreted in various ways, using cohort-based metrics are easier to understand as you can imagine a user going through the different steps instead of abstract clicks, impressions, etc.

Cohort Analysis

To increase the interpretability and actionability of metrics LS suggests to use the concept of cohort analysis. Funnel analysis is a good first step to analyze the different steps of customers (see figure 2.7). However, gross data makes it hard to interpret and to draw the right conclusions, preventing the actionability of the metric. In order to change this a cohort-based analysis is more helpful.

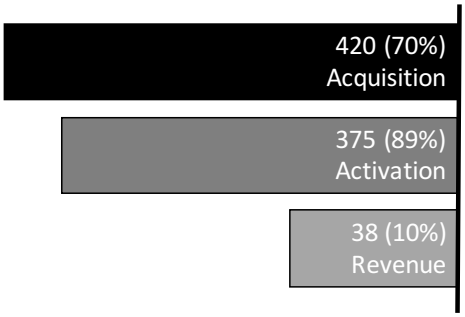

Figure 2.7.: Example of Simple Conversion Funnel (Maurya, 2012a, p.125)

Instead of looking at gross numbers, one looks at the metrics for distinct groups, so called cohorts. Usually this grouping is based on "join date", i.e. when a user first comes in contact with the product or joins the service. However, any property of a user can be used like a specific plan type or gender (Maurya, 2012a, p.125). An example of a weekly cohort based funnel can be seen in figure 2.8.

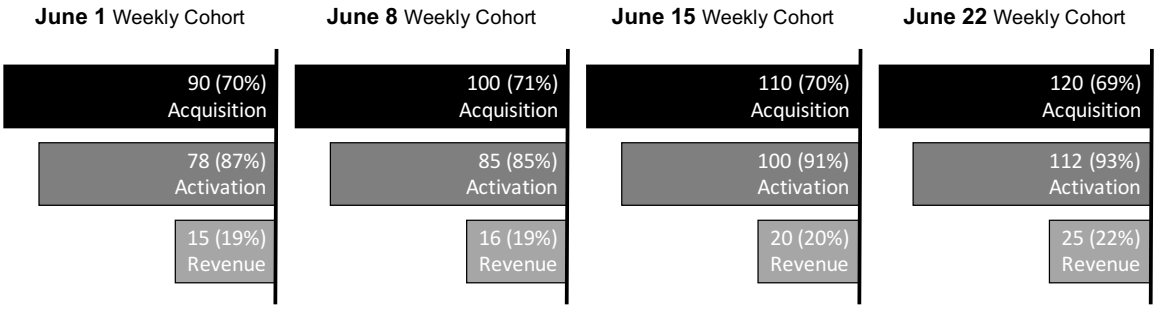

Figure 2.8.: Example of Weekly Cohort Based Funnel (Maurya, 2012a, p.125)

By splitting the different customers according to their joining date you can attribute a change in metrics to a change of your product or some specific marketing effort that was performed between the cohorts.

Example Metric Framework: Pirate Metrics - AARRR

Pirate metrics is a metric framework described by McClure (2007) for analyzing the online customer lifecycle and to get a holistic view on your company. It is often mentioned in the LS context and describes "five steps through which users, customers, or visitors must progress in order for your company to extract all the value from them" (Croll and Yoskovitz, 2013, p.45). Although primarily used in an online context it is in general a "good framework for thinking about how a business needs to grow" (Croll and Yoskovitz, 2013, p.46) as the different steps can be transferred to almost any business. According to Croll and Yoskovitz (2013, p.46) they can be described as follows:

- **Acquisition**: How do users become aware of you? Possible metrics: Traffic, mentions, cost per click, search results, cost of acquisition, open rate
- **Activation**: Do drive-by visitors subscribe, use, etc.? Possible metrics: Enrollments, signups, completed onboarding process, used the service at least once, subscriptions
- **Retention**: Does a one-time user become engaged? Possible metrics: Engagement, time since last visit, daily and monthly active use, churns
- **Revenue**: Do you make money from user activity? Possible metrics: Customer lifetime value, conversion rate, shopping cart size, click-through revenue
- **Referral**: Do users promote your product? Possible metrics: Invites sent, viral coefficient, viral cycle time

2.3.6. Artifacts for Lean Startup and Business Modeling

There are no artifacts that were specifically created for the original LS method. However, there exist some commonly used artifacts. The Business Model Canvas (BMC) by Osterwalder is mentioned to help structure the assumptions of the business model or other generic artifacts like a Kanban board are presented as part of case studies (see Ries, 2011, p.138f). Maurya focuses more on the implementation of LS by presenting his adaption of the BMC he named Lean Canvas and also by picking up ideas like the Kanban board (Maurya, 2012a). With regards to the experimentation process, specific artifacts were developed out of implementation practices to provide more structure like a validation or experiment board. Besides those artifacts that are used more specific for applying LS, traditional artifacts for business modeling and communication purposes are briefly explained in the following sections.

Business Plan

A business plan is usually a written document explaining all the important aspects of the business in detail. The usual topics that are covered and explained in a business plan are the following: (see BayStartUp, nd, p.33)

- Product or service
- Market and competition
- Sales and marketing
- Business model and organization
- Founding and/or management team
- Roadmap to realize the concept
- Chances and risks
- Financial plan and financing

The purpose of a business plan is to think through the most important aspects of the business before spending any resources on a project that is doomed to fail from the beginning. It is a common planning tool in the beginning. However, as addressed in section 2.4.4 the value of too much planning is questioned and the idea of spending too much time and effort on a lengthy document that is not necessarily grounded in reality but based on a set of assumptions is often dismissed in the LS context (see principles of Customer Development in section 2.3.2 "No business plan survives first contact with customers").

Another reason founders usually write a business plan, besides using it as an internal planning and controlling tool, is to communicate to third parties, i.e. usually investors or banks who need to assess the feasibility and attractiveness of a business.

Pitch Deck

A pitch deck is a form of sales presentation to summarize the main aspects of your business idea in order to present it to third parties. It is considered an industry norm and often delivered in form of a presentation. The pitch deck has to tell a compelling story that the audience, usually investors or potential partners and customers, needs to buy into (see Babak, 2007).

It should cover most of the aspects of a normal business plan but due to the shorter time available it needs to be more concise. Usually it is not used as a planning tool, but is supporting to think about the big picture, take an investors point of view and not get lost in the details of a lengthy business plan.

Business Model Canvas

In addition to a full business plan or a pitch deck, another commonly used artifact for business modeling is the BMC. Osterwalder started his thesis under the assumption that under today's complexity for potential business models, existing concepts and tools may not be sufficient anymore. Trying to come up with a reference model to specify and conceptualize business models he developed the idea for the BMC (Osterwalder, 2004).

This artifacts covers the most important aspects of a business model in a one-page canvas and is thereby able to visualize the relationship of the different components (see figure 2.9).

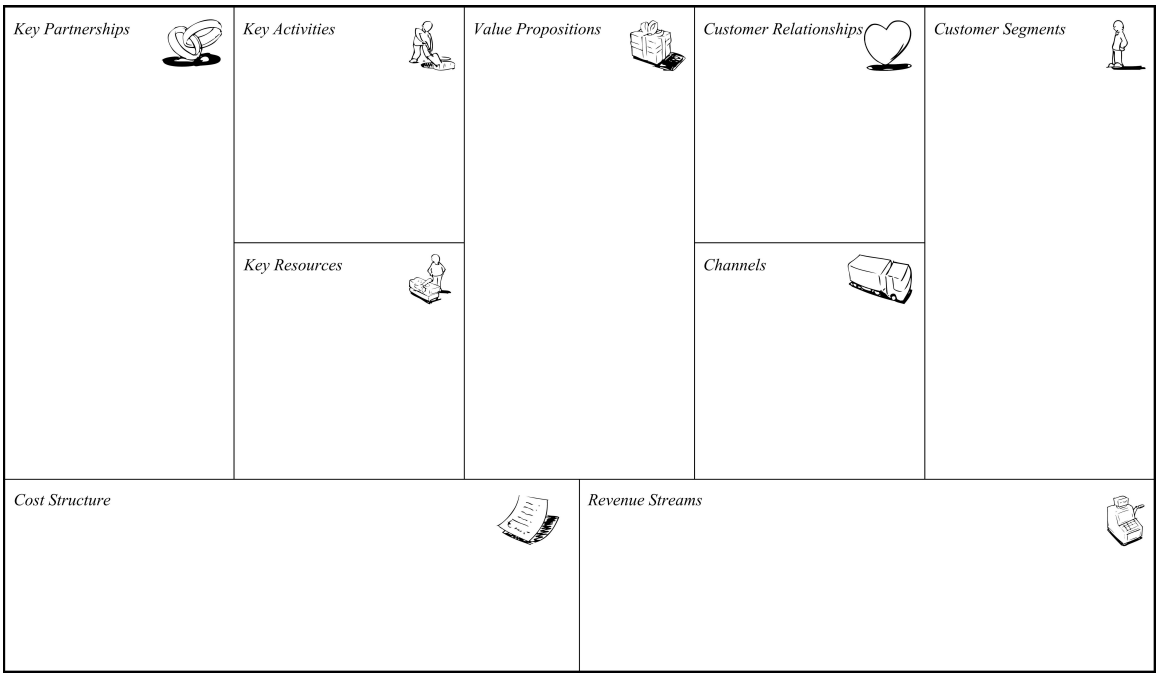

Figure 2.9.: Business Model Canvas (Osterwalder and Pigneur, 2010, p.44)

It consists of nine different building blocks that can be grouped into four parts (Osterwalder, 2004, p.45):

- **Product**: What do you offer? (Value Proposition)
- **Infrastructure Management**: How do you create the offering? (Key Partners, Key Activities and Key Resources)
- **Customers Interface**: Who do you create it for and how do you deliver it? (Customer Segments, Customer Relationships and Channels)
- **Financial Aspects**: What are the financial aspects? (Revenue Streams and Cost Structure)

The BMC became popular in the startup scene as it was often mentioned in the context of the LS approach. There it is presented as a tool to capture the assumptions about the different aspects of the business model. For further reference, the BMC is presented in more detail in Osterwalder's book (Osterwalder and Pigneur, 2010) with multiple examples and different use cases.

Lean Canvas

Out of his own experience with startups, Maurya adapted the BMC and created the Lean Canvas. The BMC is often used to analyze existing and successful business models, however, the part that interested Maurya the most was the starting phase. He tried to make it more actionable and entrepreneur-focused, thereby making it more applicable for the LS context. The main changes were made to cover more startup-relevant aspects and replace existing boxes of the BMC as described below (Maurya, 2012b):

- **Problem**: Building the wrong product is the main reason for failure, therefore, it is important to focus on understanding the problem first (replaces Key Partners).
- **Solution**: After understanding the problem you need to define a possible solution to this problem (replaces Key Activities).
- **Key Metrics**: Focusing on the few right metrics is key to building a successful startup (replaces Key Resources).
- **Unfair Advantage**: Normally a startup does not necessarily have an unfair or competitive advantage, therefore, this box should encourage to build one (replaces Customer Relationships).

More details about the logic behind the Lean Canvas can be found in his article (see Maurya, 2012b).

Kanban Board

Originally part of the lean manufacturing system and often applied in the context of Agile Software Development, the Kanban board is a generic tool to structure and prioritize tasks. The tool can be adapted to track the progress of any kind of project, like a manufacturing process, software development or a LS project, by defining different states. These states can range from simple steps of "to do", "in progress" and "done" (as depicted in figure 2.10) to more complex versions in a software development project like "backlog", "to do", "implementing, "test", "reviewed" and ultimately "deployed". Usually an upper limit of tasks in one state is defined to identify bottlenecks and guide efforts where they are most needed (Reppin, 2012, p.122). This structure enables to implement the pull and flow principle of lean thinking (see section 2.3.2).

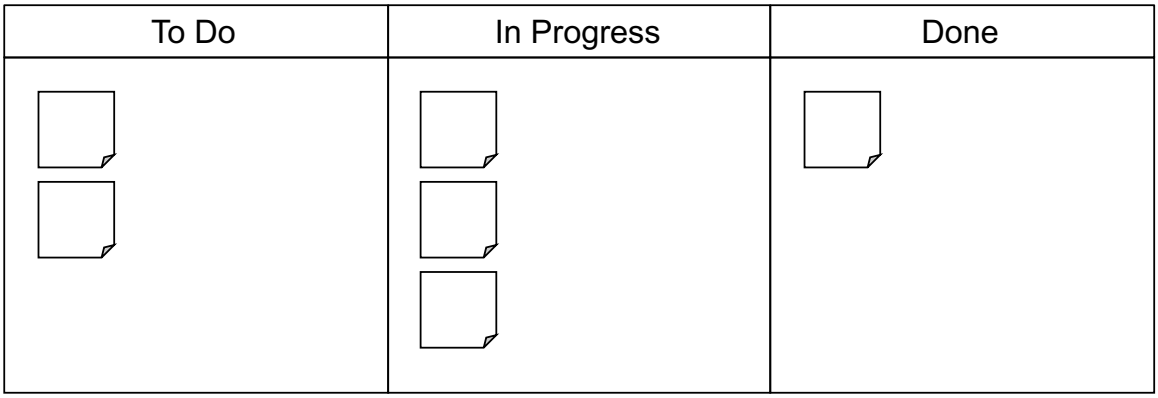

Figure 2.10.: Own Version of Simple Kanban Board (Adapted from Reppin, 2012, p.121)

Validation/Experiment Board

Whereas a Kanban board is a rather generic tool to structure and track a process, there are other tools that are tied closer to the experimentation process of the LS approach like the validation board from Lean Startup Machine or the experiment board by Javelin (see figure 2.11).

Instead of relying on a constant flow these boards are focusing more on the iteration steps and reflect the LS process in more detail. They are explicitly designed to support hypotheses testing by defining assumptions, test methods and success criteria. After conducting the actual test, they support the documentation of results, made decisions and ultimately the validated learning generated through the iteration step.

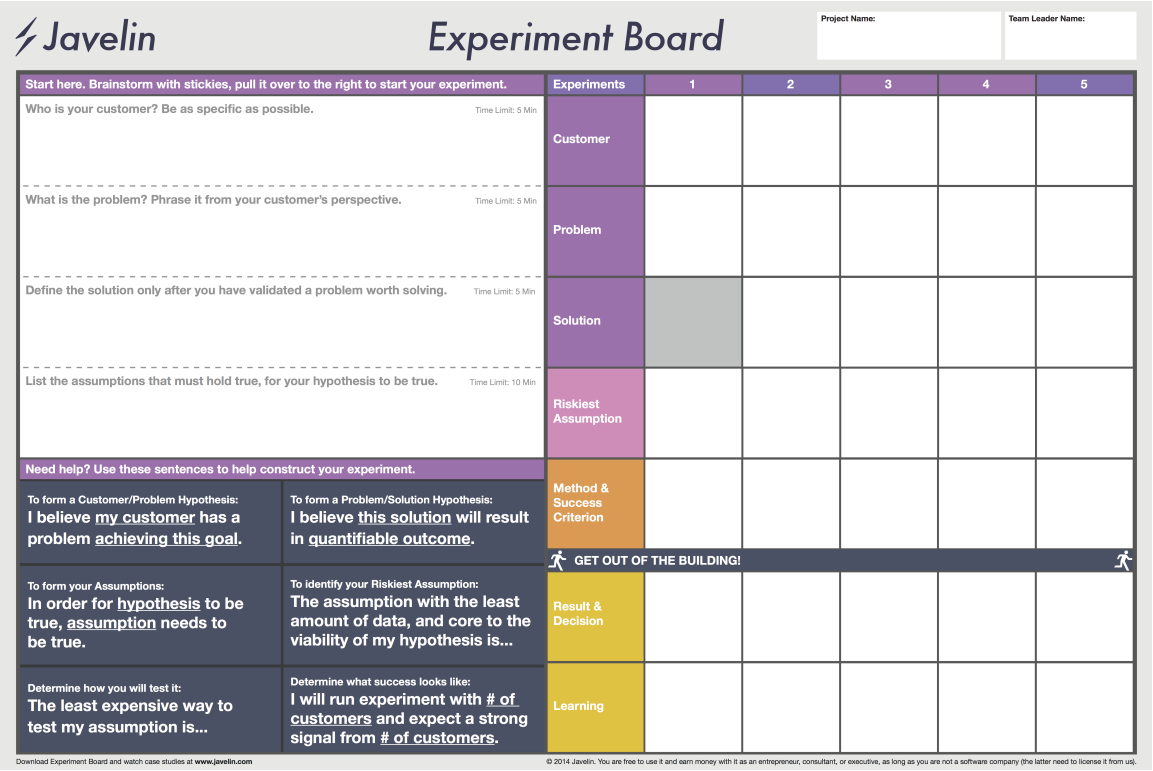

Figure 2.11.: Javelin Experiment Board

2.3.7. Tools to Support Lean Startup

The aspect of used tools and possible tool support is of special interest for information systems research. Given the broad methodology and framework, it is hard to identify tools specific for the LS methodology as it can be implemented and supported in many different ways. Often the methodology is simply implemented by using printed out canvases of artifacts presented in section 2.3.6. In a more sophisticated version one could use project management or software development tools to support the process or one of the canvas softwares to capture assumptions and tests.

Possible tools to support LS are the following:

- **Analog Tools**: The easiest way to support the process is to use print out versions of proposed artifacts. The main advantage is the easy collaboration if the team is colocated. It is always present and accessible if hung up in the office. Further it provides high degree of flexibility as it can be adapted as needed.
- **Standard Office Tools**: A first level of IT support would be to use generic office tools in the form of word processing or spreadsheets like MS Word and MS Excel. These tools provide the greatest degree of flexibility, but lack any methodological structure. Therefore, methodology knowledge needs to be incorporated by the user. Cloud solutions like Google Docs further help to simplify collaboration.
- **Project- and Task Management**: Generic project and task management tools (e.g., Asana or Trello)[2] address more of the processual aspects and enable a better support of for example planning experiments, distributing tasks and keeping the team informed. However, these tools also lack the methodological structure that needs to be incorporated and implemented by the user.
- **Agile Software Development Tools**: Usually applied to support the whole software development process these tools help to manage every aspect from planning to release of software in an agile way. This kind of support could be used for the iterative approach of LS too, as it supports similar methodologies like Kanban boards, and enable workflows that could support the experimentation process. Further those tools can directly link the experimentation to software development. Given the different purpose of use, those tools offer more structure but the methodology still needs to be incorporated by the user. Examples would be Atlassian Jira or Pivotal Tracker[3].
- **Canvas Tools**: These tools offer a digital version of the various canvases and artifacts as presented in section 2.3.6. Instead of working with print-outs the canvases can be edited digitally, which enables sharing and collaboration of the work and thereby also enable working on them in a distributed way. The most famous versions are Canvanizer or Strategyzer[4] which was created by Osterwalder.
- **Specific LS Tools**: Besides the mentioned tools that often do not provide the methodology but require the user to implement these concepts, there are tools that provide

[2] for more details see https://asana.com and https://trello.com
[3] for more details see https://www.atlassian.com/software/jira and http://www.pivotaltracker.com
[4] for more details see https://canvanizer.com and https://strategyzer.com

more methodological knowledge. Javelin[5] promises to offers a wide variety of support for the LS process. The features cover identifying the customer needs by offering on-demand customer interviews, interview management and recording and transcription capabilities. It enables product validation by providing a landing page builder and integrated Google Ads support to create first baseline metrics. Finally the tool helps the implementation by integrating with development tools.

2.3.8. Limitations and Criticism of Lean Startup

Given the increasing popularity more and more people are also voicing their criticism and researchers look at the possible downside. Although LS in general has a broad applicability for different types of ventures there are certain situations in which the full potential of the approach is hard to capture and advantages are difficult to realize.

Eisenmann et al. (2012) specifically address three possible limitations in applicability of the approach:

1. **When mistakes must be limited**: The LS approach requires the ability to make mistakes and learn. Eisenmann et al. (2012) name three situations, where this is not possible to implement:
   - No post-launch ability to correct mistakes: E.g., changes to hardware design for an unmanned interplanetary mission
   - Mistakes would impact customers' mission-critical activities: E.g., losing data of the customer
   - Limited societal tolerance for mistakes: E.g., development of pharmaceuticals
2. **When demand uncertainty is low**: E.g., low-cost cancer cure with no adverse side-effects. In this situation there is no uncertainty about the demand so following a lean approach is not required to test the market demand. However, a hypothesis driven approach can be used for other parts of the development.
3. **When demand uncertainty is high but development cycles are long**: This is especially true for hardware companies with innovative products, Eisenmann et al. (2012) gives the example of Segway to illustrate this situation. There is a limitation if you have to have a full product in order to test your assumptions and the feedback cycle is too long.

Overall, Ladd (2016) concludes that the experimental approach of LS works, but finds no linear relationship between number of tests and success. His research shows that too much testing can be harmful. Possible explanations are that by being lead by the market and gradually steering away from your own idea, there is an erosion of confidence. Furthermore he suggests that setting the wrong focus on too much testing consumes too many resources, addressing the possible costs of overhead of the approach.

[5] for more details see http://vip.javelin.com

This ties in with criticism by Horowitz (2010), who coined the term "the fat startup". He addresses the problem that people put too much emphasis on running lean as an end in itself. His central argument is that startups only have two priorities: Winning the market and not running out of cash. Both approaches (lean and fat) are valid to achieve the first goal of winning the market, referring to his own experiences running a fat startup.

During an interview with Eric Ries, famous investor Marc Andreessen voiced his criticism too (Kern, 2012). He emphasized having the right mindset. Approaches like LS further embrace failing as a way of learning and having the right culture towards failure is an important part of the success of places like Silicon Valley. However, people need to be cautious not to take this idea too far and end up with what he calls "fetish for failure" thinking that if you did not fail you are doing something wrong. He further notes that not all startups can be lean startups. Some companies need to have audacious goals that are hard to test in a lean way, otherwise you would reject ambitious projects. Relying too much on pivots could also lead to giving up too fast. Sometimes it is important to persist and not pivot too early and often.

Ladd (2016) also addresses this by the problem of LS to produce false negatives, i.e. good ideas that are nevertheless rejected due to wrong tests, wrong interpretation, etc. but would have been successful if the founder persisted. One important reason he sees is a missing criteria for success, clear thresholds and rules when to stop testing and start scaling. As with every method and approach, one has to be careful not to blindly follow it but reflect and use his own judgement to adapt to ones own needs.

2.4. Evaluating the Experimental Approach of Lean Startup

2.4.1. Literature Review Approach

Taking an exploratory approach for this thesis, performing a focused literature review is difficult given the broad area of research. Therefore, the motivation for the literature review was to get a better understanding about the current state of research on LS and verify if there is a difference between what theory and current research on venture creation suggests compared to the experimental approach presented by LS. I took an exploratory approach by conducting a literature review on the term "Lean Startup" using the following databases: Web of Science, Science Direct and Google Scholar. The research resulted in 45 matches for Web of Science, 81 for Science direct and 3220 for Google Scholar where only the first 200 matches were evaluated.

The results suggest that still little research is done on evaluating the method itself, whereas the main focus is on experience reports about projects trying to apply LS in a certain context or adapt it to a certain environments. However, through the literature review, certain adjacent topics were identified as relevant in this context and further investigated to have a theoretical foundation for the following empirical work. Those identified topics were the following: The difference between risk and uncertainty, effectuation vs. causation and the value of planning vs. non-predictive approaches for venture creation. Influencing factors on the venture creation process were investigated to get further insights in addition to processual aspects. The findings are presented in the following sections.

2.4.2. Concept of Risk and Uncertainty in the Entrepreneurial Process

An important distinction in this context that is described by Knight (1921) is the difference between risk and uncertainty. By introducing the differentiating factor of probability he is able to illustrate those two concepts. In theory, risk is predictable and calculable in its value and probability as you could theoretically enlist all possible outcomes and determine the probabilities for those outcomes to occur. Taking the example from Silberzahn and Midler (2008) as an illustration: If you have a box with differently colored balls and you know the distribution of the balls you can calculate the probability of a specific draw. In contrast, true uncertainty describes a situation where the same calculation as with risk is not possible. You do not only not know the number of balls and thereby the probability distribution, but it is "objectively unknowable" (Silberzahn and Midler, 2008), i.e. there might not be a box and balls at all. True uncertainty defies any form of prediction because you do not necessarily know the circumstances or have any form of guidance. This is the situation innovative entrepreneurs usually face, by entering a market that does not even exist yet and creating a product for customers that do not exist yet either.

2.4.3. Effectuation vs. Causation

The distinction between risk and uncertainty is the basis for the work of Saraswathy who developed a new concept of understanding how entrepreneurs think and behave given an uncertain environment, namely effectuation. This concept is best described in contrast to causation, i.e. causal thinking and reasoning. Sarasvathy (2001) defines it as follows: "Causation processes take a particular effect as given and focus on selecting between means to create that effect. Effectuation processes take a set of means as given and focus on selecting between possible effects that can be created with that set of means". This definition describes the difference that causation rests on a logic of prediction whereas effectuation rests on the logic of control. Those two concepts are important parts of human reasoning and are not mutually exclusive. In reality the two approaches can occur simultaneously or overlapping (Sarasvathy, 2001).

The best example to illustrate these concepts is given by Sarasvathy (2001) explaining the task of cooking dinner by a chef. In a causation based approach a specific meal would be defined and the chef would need to buy the required ingredients and prepare the meal in a certain way to achieve a specific outcome, i.e. he finds the most efficient way to achieve his goal. In an effectuation based approach, the chef is handed various possible ingredients he could use to cook a meal. In this scenario the chef has to come up with possible menus that he is able to prepare with the given ingredients.

In the context of entrepreneurship the causational approach would mean a founder would define a product and business model for his company and then plans out the different means and steps necessary to take. Afterwares he would try to acquire those means and implement the steps in order to achieve its first set goal. The effectuation based approach would take a different path and start with the given means of the entrepreneur. He then would try to figure out what he could achieve with those means in order to become successful. It is

important to be guided by a vision to have direction, but in the effectuation based approach you are not bound to a specific outcome as you are probably not able to predict it anyway.

The core principles of effectuation according to the effectuation movement[6] and Sarasvathy (2001) are as follows:

- **Bird in hand principle**: Focus on the means available, specifically what you know, who you are and whom you know.
- **Affordable loss rather than expected returns**: Focus on the downside and limit the loss to an affordable level instead of hoping for high returns.
- **Crazy quilt**: Leverage strategic alliances and partnerships rather than focusing too much on competitive analyses.
- **Lemonade**: Exploitation of contingencies rather than exploitation of preexisting knowledge.
- **Pilote-in-the-plane**: Take control, as to the extend that you can control the future, you do not need to predict it.

Dew et al. (2009) further support the theory analyzing the different approaches of entrepreneurial experts and novices to solve a given problem. Entrepreneurial experts were following an effectual logic whereas novices used a more predictive approach. Read et al. (2009) challenge the fundamental assumption that opportunities are simply found and follow the stream of research that entrepreneurs are co-creators of opportunities. The research tries to find a relation between effectuation and venture performance and can support that the three principles focus on means, leverage partnerships and leverage contingency have a significant impact on venture performance.

The concept of effectuation is the foundation for how successful entrepreneurs approach the venture creation process and give a frame of reference for the following section on the value of planning which is in line with a causational approach and other factors influencing the venture creation process presented in section 2.4.5.

2.4.4. Value of Planning vs. Non-Predictive Approaches for Venture Creation

As mentioned little research was conducted specifically on evaluating the experimental approach of LS. As already presented in section 2.3.8, Ladd (2016) is one of the few who directly tried to evaluate LS. He could support that an experimental approach has a positive impact on the success of a startup, so experimentation is beneficial. However, no linear relationship was found, i.e. too little but also too much testing can be counterproductive. He argues that it is more important to have a strong strategy and too much testing results in an erosion of confidence. Too much feedback results in too frequent changes of the idea, so the founder becomes disheartened. However, he still argues it is difficult to know when enough experiments were conducted.

[6] for more details see http://www.effectuation.org/learn/principles

Besides this article, in the following the two more broad schools of research (planning vs. learning) are presented:

Given the above presented concepts about uncertainty and effectual thinking, the value of planning and especially the value of a business plan in the early stages is often questioned (Honig et al., 2004; Karlsson and Honig, 2009; Kirsch et al., 2009; Lange et al., 2007). Nevertheless there is also evidence in favor of planning and writing a business plan (Burke et al., 2010; Delmar and Shane, 2003; Gruber, 2007; Shane and Delmar, 2004). These two general schools of research in this field can be described as one that focuses on planning and one that focuses on learning. For both sides evidence is found but dependent on the variables controlled for. It is important to put the different views into perspective and see when a certain approach is more favorable (Wiltbank et al., 2006) and how both approaches can benefit each other (Burke et al., 2010; Kraaijenbrink and Ratinho, 2010).

Brinckmann et al. (2010) analyzed the relationship and mediating factors between business planning and performance for established small firms and new firms. They found that planning is beneficial for both types of firms, and that both the outcome (business plan) and the process (business planning) enhance the firms performance. However, the relationship is stronger for the established ones. Shane and Delmar (2004) also find that business planning has a positive effect as it lowers the hazard of termination prior to talking to customers and other marketing activities.

The process and outcomes for new firms are often based on little information, they follow an incremental and unstructured approach and often not even write down results. This lack of structure and procedures combined with the uncertainty reduce the return on business planning (Brinckmann et al., 2010). Therefore, Brinckmann et al. (2010) suggest a dynamic approach, combining planning, learning and doing, stressing parallel activities and not a sequential process, i.e. increase the allocation of resources to more planning over time and applying more formal and sophisticated planning approaches.

This is further supported by Chwolka and Raith (2012) who emphasize the quality of planning to increase the return on planning. They argue that planning skills are important to reduce the costs of planning, which is one of the main reasons people are normally opposed to planning.

Gruber (2007) further emphasizes the distinctive approaches that should be taken depending on the characteristics of the founding environment. Highly dynamic environments require a more focused approach to use planning for very specific activities and increase the speed in planning, whereas a low dynamic environment enables the entrepreneur to benefit from spending more time on planning.

Focusing more on the formalization of writing a business plan Lange et al. (2007) find no difference in performance, therefore, there is no compelling reason to write an extensive business plan unless you need to raise substantial funds. In this situation institutional pressure by investors and banks is present to provide one. Other findings by Liao and Gartner (2008) suggest that people completing a business plan were more likely to actually follow through with starting the business.

Another strategy in contrast to extensive planning is following a learning based approach (Midler and Silberzahn, 2008; Silberzahn and Midler, 2008) based on organizational learning theory. Usually markets and products are chosen early in the foundation process to provide guidance and an early definition by having a strategy is seen as an important success factor (Midler and Silberzahn, 2008). However, in a situation where the market is not existent, this early choice limits the companies flexibility.

Midler and Silberzahn (2008) and Silberzahn and Midler (2008) find an alternative approach in the absence of markets. Companies advance through multi-project development projects, i.e. the startup development becomes a succession of exploration projects to simultaneously create products and explore new markets. Thereby maintaining the flexibility to adapt. In this approach learning efficiency becomes a key success factors and the focus shifts from the link between the firm and its environment to organizational capabilities. This exploration and evolution of the company is following a lineage based development strategy, i.e. the evolution is path-dependent and the learning is cumulative building on previously conducted experiments and projects. Exploration becomes a crucial concept instead of detailed planning.

The so far presented dichotomy between learning and planning is based on the presumption that what can be predicted can be controlled. The more effort I put into predicting the future the better I can plan and thereby control the outcome. If I do not focus on prediction I have to put more weight on an adaptive approach and react to the changing environment. Both approaches are about positioning the company in a given and uncertain environment, i.e. assuming exogeneity of the environment (Wiltbank et al., 2006).

Depending on a different way of thinking Wiltbank et al. (2006) introduce a constructive approach relaxing the exogenic assumption and assuming that prediction and control are independent, thereby adding two more possible strategies, the visionary and the transformative strategy (see figure 2.12).

In the case of the visionary strategy, the future is perceived as predictable but also malleable, thereby it is possible to impose ones vision on the environment and control the desired outcome. Most relevant in the entrepreneurial context is the transformative strategy, taking a non-predictive but still constructive approach. This basically refers to the concept of effectuation introduced earlier (see section 2.4.3). One assumes that the future can not be predicted, therefore, the focus is on what can be controlled to achieve a desired outcome.

To position LS in this framework, I refer to Bonazzi and Perruchoud (2014), who tried to combine the notion of LS and effectuation. They argue that LS generally follows a causation mindset by setting a vision or overall goal, but through quick iterations and testing allows it to reach similar results to those following an effectuation attitude. I argue that it can be positioned somewhere between the adaptive and transformative section, as it does not try to predict the future but also does not only react and adapt to the environment. Focusing on the means available is not central to the concept of LS, therefore, I suggest that extending the LS concept with adding the notion of effectuation could be beneficial.

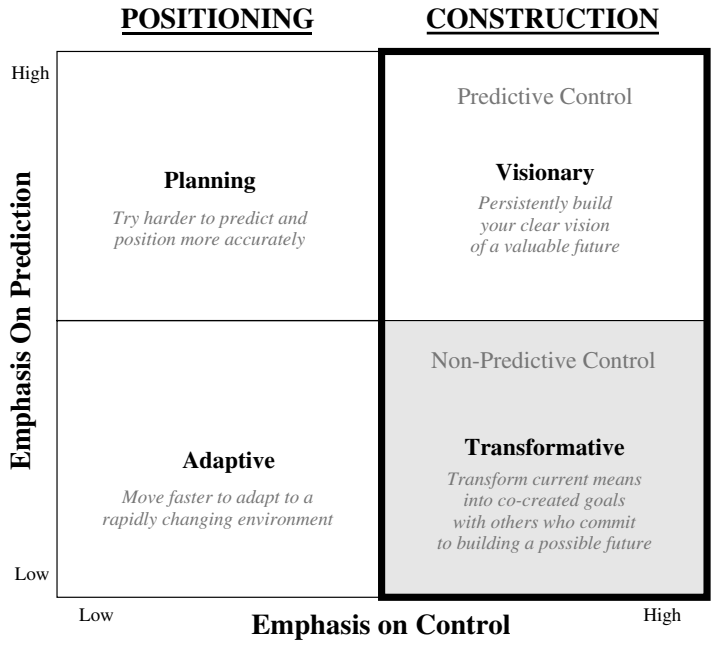

Figure 2.12.: Strategy Framework Under Uncertainty (Wiltbank et al., 2006)

2.4.5. Influencing Factors of Venture Creation

Besides the addressed impact of the approach to the venture creation process other factors that influence the venture creation process are addressed in this section to give a holistic view and to be able to put the approach into context. As presented by the model of the entrepreneurial process of Bygrave (1997) illustrated in figure 2.13, most of the factors that influence the starting of a new enterprise, and thereby significantly important for the entrepreneurial process, is based on personal attributes and environmental factors (see Bygrave, 1997, p.2). Organizational factors become important only later during the lifecycle.

I briefly want to address the following aspects: Personal traits, experience and prior knowledge of the entrepreneur, environment, social network and outside assistance.

Personal Traits, Experience and Prior Knowledge of the Entrepreneur

Personal traits of the entrepreneur have an important influence on the entrepreneurial process. Usually certain traits like a special need for achievement, a higher risk tolerance or locus of control distinguish entrepreneurs from non-entrepreneurs in the first place, but also have an influence on the entrepreneurial process that follows after deciding to start a company (Bygrave, 1997). Another trait with an important impact on the entrepreneurial process is alertness, i.e. the assumption that entrepreneurs are more alert to possibilities for new ventures (Tang et al., 2012). It is seen as a necessary condition for success of opportunity identification (Ardichvili et al., 2003). Alertness seems to be influenced by prior experience

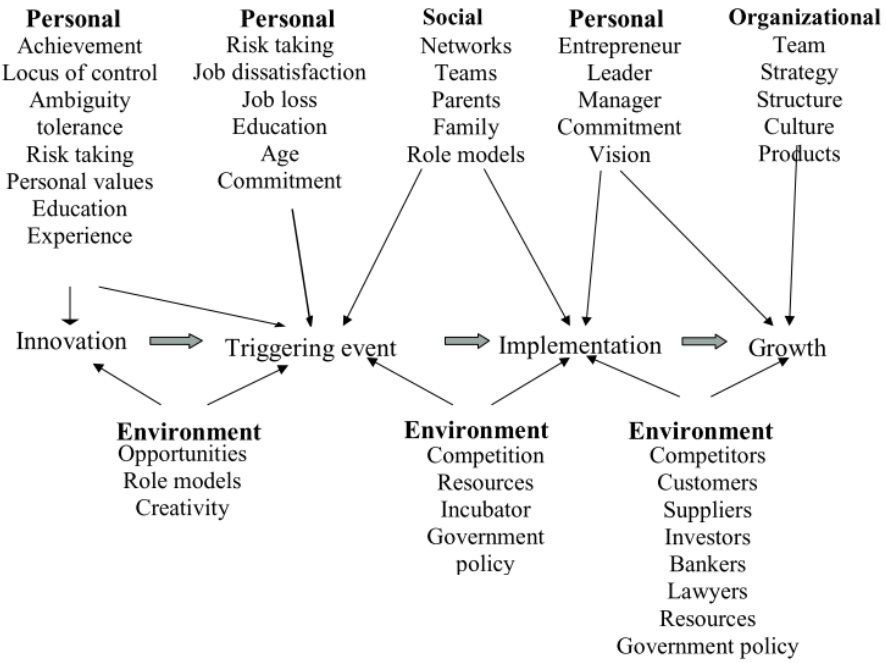

Figure 2.13.: Influences on the Venture Creation Process (Bygrave, 1997)

of the entrepreneur (Shane, 2000). Ucbasaran et al. (2009) could support this and found that experienced entrepreneurs identified and consequently exploited more opportunities. In addition to personal traits and the influence on alertness, prior knowledge and gained experience is perceived as a further success factor. Delmar and Shane (2006) found that industry and startup experience enhances the survival and sales of new companies, but not in a linear relationship. Song et al. (2008) could support the positive influence of marketing and industry experience, but found that experience with startups has no significant impact.

Environment

As conceptualized by Gartner (1985) and addressed by Bygrave (1997) the environment a startup operates in has a significant influence on the venture creation process and ultimate success of a startup. Being embedded in an established entrepreneurial ecosystem can support the venture on critical topics (Isenberg, 2014). Proximity to investors and availability of funding and other resources can be a decisive factor in the survival of a venture. The type of competition can also have an impact on the venture performance. Whereas healthy competition can be encouraging to make progress, destructive competition and pricing wars can undermine an otherwise healthy business model.

Social Network

Research covers the importance of the social network and social capital for the entrepreneurial process (see Hayter, 2013; Jiang and Yanqiu, 2010; Leyden et al., 2014; Panda and Dash, 2015; Stam et al., 2014; Sullivan and Marvel, 2011). It was analyzed how different networks support the entrepreneur to identify new opportunities and gain legitimacy to overcome the liability of newness (Panda and Dash, 2015; Stam et al., 2014). Further Leyden et al. (2014) researched how the social network of an entrepreneur helps him to gain access to knowledge or resources and thereby help improve the survival of a new venture and even make it more successful. Considering entrepreneurship as a search process, i.e. exploring of combinations of knowledge, actions and resources that have a reasonable chance of resulting in the desired outcome, the search costs decrease with the effectiveness of ones network (see Leyden et al., 2014). This ultimately increases the probability for entrepreneurial success.

Different types of connections depending on the intensity are used for different reasons: Strong ties help in accessing resources, reduce uncertainty and promote learning (Jiang and Yanqiu, 2010), whereas weak ties help in accessing new opportunities, information and further business contacts. Both types are important for the success of a venture (Panda and Dash, 2015). In addition to the intensity of connection, the diversity of your network has a strong effect on the social capital - performance link, especially for new firms and in high-technology industries as the required flexibility and higher dynamic in those cases benefits from the diversity (Stam et al., 2014).

Outside Assistance

Outside assistance in the form of advisors, mentors or coaches plays an important role to help overcome the lack of experience in new ventures. Chrisman et al. (2005) analyzed the impact of guided preparation defined as "research, planning, and other activities that an entrepreneur engages in prior to start-up, with assistance of an outside advisor". They found that long-term growth of the startups was significantly related to guided preparation. However, there seems to be a diminishing marginal return of guided preparation, which can even have a negative impact on performance. The support can be in different areas of the business, as Chrisman (1989) finds that amongst a number of startups receiving outside assistance, only strategic assistance was perceived as valuable compared to administrative and operating assistance. In addition, the entrepreneur's attitude toward the assistance seems to play an important role too. Audet and Couteret (2012) found that the most crucial condition was the entrepreneur's open attitude to change.

Excursus: Business Incubation

Another potential success factor that is combining some of the mentioned concepts, is business incubation. For later reference, the concept is briefly presented here. In research the term and concept is not clearly defined (see Theodorakopoulos et al., 2014, p.604). However, for the purpose of this thesis I define an incubator rather generic as an organization that is supporting young startups to increase their chances of survival and success. To be more specific and be able to distinguish incubators from other supporting organizations I want to specify the ways in which incubators support startups.

The main commonalities of services offered according to Zedtwitz and Grimaldi (2006) are the following:

- Access to physical resources, i.e. office space and IT infrastructure
- Office support, i.e. secretarial and mail services, security, IT support
- Access to capital, i.e. a direct investment or access to venture capital
- Process support, i.e. mentoring, coaching, consulting and legal advice
- Networking services, i.e. internal with other members of the incubator or external with potential customers, collaborators, etc.

Regarding the importance of the different services a general shift away from physical resources towards intangible resources and networking is observable over the recent years (Bøllingtoft, 2012; Bøllingtoft and Ulhøi, 2005). Besides not having a clear definition of business incubation there is also confusion about other used terms as mentioned by Theodorakopoulos et al. (2014). Often they refer to the same basic idea of business incubation, but differ in which phase of the company they support, how long they support, what the objective of the organization is, etc.

The following concepts for organizations fulfill the above mentioned criteria and are therefore also consider a form of business incubation:

- **Accelerator**: Similar to business incubator but often an accelerated program, with a shorter time span of support
- **Company Builder**: Often independent organization which exists to build companies for the main reason to generate profit
- **Research Lab**: Usually a business unit of an established company to use concepts of business incubation to foster innovation in an external environment

2.5. Summary and Conclusion of Theory

One of the main issues with entrepreneurship research is that it is still full of ambiguity and lacking a commonly accepted theory. However, this would be required to serve as a foundation and common ground amongst researchers to base further research on. Process models simplify and abstract the complexity that is inherent to the entrepreneurial process. Simplification is one of the main purposes of a model, however, an oversimplification can be problematic as the model might lose its practical relevance.

Although there is little empirical research on directly evaluating the experimental approach of LS, using adjacent areas of entrepreneurship research helps to answer research question 1. Concepts like effectuation give better insights and guidance for how to deal with the uncertainty faced by entrepreneurs. Given an uncertain environment, experimentation gains more and more importance to deal with an unpredictable future compared to detailed planning. Although some concepts seem contradicting, e.g., effectuation vs. causation, planning vs. non-predictive approach, every approach has its applicability. It is important to not see them as dichotomous options but rather find the right application for each concept. Having the right balance between the concepts depending on the given situation by using sound judgement is key.

Besides the presented concepts, other factors influence the outcome of the highly complex venture creation process, like personal traits of the entrepreneur, former experience and knowledge, the environment the venture operates in and also the social network of the entrepreneur. These factors give further guidance for what might be important in addition to the focus on processual aspects suggested by LS.

Concluding, the broad state of research supports the iterative and experiment based approach of LS given the uncertain and dynamic environment technology startups usually operate in. However, it is not the only variable influencing the possible success of a startup.

3. Methodology of Empirical Study

3.1. Methodology for Interviews

3.1.1. Interview Theory

A qualitative method is believed to provide a deeper understanding than quantitative methods like surveys. Three approaches exist depending on the degree of structuring: structured, semi-structured and unstructured interviews (Fontana and Frey, 1994, p.361).

Structured interviews consists of the same set of predefined questions, being asked in the same order to minimize the effects of the interviewer and the instrument on the research results. This approach is similar to a survey, however, it is conducted orally rather than in a written form (Zhang and Wildemuth, 2009, p.222).

Unstructured interviews, often also known as conversational interviews, in-depth interviews or non-standardized interviews have a deeper foundation in social sciences. The goal is to elicit people's social realities, therefore, this method tries to avoid imposing any a priori categorization by neither defining the question nor answer categories upfront (Zhang and Wildemuth, 2009, p.222).

As the interview method is used in an exploratory phase of the research a semi-structured interview approach was followed as a standardized questionnaire would limit the possibility of answers in this phase and a too loose approach in form of unstructured interviews would give no guidance at all. Barriball and While (1994, p.330) state this approach is well suited to explore the perceptions and opinions regarding complex issues and enables probing for more information and possible clarification. However, they also address limitations regarding reliability, validity and objectivity of research based on semi-structured interviews.

3.1.2. Goals of the Interviews

The incubators were used as proxies for startups. I assumed incubators follow a structured approach for the founding and support process of startups and can thereby generate insights into best practices from multiple startups.

The main goals of the incubator interviews therefore were the following:

- Gather general insights from experts for founding startups
- Understand different approaches to the incubation and founding process
- Gather opinions on the topics of knowledge transfer and tool support and tool usage in the incubation process

For the detailed interview guideline see Appendix A.1.

The interviews with startups and practitioner of LS were used to get a more detailed and focused view of practitioners and to build a basis for preparing the survey.

The main goals of the startup interviews were the following:

- Explore the opinion of founders and practitioners on LS (definition, criticism, success factors, etc.)
- Generate insights into different aspects of the founding process with regards to LS from a practical point of view (general approaches to the founding process, validation process, implementation of concepts)
- Create a basis of knowledge for the development of the questionnaire for the online survey

For the detailed interview guideline see Appendix A.2.

3.1.3. Interview Partners

In total 11 persons were interviewed during the study. Seven persons involved in business incubators in a leading or supporting role, three startup founders and one LS expert. To pick the interview partners of incubators a long list of possible incubators in Germany was created and in the following step narrowed down to a short list to cover a broad spectrum of possible approaches to business incubation. The programs differed in terms of age of the program, industry focus, objective of the organization, phases of admitted startups and duration and degree of involvement.

The final interview partners of incubators were the following:

No	Code	Role	Type of Program	Age
1	ES	Project Manager	Publicly funded incubator program	1-5 yrs
2	DA	Innovation Lead	Corporate incubator/research lab	1-5 yrs
3	ML	Program Manager	Publicly funded incubator program	<1 yr
4	TF	Chief Operating Officer	University affiliated accelerator program	<1 yr
5	LM	Community Manager	University affiliated incubator program	>5 yrs
6	HV	Chief Operating Officer	Independent company builder	>5 yrs
7	AC	Chief Executive Officer	Independent accelerator program	<1 yr

Table 3.1.: Interview Partners - Incubator

For the startup perspective the idea was to have a broad impression and different perspectives on the topic so partners were chosen to represent a variety of knowledge and experience levels, covering innovative startups but also startups that implement a known model. The expert was identified as an organizer of a LS meet-up group, two startups were picked as participants of an incubator program and one startup was picked out of the local startup community.

The interview partners for the startup perspective were the following:

No	Code	Role	Description
8	W	Technical Founder	Platform for e-commerce shops; similar services exist already; before scaling phase and first financing round; basic knowledge about the concept but no practical experience
9	ST	Business Founder	Media startup; first of its kind; early validation phase with internal beta test; no experience besides general theoretical knowledge
10	DK	Business Founder	Media startup; first of its kind; still in validation phase in form of a beta test; advanced experience through workshop and coachings
11	AS	Business Development	Established online market place; no startup but experimental business development projects; advanced experience with LS

Table 3.2.: Interview Partners - Startups/LS Expert

3.1.4. Approach of the Interviews

After identifying potential interview partners as described in the previous section, initial contact was established via email to provide a basic summary of the research project and clarify the intention of the interview. The covered topics of the interview were presented and after receiving a confirmation of interest to participate, appointments for the actual interviews were scheduled.

Prior to each interview the background of the interview partner and organization was researched to have a basic understanding and to be able to concentrate on the relevant aspects, rather than clarifying general information.

Due to reasons of practicability and to minimize the organizational efforts of the interview partners all interviews were conducted via telephone. Prior to the actual interview all interview partners were asked for their permission to record the telephone call to enable further processing of the gathered data. The participants were ensured that all provided information will be treated anonymously, therefore no identifying information is presented in the thesis and the interview partners are referred to with randomized abbreviations.

As suggested by Mayring (2002, p.91) the interviews were transcribed as detailed as necessary to capture the important information and enable further processing. As a next step segments relevant for the research were extracted from the transcription and summarized according to considered categories (Mayring, 2002, p.94ff). After each interview the guidelines were updated to address recognized shortcomings of the guidelines or incorporate new information gathered throughout the interview.

After all interviews have been conducted the findings were analyzed and consolidated. For the findings of the incubators a shorter form of consolidation was chosen to account for the broad and initial scope (see section 4.1). Findings of the startups are presented case by case and summarized according to the different aspects to illustrate the diverse perspectives of the interview partners (see section 4.2).

3.2. Methodology for Survey

3.2.1. Survey Theory

A survey is generally used to gather information from a larger sample of individuals in an organized and structured way. The size of the sample is usually larger compared to a less structured form of qualitative research like a semi-structured interview. The intention of a survey is to draw representative conclusions for a larger population. However, the appropriate sample size can vary depending on the overall population and how representative the results need to be. For example the sample size for a consensus of a country is probably in the millions compared to a survey amongst industry experts which are more likely in the hundreds.

There are multiple ways surveys can be conducted, like face-to-face interviews, telephone surveys, or self-administered questionnaires conducted via mail or the internet. Depending on the research objective one form may be more suitable than the other. Furthermore each form has a different impact on the quality metrics as a telephone interview gives the chance for clarification if a question is not understood and thereby reduces measurement errors compared to an internet survey. Ultimately this also has to be balanced with the available resources to conduct the survey, as the effort and costs are significantly higher for a large sample contacted in a telephone survey than a self-administered internet questionnaire which can be distributed to a larger audience at almost no cost.

According to de Leeuw et al. (2008) the four cornerstones for a high quality survey and possibilities for errors are coverage, sampling, response and measurement. Coverage refers to the quality that the target population is sufficiently covered by the sample of the survey. If most of the target population is not using the internet a web-based survey would result in a high coverage error (Manfreda and Vehovar, 2008, p.269). Sampling errors occur because only a small sample of the whole population is analyzed, therefore depending on the sampling method different statistical methods need to be applied to increase the accuracy of the results. Nonresponse errors occur if data can not be obtained from all sampled units for all questions. This can be mitigated by the specific survey design. Finally measurement errors are results of errors in the data collection process, i.e. the question was misunderstood, the questionnaire did not enable the participant to respond in the right way, etc. This error is mainly reduced through a well-designed and well-tested questionnaire (de Leeuw et al., 2008, p.7ff). These cornerstones need to be addressed while designing the survey. Balancing the different aspects, I decided to conduct a web-based survey.

3.2.2. Goal and Structure of the Survey

In addition to the interviews an online survey was conducted to achieve the following goals:

- Validate findings of the interviews
- Collect further information about the understanding and implementation of LS
- Identify differences between founders that do not apply LS, that are experienced LS practitioners and those who are unexperienced LS practitioners

To achieve these goals a list of questions and possible answers was created with the input of the theoretical research (see chapter 2), the findings of the interviews (see section 4.1 and 4.2) and a survey conducted in the LS context by Kählig (2011).

The survey was structured according to the following broad topics:

- Information about the survey participant (demographic data)
- Information about the founded company
- Experience and understanding of LS
- Implementation of LS (measurement, customer involvement, MVP, artifacts and tools)

For the detailed questions and suggested answer see Appendix A.3.

3.2.3. Approach of the Survey

According to Manfreda and Vehovar (2008) designing a questionnaire for a web based survey is different to other forms of surveys. As users tend to read or rather scan more quickly, questions need to be short and concise to be easy to understand, compared to other survey modes, where this aspect has a wider area of tolerance and is not influencing measurement errors as much (Manfreda and Vehovar, 2008, p.276). Considering this a list of questions and possible answers was created and afterwards technically implemented using Google Forms as the survey is supposed to be conducted solely online.

After the first implementation of the survey, a short pre-test was conducted to clarify possible misunderstandings and errors in the survey. The pre-test should help reducing the rate of uncompleted surveys and also increase reliability and validity of the results of the survey. The pre-test was conducted with four people, two currently in the process of founding a startup or with prior startup experience, one startup mentor and one survey expert. The overall feedback was positive, only the time necessary to complete the survey was perceived as too long, therefore the number of questions was limited and a conditional course through the survey was implemented, resulting in a completion time ranging between 10-15min.

As described by Manfreda and Vehovar (2008, p.270) general invitations often have little success depending on where and when the invitation is posted. As a result only a low response rate is often achieved. Far more effective is the use of individual invitations, although requiring precise contact information. After initial tests with posting the survey in relevant social networks like Facebook and Xing were not producing enough responses,

a more direct approach was pursued. In addition to using my own personal network for contacts to startup founders, the best response rate was achieved by directly addressing relevant participants through social media or collecting contact information from publicly available websites. The sent invitation was personalized and shortly described the purpose of the study to adhere to the recommendations by Manfreda and Vehovar (2008, p.271).

Further emphasis was put on preparing a survey introductory page (Manfreda and Vehovar, 2008, p.272), repeating the main purpose of the survey, presenting who is conducting the survey and who is the intended group of participants to self-assess if the person should continue with the survey. Especially for longer surveys further incentives are required depending on the target group (Manfreda and Vehovar, 2008, p.273). Therefore, besides being intrinsically motivated by contributing to current research on the topic, and having an incentive by receiving the results of the study a further incentive in form of a gift card was given to increase the motivation and lower the barrier to start the survey. In the opening text the participants were ensured that the information is only used anonymously and the collected personal information are kept confidential and will only be used to contact the winner of the gift card and to send the research results afterwards.

In total 233 people were directly contacted, resulting in 36 completed surveys, thereby achieving a response rate of 15.5%. After a first review two responses had to be excluded as they did not fit the criteria for participants, resulting in a final sample size of 34.

3.2.4. Descriptive Analysis

The resulting sample of the survey varies across different dimensions giving a broad spectrum of responses. The quality dimension of being representative is not a question of mere sample size but sample composition. No detailed matching of population distribution of founders was performed, however, the mix of responses ensures that it is not narrowly biased to one special group or attribute.

Most of the participants were founders with business background (56%) or technical background (35%). The majority was between 25 and 34 years old (65%) and had a Masters (53%) or Bachelors Degree (29%). Due to the age range the professional experience measured in number of years of working experience for most participants was rather low with 1-5 years (50%). Regarding entrepreneurial experience, measured in the number of startups founded, most participants (53%) already had some experience, i.e. 2-5 founded startups. However, for a big group (44%) the current project is the first entrepreneurial endeavor.

Focusing on the characteristics of the startups, most (56%) were still in the validation phase. Apparently the phase does not correlate with the age of the startup as the duration founders already worked on the startup was evenly distributed. The distribution between business models was almost even with 47% following a B2B model compared to 44% following a B2C model. Regarding the team size, most startups (65%) were still rather small with 2-5 people involved.

Detailed descriptive analysis of the distribution according to the different characteristics can be found in the appendix A.4.

3.2.5. Evaluation Methodology

The following section describes the methodology used to analyze and evaluate the empirical data.

To have a basis for interpretation the responses were grouped in three groups. First if the respondent applies LS or not and further the people applying it were split into groups between the low experience/unexperienced (defined as having basic knowledge and used in one project at most) and high experience/experienced (defined as having advanced or expe rt knowledge or used in minimum two projects). The final distribution of groups in the sample (n=34) was balanced, with 32% not applying LS, 29% being experienced LS practitioners and 38% being unexperienced LS practitioners.

Four exceptions occurred that did not directly fit in the above categorization as those people knew about LS but were not applying it. This was distinguished depending on the respective question. For general questions about LS even those participants not using it were included. However, for questions related to the experience of implementation those answers were not considered for the LS group.

A further distinction was made between successful and not yet successful startups, where being successful was defined as receiving institutional funding by venture capitalists or being at least in the scaling phase, implying that the approval of external investors is a sign of success as well as being beyond product market fit.

As a guideline for analyzing the empirical data the following rules were used:

- A minimum support of three answers was required to confirm the option
- A significant difference between answers of different groups was considered a delta of more than 25%
- In absolute terms more than 50% is needed for an answer to have strong support
- If lower support was found usually the top two or three answers were considered

Exceptions from this guideline are mentioned in the appropriate section.

4. Empirical Findings

4.1. Findings of Incubator Interviews

In the following, the findings of the incubator interviews are summarized. Generally, findings cover the incubation process, the importance of networks and personal exchange and also aspects about the use and provision of a knowledge base and tools. This should give a first broad insight into relevant aspects for the support of the entrepreneurial process.

The codes in parentheses refers to the interview codes as introduced in section 3.1.3 and indicate the source of information for the given examples. Direct citations refer to the respective paragraphs of the transcript. As the interviews were conducted in German, the respective paragraphs and translations are attached in the appendix for easier reference (see Appendix A.5). Due to the promised anonymity no full transcripts are attached to the thesis.

4.1.1. Incubation Process

LS is a concept that is taught throughout most interviewed organizations (6 of 7). However, insights if and how it is then implemented on the startup level were limited, due to a varying degree of involvement and formalized definition of the incubation process by the incubators.

Generally, the mentioned approaches support a structure and process similar to LS. Individual approaches range from very strict mandatory steps and tools following a clear framework that was derived from LS, as used by AC, to defined process steps with suggested tools and methods created by the organization (e.g. DA) or just providing a broad phases based structure driven by individual milestones (e.g. TF). The approaches starting early in the process, like AC, DA, ML and HV, all had in common an iterative approach, identifying a problem and testing possible solutions with minimal efforts to prove a general business model idea.

The importance of having or providing a broad structure, showing a general direction and most important aspects early in the process was emphasized (ML, §51/§53). However, the value of providing the structure, which seems restricting in the beginning, is often only seen in retrospective. As mentioned by AC who have a very strict curriculum to follow, "one or the other is annoyed, especially practically oriented people, but afterwards everyone is happy that he did it" (AC, §34).

Having a form of accountability through set milestones and external checks was deemed important (LM, §45). Ultimately, the initiative has to come from the startup for it to be successful (HV, §46; TF, §28; ML, §27). As mentioned by HV "the founding team has to bear it (the startup) ... otherwise it is going to be difficult" (HV, §46).

4.1.2. Network and Personal Exchange

Besides the general process another important pillar of support that was mentioned by all interview partners was the access to networks and thereby support by coaches, mentors and experts.

Almost all emphasized the individuality of each project. Despite having a general structure of the process individual support by experienced mentors is necessary. There is no template or blue print available to build a company. Therefore, adaptability and flexibility is an important requirement for any support by a method or tool. Besides the interaction with mentors, coaches and experts the exchange between startups was another supporting factor (HV §28b; ML, §41; TF, §86). As mentioned by ML, "the teams are always on site, which proved to be a great strength, as they communicate a lot amongst each other" (ML, §41). Further TF said "we watch closely who to put together in an office space, then they exchange intensively" (TF, §86). The exchange on the same level is used to share experiences, learn from each other and even help each other out from time to time (ML, §41).

Concluding, human interaction is an important part of the process. Often tacit knowledge needs to be exchanged, which is mainly done through personal connection as it is difficult to codify or automate (TF, §80/§99). Furthermore, trust is an issue in this environment and sets a limit for the usage of tools and communication of sensitive information as it is important to know what is and should be disclosed to whom (LM, §42).

4.1.3. Knowledge Base and Tools

The challenge of knowledge transfer was mentioned multiple times, HV even went as far to state it is "the biggest challenge in my opinion" (HV, §14a). Besides information that is difficult to codify a big challenge is the lack of time and low priority for this task.

Some organizations established a knowledge base e.g., in form of wikis describing process steps, possible tools and how to apply them (AC, §30; DA, §24/§28). Others tried to establish some form of knowledge base (LM, §32a) but those efforts often fail due to missing incentives and participation of teams as there is an asymmetry in interest between people having and people needing the information (HV, §28a).

Content for some topics of the startup process are also short-lived, thereby making it difficult to keep information up to date. As mentioned by LM "we work in an environment where topics change quickly, every half year with a new batch the topic are completely different" (LM, §34). The most promising solutions were managed and directly provided by the incubator and did not require the input of the startup teams. However, the easiest option in most cases was to fall back on personal exchange of information.

Regarding the availability of tools, there are often too many tools available for a task (ML, §37) and in addition according to LM "most tools are very overloaded" (LM, §40). Therefore, the challenge seems less in tool support in general but in choosing the right tool for a certain task. Recommendations for tools and exchange of other experiences often happen in an informal setting and is individual and personal as the choice is mostly contextual to

the situation and setting of the startup (HV, §16; TF, §78/§80). The idea of providing a toolbox was perceived as useful, but difficult to implement due to above mentioned reasons (TF, §89). However, examples of interview partners show that it is possible.

Tools should not restrict in any form, therefore, the incubators often do not want to push specific tools on the startups (LM, §32b). As with the general approach, the initiative and final deciding power has to be with the startup.

Summary of Findings of Incubator Interviews:

- Providing an overall process structure and external accountability through milestones is important.
- Personal exchange with coaches, experts and peers is required to enable exchange of tacit knowledge and provide a setting of trust.
- Provision of knowledge base and tool set is perceived as useful to overcome knowledge gaps and provide best practices.
- Initiative and deciding power has to remain with the founders, in order for them to keep the responsibility of their actions.

4.2. Findings of Startup and Lean Startup Expert Interviews

In the following the relevant parts of the four interviews are summarized for each interview partner covering the topics LS definition, MVP and customer involvement, used artifacts and tools. Concluding criticism and success factors regarding the application of LS are summarized more broadly.

4.2.1. Lean Startup Definition

This section summarizes the different understandings and definitions of the LS approach of the interview partners.

W: In a narrow sense LS is a very scientific approach with methods for the various aspects of the business. It is about explicit learning cycles and validated feedback loops, using methods like split tests. In a broader sense for W it means just being customer oriented, i.e. developing the product with the customer keeping a close feedback loop regarding feature development. You have to draw the right conclusions from customer feedback and implement the product in an agile way, using short release cycles.

ST: Simply speaking, reduce the time spent on concepts and access the market as fast as possible and improve shortcomings on the way. This is valid for the product and for the business model.

DK: Lean means working in iterations using prototypes and MVPs. You need to produce first results fast and constantly ask for customer feedback and test before starting the implementation of the real product. At its core you need to ask for customer benefit first, evaluate if there really is a problem and thereby a real need for your product or service. The goal is to understand what your customers really want and if there is a market for your idea or do I have to adapt it. DK sees it as more of a general mindset.

AS: Most important part is to put the customer in the center of everything and take not a linear but an iterative approach. You should have a plan but assume that the plan is not going to remain valid for long. Let the customer interact with the product and set the focus on learning with an open mind regarding possible results.

Summary - Lean Startup Definition:

- Broad spectrum of definitions and interpretations of LS is found, from having a lean mindset to a strict concept with learning cycles, feedback loops and following a scientific approach.
- Most of the principles of LS can be confirmed (e.g., iterative approach, customer focus, using MVPs, focus on learning, etc.) but individually different emphasis on specific aspects.

4.2.2. Minimum Viable Product and Customer Involvement

This section covers the use of the MVP concept and forms of customer involvement.

W: W stated a limited possibility to apply the MVP concept, as a high upfront investment in building a platform was required and the idea was not as risky to require rigorous testing in the beginning. First test with customers was performed with a prototype in a beta test and iterative development from this point onwards. Customer involvement is mainly done through sophisticated integration of a customer relationship management tool. The initial feature set of the prototype was chosen out of experience in the industry and benchmarking with existing products.

ST: The MVP concept was not consciously applied out of the LS context, but used out of necessity of resource restriction. To test different marketing channels and get market feedback about the product, pricing and acquire first test users a fake landing page was used. In retrospect they became aware that this approach is common for LS. Besides this test, customer involvement was limited as the product is not in a stage to be tested publicly and a first prototype is only tested internally.

DK: DK performed ongoing customer involvement through informal interviews. Early in the process videos were created to visualize the possible product, thereby also implicitly using an MVP technique, accompanied by qualitative interviews to evaluate the product idea. Further evaluation was done with mockups. Only after the idea was validated the team started building a first beta version of the product.

AS: AS is working in a different setting as LS is being used in a business development situation. However, the concept was known and multiple MVPs were suggested. Known MVPs like using a landing page or the concierge model were proposed as a good way to test and start a product with minimal effort.

Summary - MVP and Customer Involvement:

- Different versions of MVPs were used (Video MVP, Landing Page, Mockups or functioning prototype) across the interview partners.
- Some types of MVPs were used without consciously attributing to LS, therefore suggesting that MVP concept is not differentiating LS from Non-LS practitioners; prototyping and iterative approach results out of necessity of lacking resources.
- All interview partners involved customers to varying degrees along the development process, suggesting that general customer involvement is not a differentiating factor.
- Forms of interaction ranged from informal and personal interviews to collecting information over various channels with a customer relationship management solution.

4.2.3. Artifacts

The following section addresses the various artifacts used in the beginning focusing on business modeling and experimentation.

W: BMC was used for internal documentation purposes to track progress over time and see if assumptions changed. It should serve as a basis for discussions and the idea was to update it regularly, but the task has not the highest priority in the daily business, therefore it was often neglected. Specific events are used as a reason to revisit the document, e.g., before talking to investors. The BMC was created with a software tool and made accessible for the team on a shared drive. The importance of a provided explanation on how to use the canvas in the online tool was mentioned.

A more formal business plan was started out of necessity for an application for a federal grant. However, it is not the focus at this time, as there is no value seen at the moment. A commonly known handbook for creating a business plan was used as an orientation. The current focus for external communication is a pitch deck for investors. Examples were provided by advisors and served as a template.

ST: A BMC was filled as an exercise using the canvas on a piece of paper. It did not provide any value or more insights, so the concept was abandoned. The only artifact that resembled a business plan was a basic financial plan to validate the general viability of the concept. A formal business plan was not written, as the stage of the startup was considered as too early and the concept has too many uncertainties. The effort to consider all possible combinations that ultimately may not be pursued was seen as too wasteful and not a good use of time.

DK: Artifacts specific for LS were introduced and applied during a LS workshop. Javelin Board as a form of experiment board was used to support through the different iterations of the validation process. The Javelin Board required setting clear tests, goals of the tests and summaries of the results and learning achieved. The board was used as a print-out poster and perceived as sufficient for their purposes.

A BMC was used independently of the LS workshop as a print-out poster with post-its and was hung up in the office to be accessible and in view all the time. It was actively used during the early phases, but it was difficult to keep updated, so it did not represent the latest information and was abandoned as the core business model was not changing as often as in the beginning. One version of the canvas was digitalized using a canvas software tool.

AS: As a specific LS artifact a validation board is used in a print-out version and further applying post-its. The post-its were considered an important tool to condense information as it forces precision when formulating tests and hypotheses. The simplicity to re-arrange the post-its was considered important. Further the analog version was used as it gives more physical space and a better overview when working on the board.

Summary - Artifacts:

- In general similar artifacts were used across interview partners. However, there was a difference to which extent they were used and perceived useful, probably due to a lack of experience.
- Explanation of how to use artifacts was perceived useful to effectively work with them.
- BMC as an artifact is not exclusive to LS.
- Business plan seems to be less important in the early phases if no external investors are involved.
- LS specific artifacts like validation or experiment board were only used when cases explicitly followed the LS approach.
- Varying levels of engagement with artifacts over time, due to different purposes and value generated out of usage.
- Analog versions, i.e. print-out posters, of the artifacts play an important role, due to ease of use and accessibility.

4.2.4. Tools

The following section addresses the various tools used in the beginning focusing on business modeling and experimentation.

W: To support the creation of the BMC a canvas tool (Strategyzer) was used. Explanation of how to work with the canvas was considered an important aspect. Also the possibility to share it and have a persistent documentation seemed to be important. General project management was done on a whiteboard with a rough roadmap, because it is not changing as frequently. Aspects closer to development were tracked in a software development tool (Atlassian JIRA) to support their implementation of the Scrum process. The development process was highly formalized, but the rest of the business was still very unstructured. Processes besides the software development process in the startup phase were perceived as too trivial to require more software support than basic communication and groupware tools.

Choice of tools is very individual and based on own preferences. An example was given of various changes in their communication tools, also due to trends and which tools are used by other startups. Ultimately everyone has to try and see what matches their needs, having the only real criteria that software should not be an obstacle.

ST: As ST did not consciously followed the process, there was also no important tool support mentioned to support it. Besides tools specific for the implementation of the prototype, analytics tools of Facebook and Twitter were mentioned. According to ST, the size of the team does not require significant tool support as everyone is aware of what is happening.

DK: No specific tool for LS besides the canvas tool to capture and persist a final version of the BMC was mentioned. Simple print-out canvases were perceived as enough to support the LS and business modeling process. Opinion was voiced that there are actually too many tools available for various use cases, but the value is not seen.

AS: Groupware tools like Slack are considered important if the team is not in the same place, but no perceived value add for the process otherwise. As the small team is constantly working together there are little information asymmetries.

Summary - Tools:

- Perceived usefulness of (IT) tool support of the process is low compared to basic tools like posters and post-its.
- Tools are used to support various distinct tasks (communication, software development, analytics, etc.) but overall process not guided in a specific way.
- Size and location of team is an important factor to require a tool to share information.
- Founders are overwhelmed with tools and lack support to assess which tool is helpful.
- Flexibility and decision power over tools should be with the user.

4.2.5. Criticism and Success Factors

Criticism that was voiced during the interviews and reasons why applying LS was not used were the following:

- Founders do not know about the concept or fail to understand it clearly.
- Method is perceived as too academic and if followed closely the process has too much overhead or would contradict its principles of lean processes.
- Startups reject being forced into a process, the concept is perceived as too rigid and flexibility in applying the concept is not seen.
- Rejection of specific methods, e.g., like concierge MVP.
- Founders are convinced about their idea and product and therefore want to just execute on their plan.
- Fear about false negatives, i.e. rejecting a valid business model. An example was given about a successful startup that could not validate their assumptions in retrospect.

Aspects that were mentioned or derived from the interviews to positively affect the outcome of applying LS were the following:

- **Solid knowledge foundation**: As a basis learn and understand the concepts as this gives the foundation for flexibility and adapting the concepts.
- **Gain experience**: It is important to apply the approach and gain experience in own practical projects to gain not only theoretical but also practical and actionable knowledge.
- **Exchange experience**: Instead of learning and experiencing everything on your own, leverage the mistakes of others by engaging in meet-ups and share experience.
- **Flexibility**: Be flexible to adapt, don't be too rigid in following the process, but in order to be and act flexible one need to have a good knowledge and experience as a foundation.
- **Embrace failure**: Failures are inevitable and an important part of the process.
- **Be open for the outcome**: All of the interview partners addressed the aspect of being open for the outcome and influences thereby enabling serendipity that generated valuable insights during the process.
- **Personal skills development**: Learning the different skills required to implement the concepts, like conducting an interview the right way to elicit the needed information from the interview partner.
- **Time-boxing**: Use sprints and artificial deadlines to increase speed and output, also supported through workshop setting.

4.3. Findings of Survey - Understanding of Lean Startup

4.3.1. Popularity, Success and Benefits of Lean Startup

The overall question whether LS is a known concept in the startup scene can be confirmed. 79% of participants said they are to some degree familiar with the approach. 68% also claimed to apply it and all of those who apply it would recommend using it for others, speaking for the general popularity of the idea and concept. The majority of the remaining participants who did not apply it did not know about LS in the first place. Only few respondents actively decided against it, supporting the criticism about LS being too structured and thereby restricting them.

There is no clear indication that using LS is a success factor. As can be seen in figure 4.1 for successful companies the share of LS practitioners and Non-LS practitioners is balanced (53% vs. 47%), so there is no indication that successful companies rely more on the LS approach than not.

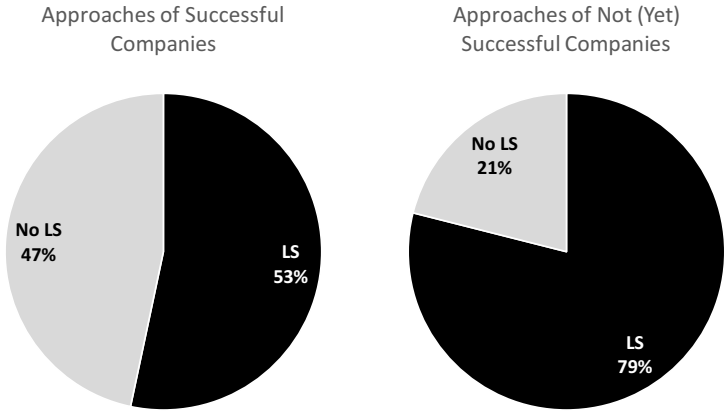

Figure 4.1.: Approaches of Successful vs. Not (Yet) Successful Companies

Among the startups that are not yet successful there is a strong tendency to apply LS (79%). However, due to the way successful is defined this group simply consists of earlier staged startups, that could still become successful. Therefore, little implications can be drawn with regards to influence on success for this group.

Given the results of the literature research on influencing factors on the success of venture creation, many more factors influence the ultimate success than just considering the processual perspective following one approach. However, as all practitioners recommend it there seems to be a perceived positive outcome as a result of applying LS, which is discussed in the next paragraphs.

As it is difficult to directly attribute success to the LS method, further possible outcomes, i.e. possible advantages and benefits, were identified and supported during the survey.

As figure 4.2 depicts, the different outcomes influence each other and can broadly be distinguished between primary and secondary outcomes. Primary outcomes are the main and direct benefits practitioners get out of applying LS, whereas secondary outcomes are supporting the primary ones.

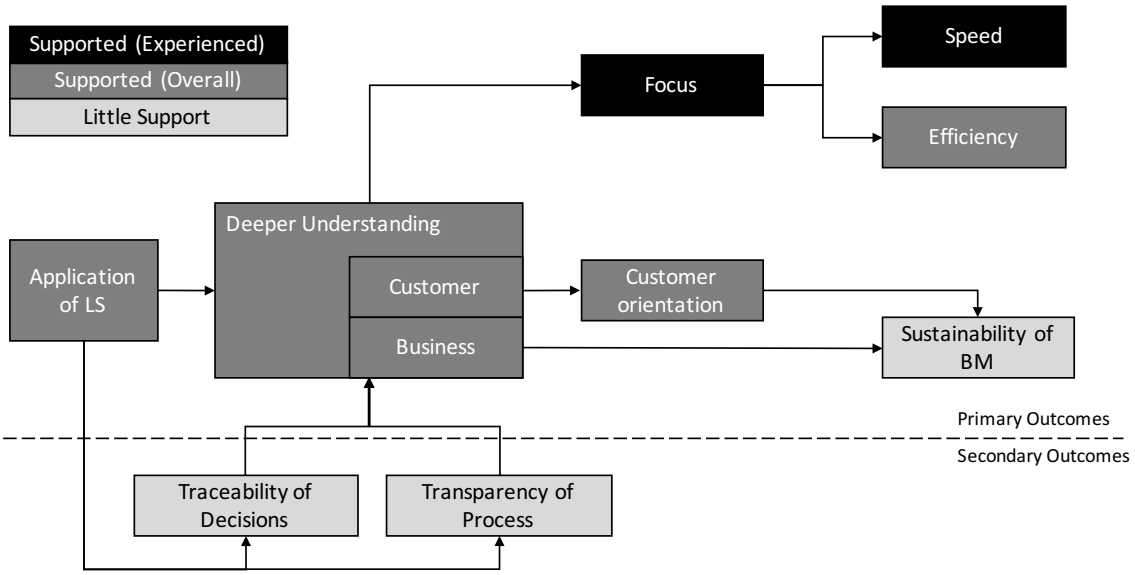

Figure 4.2.: Perceived Outcome of Applying LS

The primary outcomes that were seen and supported by participants were the following[1]:

- **Deeper understanding**: Out of the participants who claimed to apply LS, 74% stated that they were able to get more insights about the customer. Further 57% stated that they generated more insights about their business model.
- **Focus regarding business and product**: 65% of Participants supported the fact that they abandoned aspects of their business model or product faster due to applying LS.
- **Speed**: 57% of participants supported the statement that they were able to make progress faster by applying LS.
- **Efficiency of the process**: 70% of participants claimed that the process is more efficient.
- **Customer orientation**: 78% reported a deeper understanding and having more insights about the customer.

[1]If not otherwise stated percentages refer to respondents familiar with LS

Focus and speed as primary outcomes received stronger support by experienced LS practitioners than by unexperienced LS practitioners (90% vs. 46% and 83% vs. 53%). This suggests that unexperienced LS practitioners do not perceive this as important or are not able to achieve this outcome. Further they seem to not be as quick to abandon aspects of their business and product, i.e. they have a harder time translating insights into decisions and actions.

These factors are tied together and are supporting each other. A deeper understanding of the customer and business model enables a better focus and replaces guesswork. An increased focus enables a faster advancement as resources and efforts can be deployed towards a specific goal. Overall, the result is a faster and more efficient process.

Although it is the ultimate goal to develop a sustainable business model, only a third of all respondents supported this outcome. However, it is indirectly supported through other outcomes like deeper understanding and customer orientation.

Secondary outcomes were mainly identified as the following:

- **Traceability of decisions**: Achieved through documentation and validated learning, decisions have a solid foundation and are not based on pure intuition. This enables traceability over time and iterations (Supported by 30%).
- **Transparency of process**: By following a clear framework the team has transparency of the different process steps (Supported by 22%).

However, this group found little support and therefore does not seem to be the primary focus why people apply LS. Nevertheless traceability and transparency positively support a deeper understanding.

Summary - Popularity, Success and Benefits of LS:

- LS is a popular approach but not necessarily the deciding factor for the success of a startup.
- Benefits of applying LS are perceived by practitioners, in form of a deeper understanding of the business and customer, greater customer orientation, and an increased speed and efficiency caused by a higher focus.

4.3.2. Definition and Criticism

As described in the theory section (see section 2.3) LS is a framework for creating products and businesses under extreme uncertainty. It describes various concepts, methods and an overall process to follow. The question that remains is how do practitioners interpret the framework and what is their understanding of it.

The results of the survey show that there is a wide spectrum of ways practitioners define and understand the LS approach (see figure 4.3). This supports the findings of the initial

interviews about the ambiguity of the definition. On one end of the spectrum is the interpretation of LS as just having a lean mindset (supported by 23% overall), i.e. following the ideas of lean thinking but not specifying concrete methods in how to transfer this mindset into action. On the other end of the spectrum is the interpretation of LS as a very strict and structured process (supported by 12% overall) one needs to implement in order to achieve the promised outcomes of the framework.

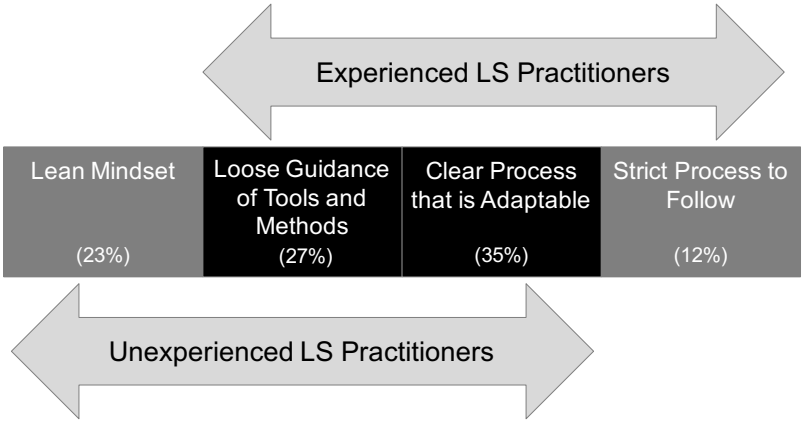

Figure 4.3.: Possible Interpretations of LS

The distribution of answers shows that the majority of respondents familiar with LS do not support the extremes but suggest a moderate interpretation. 27% see it as a loose guidance of tools and methods and additionally 35% see it as a clear process which can and should be adapted to fit the needs of the specific situation. Out of the unexperienced LS practitioners 40% see it more broadly as a mere mindset and no one supports the strict process view. In contrast out of the experienced LS practitioner no one supports the mere mindset view and 27% tend to the other extreme, seeing it as a strict process. This variety shows the ambiguity and complexity of the topic. Unexperienced practitioners may not know better or fully understand the framework. Further, they may not see the benefit in following a strict process or fear being restricted.

Overall criticism was voiced by two thirds of participants. The most supported criticism was the fear of false negatives (42% by experienced practitioners vs. 13% by unexperienced practitioners), i.e. the fear that actually good ideas will be rejected by trying to validate them with the LS approach. This point was also raised during the interviews addressing the fact that if you e.g., choose the wrong customers to talk to, ask the wrong questions or draw the wrong conclusions you might accidentally kill an idea that might have been successful. This raises the question if the framework is producing the right outcome or false negatives are just outliers and not representative for the larger population. The strong support by experienced practitioners shows the awareness for this downside and suggests that unexperienced might question the outcome of taking this approach less.

Further criticism that was brought up was the following[2]:

- **Not accepted method by investors or banks**: For some investors and especially banks using the LS approach might be a red flag as they might value a clear vision and plan to achieve the companies goal. (Supported by 15%)
- **Only useful if gained experience**: LS may not be useful for first time founders as the method requires experience to achieve good results. (Supported by 11%)
- **Too much overhead**: Compared to directly building a product, the process of testing and experimentation adds unnecessary overhead. This criticism was further supported by comments that claim it is "too complicated" and "not the fastest way". (Supported by 7%)
- **Process is too rigid**: Practitioners might feel restricted by having a too narrow understanding of the framework and do not see the possibility or have the ability to deviate from it. (Supported by 11%)
- **Methods are not applicable**: Restrictions for the applicability of the approach are seen regarding attributes like the business model or industry of a company. (Supported by 11%)

Although not receiving much support, the mentioned criticism provides insights in the understanding and possible challenges that prevent practitioners from implementing the LS approach.

Summary - Definition and Criticism:

- Unclear understanding of LS, majority is supporting a moderate interpretation, seeing LS as a loose guidance of tools and methods and also as a clear but adaptable process.
- "Fear of false negatives" biggest criticism of LS, especially by experienced LS practitioners.
- Most other criticism received little support and is based on a too narrow interpretation of LS.

[2]If not otherwise stated percentages refer to respondents familiar with LS

4.3.3. Principles and Broad Implementation

The following principles were derived from the relevant literature and proposed to the participants of the survey to be categorized as either "not a principle" or if they agreed on it to be a principle, assess the difficulty to implement on a three grade level (easy, medium, difficult). All principles were confirmed, i.e. at least three supporters were found to recognize those as principles of LS. To distinguish between low and high difficult principles the categories were mapped to numerical values (easy=1, medium=2, difficult=3) and listed in decreasing order of difficulty as presented below:

1. **Clear measurement of reached target**: To avoid guesswork and have a good foundation for decision, everything needs to be quantified and based on clear measurements.
2. **Pivot as necessary**: In contrast to a visionary approach, where you would do everything necessary to implement your initially set vision, LS incorporates possible changes of strategy along the way, depending on the gathered data.
3. **Reduce risk of failure**: Generally, LS embraces failure as a possible outcome of experiments. However, through iterative cycles the idea is to develop a successful model thereby trying to reduce the risk of failure for the whole business model.
4. **Avoid premature scaling**: Following the Customer Development process, scaling prematurely needs to be avoided before all the important levers of the business are figured out and product/market fit is reached. Spending money on scaling earlier is considered wasteful.
5. **Validate learning**: Instead of learning implicitly, learning should be done explicitly in a formalized manner and with quantifiable results.
6. **Iterate rapidly**: In order to achieve speed in the process, LS focuses on fast iteration cycles through the BML process.
7. **Talk to customers**: Being a customer centric approach, LS emphasizes engaging with customers to gain valuable insights for your business.
8. **Build MVPs**: Supporting the iterative approach and Lean Thinking, MVPs need to be built instead of directly building fully developed products.
9. **Question your assumptions**: One of the foundations of LS is that everything you start with is a set of assumptions. So in order find a successful business model one constantly needs to question those assumptions and turn them into facts.
10. **Get out of building**: Being a principle of the Customer Development process, practitioners need to get into the real world to start the learning process and not only think hypothetically about the business, sitting at their desk.

The five principles that were considered the most difficult to implement are almost all related to the themes of measurement and decision making, addressing the core of LS. The basis being validated learning that is achieved through measurement. Based on validated learning the decision to pivot or not should be possible. However, if there is no solid

basis of data to rely the decision on or have a clear criteria how to decide, the main idea of LS is compromised. Another idea of Customer Development is to avoid scaling before product/market fit is achieved, being also dependent on the right measurement of progress to know when the right time is to start scaling. This should be the value add in form of suggestions and guidance of LS but is apparently still one of the most difficult aspects.

Besides agreeing on the general principles and the assessment of their difficulty, an important aspect is how the practitioners bridge the gap to actually implement the LS. Asking about the broad way of implementing LS the majority of LS practitioners focuse on using MVPs and involving the customer (both 83%, see figure 4.4). Combining this with the findings of the principles and their difficulty, it seems as if participants mostly focus on the easy principles.

As a contrast only 35% actually design and conduct experiments to test hypotheses. Experimentation, which is an integral part of LS, is not widely applied, suggesting that it is either too difficult to implement, hard to do right or the value is not seen in formalizing experiments. This touches on already mentioned criticism of LS, i.e. the rigidity and overhead of the approach. However, 50% of experienced compared to 23% of unexperienced LS practitioners are using experiments, suggesting that it again comes down to experience to make use of the presented concepts and find the right tradeoff between too much formalization and neglecting the method as whole.

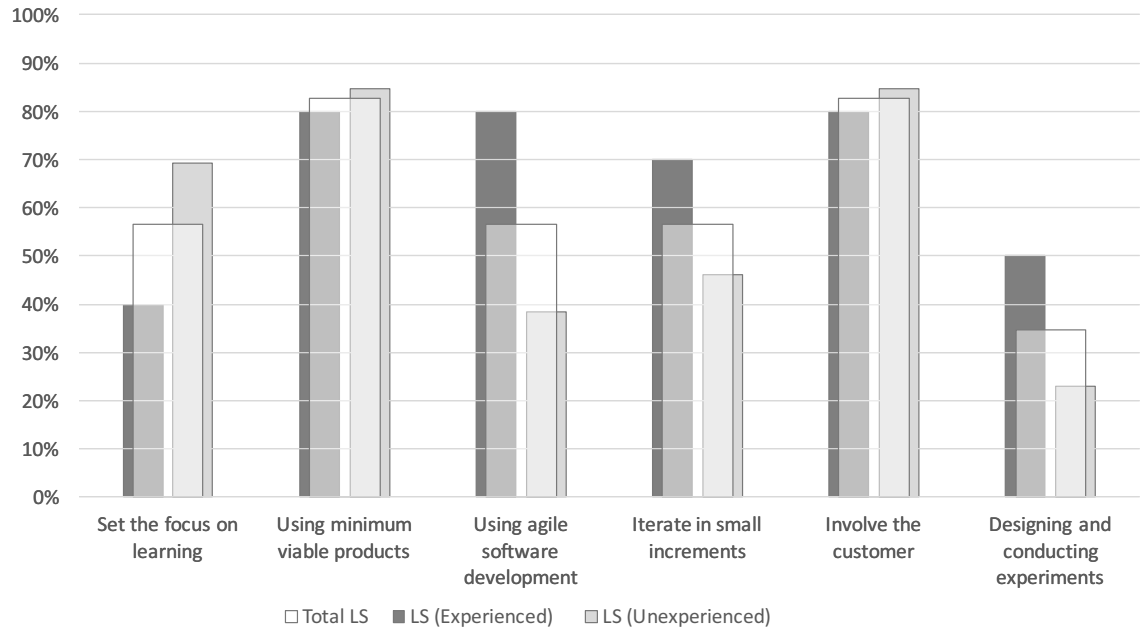

Figure 4.4.: Broad Implementation of LS

Overall medium support was found for a focus on learning, using agile software development and iterating in small increments. Differentiating between experienced and unexperienced practitioners, the former tend to apply agile methods more often (80% vs. 38%). However, it is difficult to assess how important and even applicable this is for the overall product or service. Unexperienced practitioners focus more on the learning aspect (69% vs. 40%), suggesting that they more consciously have to make an effort to learn about their business model and customers, whereas experienced practitioners may be able to build on top of existing knowledge and experience.

Summary - Principles and Broad Implementation:

- Measurement and decision making are the hardest aspects about LS.
- Broad implementation focuses on easy principles like customer involvement and building MVPs, neglecting core ideas of LS like experimentation.
- Experienced practitioners make more use of LS specific concepts like experimentation.

4.3.4. Influencing Factors and Supporting Resources for Applying Lean Startup

External and internal influencing factors for applying LS were surveyed. External factors refer to potential restrictions of applicability given by the environment or factors inherent to the circumstances and thereby lacking the possibility to be changed easily. These factors might limit the benefits of using LS as presented in the theoretical part (see section 2.3.8). Internal factors on the other hand refer to characteristics of the practitioner or team of people applying LS. In addition resources were identified that support the internal factors and further enable learning and applying LS.

External Factors

Two thirds of all respondents applying LS saw some form of restrictions. This restriction was seen with regards to specific business models, product categories or industry. However, there was no significant focus on one aspect as they all received support below 30%. This is in line with the theory as Eisenmann et al. (2012) raised limitations for hardware products due to longer product cycles or resistance in the pharmaceutical/medical industry due to moral issues. No information on the degree of the impact was elicited. Almost significant support was found for a restriction regarding the size of the company or team but only by the group of unexperienced practitioners (47%).

Some voiced restrictions with regards to applicability in different phases of the founding process but further investigation showed that experienced practitioners actually apply it over the whole process starting with initial idea validation (80%), to prototyping (100%) and ongoing product development (100%). Restrictions were supported by unexperienced

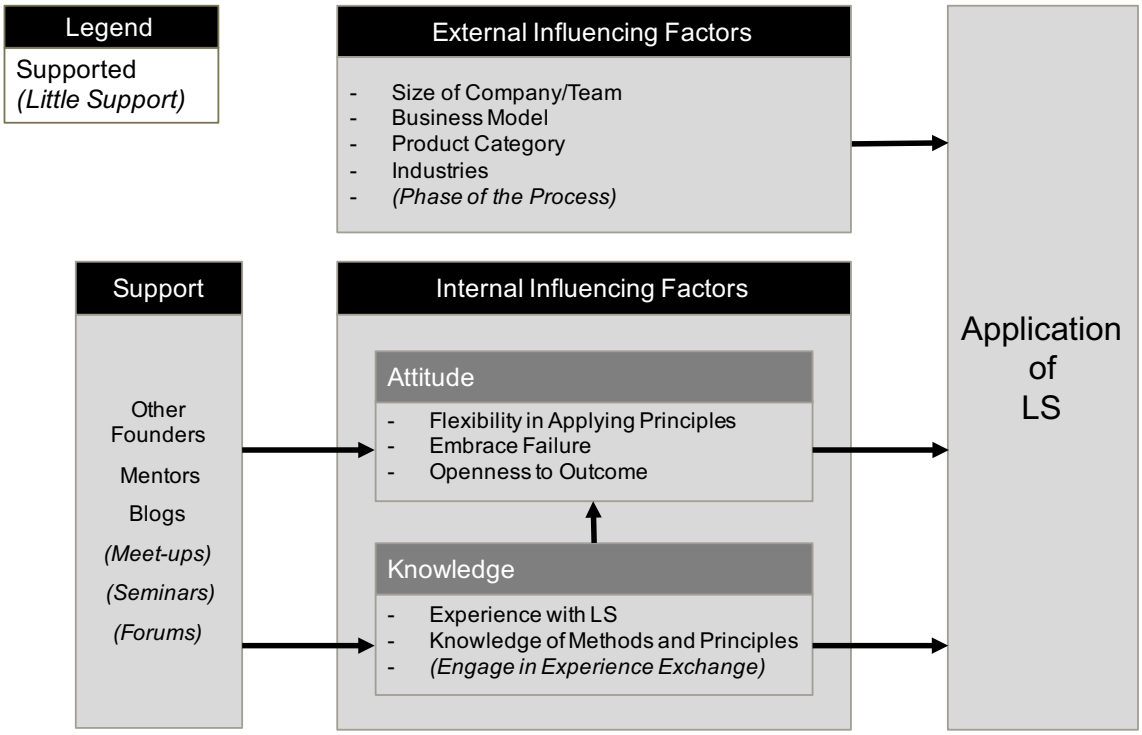

Figure 4.5.: Influences on the Application of LS

practitioners that focused the application on the prototyping and product testing phase (85%), whereas there was fewer support for using it during idea validation (54%) or ongoing product development (62%).

Voiced restrictions to the applicability therefore suggest that it is not a one-size fits all concept but is restricted or at least needs to be adapted to incorporate the mentioned factors.

Internal Factors

Internal factors are attributed to the founder or team that is using LS. They are important as they possibly can be altered or enhanced. In general the findings support two distinct groups of success factors that positively influence the application of LS: "attitude" and "knowledge".

The strongest support was found for "attitude" factors, that were identified as the following[3]:

- **Ability to embrace failure** (74%): As the core of LS is using experiments, practitioners will inevitably face failure. Therefore, being able to handle setbacks and embrace failures as opportunities to learn is especially important for LS.
- **Openness to outcome** (70%): As you do not just execute a plan, the final outcome might not be clear in the beginning. Being open to possible outcomes therefore is critical.
- **Flexibility in applying the principles** (67%): As every project is different and there is no blueprint for a successful business, flexibility is required to adapt the principles of LS to the given situation. This also supports the more moderate interpretation of the framework.

"Knowledge" factors had less significant support and were identified as the following:

- **Practical experience** (59%): As with most methods and frameworks, the more experience you gain the better you get at implementation.
- **Deep knowledge of methods and principles** (37%): Having knowledge about the framework is a prerequisite to apply it. However, having a deep theoretical knowledge about methods and principles is not perceived as very important.
- **Participation in experience exchange** (19%): As an informal way to build knowledge and indirectly gain practical experience, exchanging experience with other practitioners was not seen as very important. This factor was stronger supported by experienced practitioners, so apparently they see more value in this informal way of learning.

General traits and having the right mindset seem to be more important than knowledge and experience. Nevertheless, attitude factors are positively supported and reinforced by more knowledge. The flexibility in applying the principles is based on having a deep knowledge to source possible options from, thereby giving the ability to adapt it to given circumstances. Experience is also more supported over mere knowledge, as it gives you more actionable knowledge.

[3] If not otherwise stated percentages refer to respondents familiar with LS

Supporting Resources

In addition to the internal and external factors that directly impact the application of LS, supporting resources were identified. Those resources are supporting the internal factors with more weight on influencing the knowledge factors than the attitude factors.

Most supported as resources were other founders (86%) and mentors (50%) as a source of knowledge and experience. Whereas other founders share experiences on the same level amongst peers, mentors are usually in some way ahead of the founder, so as described in theory are more valuable for giving input on direction and strategic advice.

Blogs as a source of information to learn about the approach and methods were also supported by 45% of respondents familiar with LS. However, it was not perceived as valuable for experienced compared to the inexperienced practitioners (20% vs. 67%). Blogs seem to be a good starting point to learn about the concept and its principles, but not the best medium for interaction that is required for experienced practitioners that are beyond learning the basics.

Meet-ups and seminars gained the least support, suggesting that too structured and artificial forms of exchange and learning are not perceived as valuable. Seminars are often about learning the methodology, which is, as mentioned in an interview, not yet common amongst founders. Seldom founders learn methodology in advance before starting a project, but rather learn the methodology while progressing.

Meet-ups are possibly more valuable for networking purposes than for directly supporting the application. Different forms of interaction may be more valuable, like an exchange on an ad-hoc basis, when there is a question or need the practitioners could reach out to mentors and other founders.

Summary - Influencing Factors and Supporting Resources for Applying LS:

- External factors like company size, business model or industry operated in might limit the achievable outcome of applying LS.
- Internal factors that refer to attitude factors (embracing failure, openness, flexibility) are perceived more important than knowledge factors (practical experience and deep methodological knowledge). However, knowledge supports the attitude factors.
- Personal exchange with other founders and learning from mentors was perceived as important as supporting resources.

4.4. Findings of Survey - Implementation of Lean Startup

4.4.1. Minimum Viable Product and Customer Involvement

As mentioned earlier, the focus of implementation and two important aspects about LS is the usage of MVPs and involving the customer.

85% of all participants try to implement the concept of an MVP, no matter if they claim to be applying LS or not. This implies that the concept is not restricted to LS, and the idea of prototyping and building products with reduced functionality is a common approach, probably caused by restricted resources rather than intentionally for learning purposes.

The usage of MVPs according to the ones presented in theoretical part (see section 2.3.4) were surveyed. The results can be seen in figure 4.6.

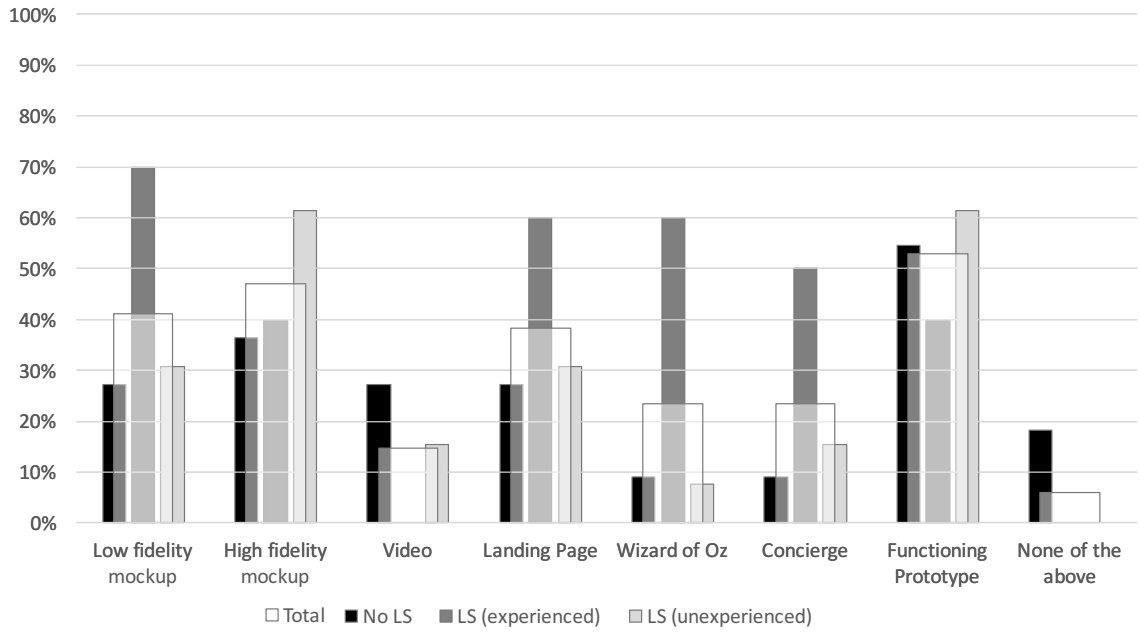

Figure 4.6.: Choice of MVPs

Out of all participants ("Total", figure 4.6) the most used MVPs were low fidelity mockups (41%), high fidelity mockups (47%) and functioning prototype (53%), suggesting that overall the idea of MVPs has a very limited interpretation by practitioners. As described in theory, the deciding factor if it is a real MVP depends on the purpose of use, as some proposed MVPs are already part of a regular development process. More LS specific versions like Wizard of Oz MVP and Concierge MVP are mainly applied by experienced LS practitioners (60% and 50%). In general this group has a wider variety of applied MVPs. Being experienced offers more options to choose from and thereby make better use of the concepts and potential benefits.

Regarding potential challenges the process of working with MVPs was split into four potential steps and areas of challenges, 1) choosing the right form of MVP, 2) deciding on the feature set of the MVP, 3) implementing the MVP and 4) validating the MVP.

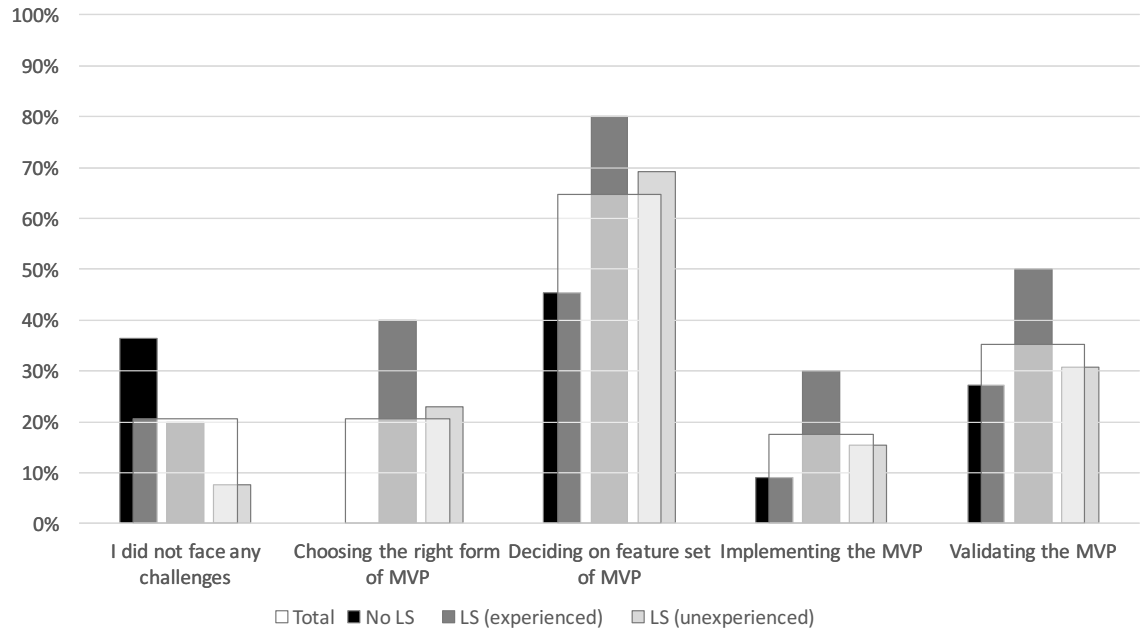

Figure 4.7.: Challenges Using MVPs

The only real support was found for 2) deciding on the feature set (65%), followed by 4) validating the MVP which was supported by 35% of the participants (see figure 4.7).

A main difference was found between people not applying LS and experienced LS practitioners on the aspect of choosing the form of MVP (0% vs. 40%) and choosing the feature set (45% vs 80%). This finding suggests that Non-LS practitioners seem less aware of the possibilities and different ways to test a prototype therefore they do not spend much thought on this topic. Not focusing on the right feature set also suggests less awareness of the potential costs that are connected with this decision.

Besides using MVPs, involving the customer is another important aspect of the LS approach, to avoid one of the biggest problems by collecting customer feedback, i.e. building a product nobody wants. To follow the idea of lean thinking and not waste resources, founders should involve the customer before starting to build the final product. The survey shows that 91% of all respondents involved customers before starting the development of the product (see figure 4.8).

Most of the participants focused on conducting informal interviews, giving the most flexibility and richness of responses, followed by more structured interviews and formal surveys either conducted online or in person. Overall, the only significant difference between people applying LS and those who do not was a stronger use of surveys conducted in person (39%

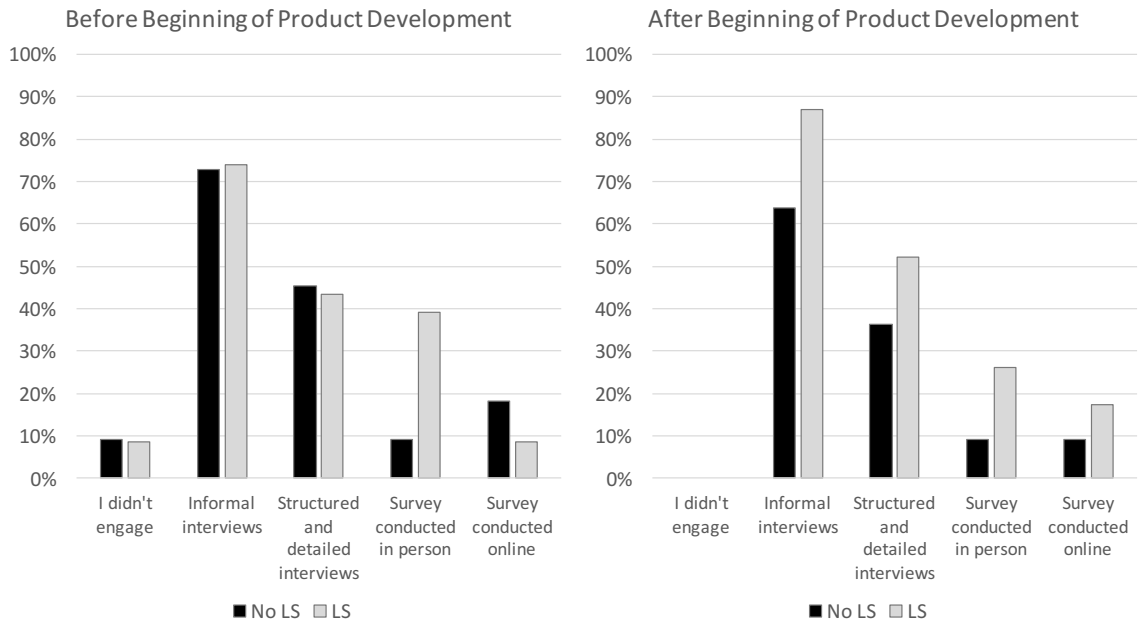

Figure 4.8.: Form of Customer Involvement

vs. 9%) suggesting that this form gives enough structure and formalization to enable comparability but still the chance to dig deeper if necessary as it is conducted in person. Most respondents involved between 10-50 people in this phase.

After beginning of product development, the distribution of forms of engagement and number of people involved remains similar with an emphasis on informal interviews. Generally, at this level of analysis involving customers before and after start of product development is not a differentiating factor between LS and Non-LS practitioners.

Similar to the MVP challenges, the process of involving customers was split into different aspects: 1) finding potential customers, 2) finding the right customers, 3) asking the right questions, 4) interpreting the findings and 5) document the findings.

As illustrated in figure 4.9, the top 3 challenges across all participants were perceived as finding the right customer (50%), asking the right questions (65%) and interpreting the findings (44%). One significant difference between experienced LS practitioners and participants not applying LS was concerning the interpretation of the findings (60% vs. 27%), suggesting more awareness of LS practitioners for problems resulting out of differences in interpretations. Another difference was found between experienced and unexperienced LS practitioners with regards to asking the right questions (80% vs. 46%). This could suggest a higher awareness of experienced practitioners of the possible impact of the wrong questions on generated insights.

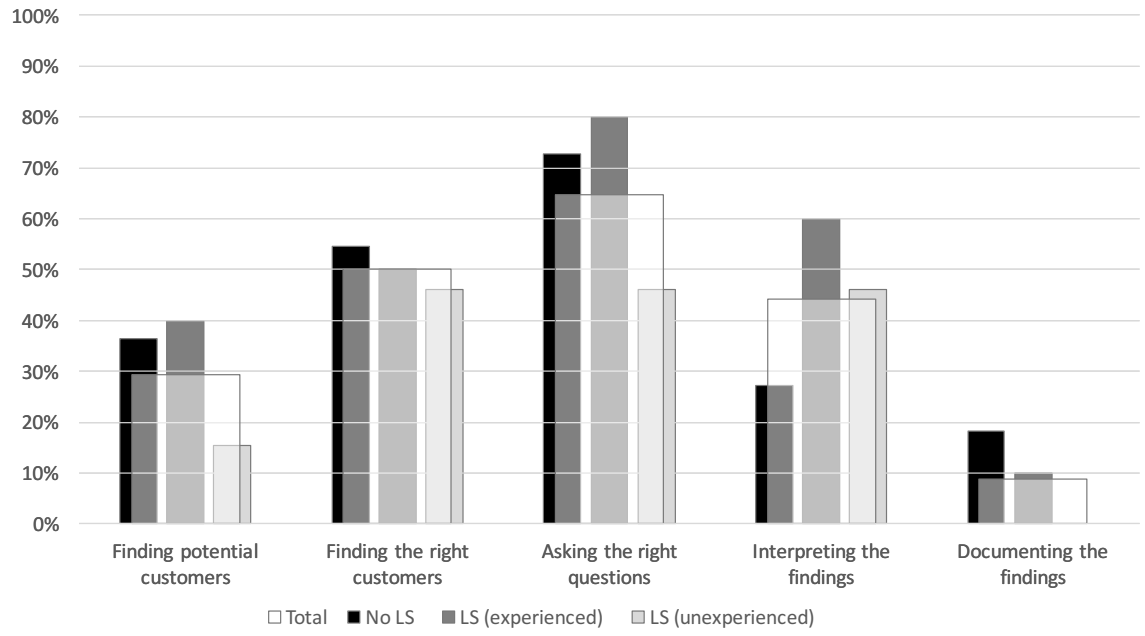

Figure 4.9.: Challenges of Customer Involvement

Summary - MVP and Customer Involvement:

- MVP concept is not specific for LS and used in varying degrees by almost all surveyed groups.
- Experienced LS practitioners are using a wider spectrum of MVPs and engage earlier in the product development process.
- Biggest challenge was perceived as determining the feature set of the MVP.
- On a high level customer involvement is not a differentiating factor either.

4.4.2. Documentation and Metrics for Progress

Documenting assumptions about the business model is a foundation for applying LS to have a basis for identifying the aspects with the highest risk and consequently test those.

More than 70% of all respondents are documenting assumptions about their business model, no matter if they are applying LS or not (see figure 4.10). Besides a focus on key activities (67%) overall most participants further focus on documenting assumptions about the customer interface, i.e. customer segments and channels as well as on the product and its value proposition (all >52%).

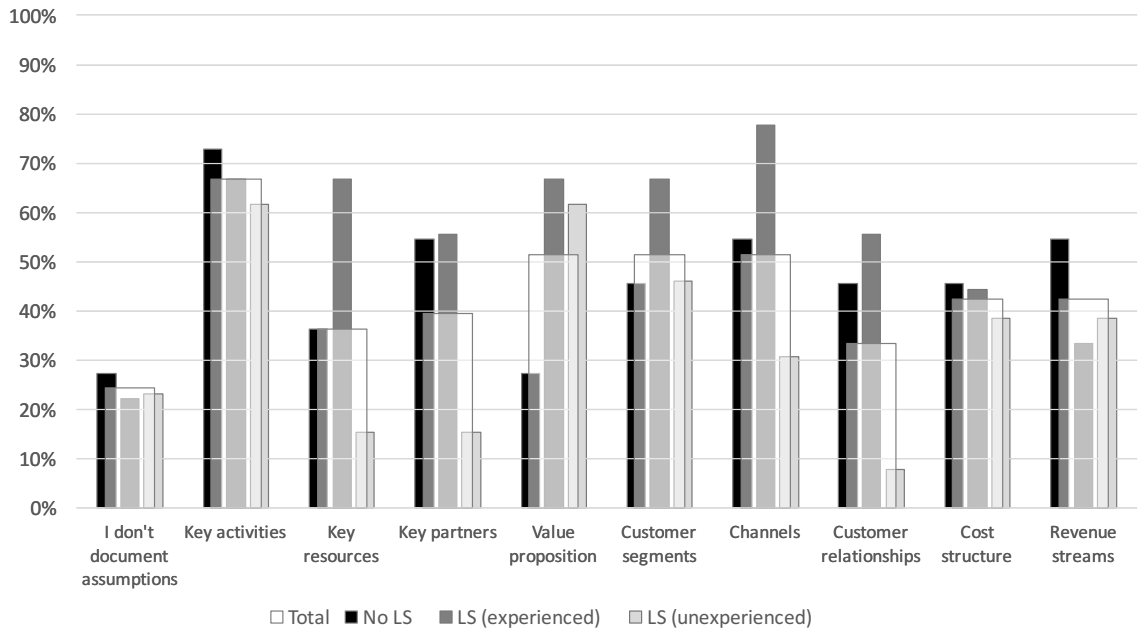

Figure 4.10.: Documentation of Assumptions

Overall, experienced LS practitioners document more aspects of the business model compared to the other groups. Whereas LS practitioners focus slightly less on revenue assumptions (33% of experienced and 38% of unexperienced LS practitioners vs. 55% of Non-LS practitioners) there is a significantly higher focus on the value proposition (67% of experienced and 62% of unexperienced LS practitioners vs. 27% of Non-LS practitioners) of the product. Assuming that the documentation is a sign of focus, the findings are in line with the LS approach, i.e. focusing on the customer and how to create value for it first, before figuring out the other aspects. It was not elicited how the assumptions are documented in detail, but responses about the used artifacts can give an indication (see section 4.4.3).

Although few participants stated that they actually conduct experiments when unexperienced (see broad implementation in section 4.3.3) , the responses about testing assumptions are more balanced for LS practitioners (60% for experienced vs. 54% for unexperienced) suggesting that although explicit experiments are not conducted, somehow assumptions are tested in a different way. Being asked if a structured approach to validate the initial problem was used, only 9% of Non-LS practitioners agreed, whereas 48% of LS practitioners claimed this. These numbers are still considered low, taking into account that validated learning and testing assumptions are some of the core principles of the LS approach.

One idea behind LS and concepts like innovation accounting is to find a way to measure progress in a phase of a company where financial metrics used for established companies are not necessarily available. Founders have to find a way to know if they are on the right track and actually make progress or not.

94% of all respondents are measuring progress in one way or another and 79% of respondents rely on more than one category of metrics. However, there is no one commonly agreed on category of metrics to measure the progress as it is probably due to availability and/or applicability of certain metrics to a specific business model. Therefore, the top 4 categories are rather generic. With support by 50% of participants most are using classic project metrics in form of milestones or completed assignments and also 50% are using customer metrics referring to metrics like number of customers or number of conducted customer surveys. Although startups often lack significant sales in the beginning revenue metrics like overall revenue or revenue per customer are with support by 47% of participants the next most used measures for progress. Considering the phase of the companies surveyed, this category is more used by older companies beyond product-market fit compared to companies in the ideation or validation phase (64% vs. 35% of companies using revenue metrics). The same support of 47% was found for qualitative self-assessment as a measure for progress.

Most other categories found little support, i.e. less than 30%. Those were 1) LS based metrics (amount of validated learning, number of pivots, etc.) 2) product/service metrics (level of functionality, etc.) and 3) metrics referring to needed time/cost to deploy a functionality. Medium usage (38%) was found for web-related metrics like number of visitors or used frameworks like the pirate metrics. Although this is the most mentioned category of LS in theory, it ultimately depends on your business model if it is appropriate to use those for measuring progress.

Differences could be found between experienced LS practitioners, which applied more metrics overall, compared to unexperienced LS practitioners. This suggests that unexperienced practitioners either do not know how to capture or use those metrics or are not aware of the potential benefits of those metrics. Using more than on category of metrics also suggests that founders want to keep a holistic view covering several aspects at the same time instead of focusing on few metrics as suggested by LS.

Being asked about the most important metric to consider, the only metric that was mentioned multiple times was Customer Lifetime Value. Most of other mentioned metrics also referred primarily to customer metrics (customer growth/traction or similar metrics) or revenue metrics.

Summary - Documentation and Metrics for Progress:

- Assumptions are generally documented with a focus on the customer interface and the products value proposition.
- Unexperienced LS practitioners are focusing on fewer aspects.
- Although being a central aspect of LS, experimentation and validation of assumptions considered low amongst practitioners.
- Variety of metrics and measurements used to assess progress, focus on the top 4 metrics: Classic project metrics, revenue metrics, customer metrics or qualitative self-assessment.

4.4.3. Artifacts and Tools

To support business modeling and the experimentation process, LS recommends to use different artifacts. In addition to already existing artifacts like the BMC over time further artifacts were developed as a result of practical experience with the approach (see section 2.3.6).

For business modeling purposes, with a support of 85% by all participants a pitch deck was used the most and also considered as the most useful by multiple respondents, as it requires to be precise, condense information and simplify data (see figure 4.11). It helps to think like an investor as it is mostly used in the communication with potential investors and furthermore facilitates quick feedback.

With a usage of 65% the BMC was the second most used artifact across all groups (65%), confirming that it is not specific for LS. Artifacts more specific for the LS approach like the Lean Canvas are not widely used (30% of experienced, vs. 8% of unexperienced LS practitioners) and artifacts questioned by the LS like a business plan still play an important role with a support of more than 50%, suggesting that it depends on how you use it instead of rejecting it generally. Summarizing, respondents rely on multiple artifacts for different purposes and dependent on the possible recipient of the artifact.

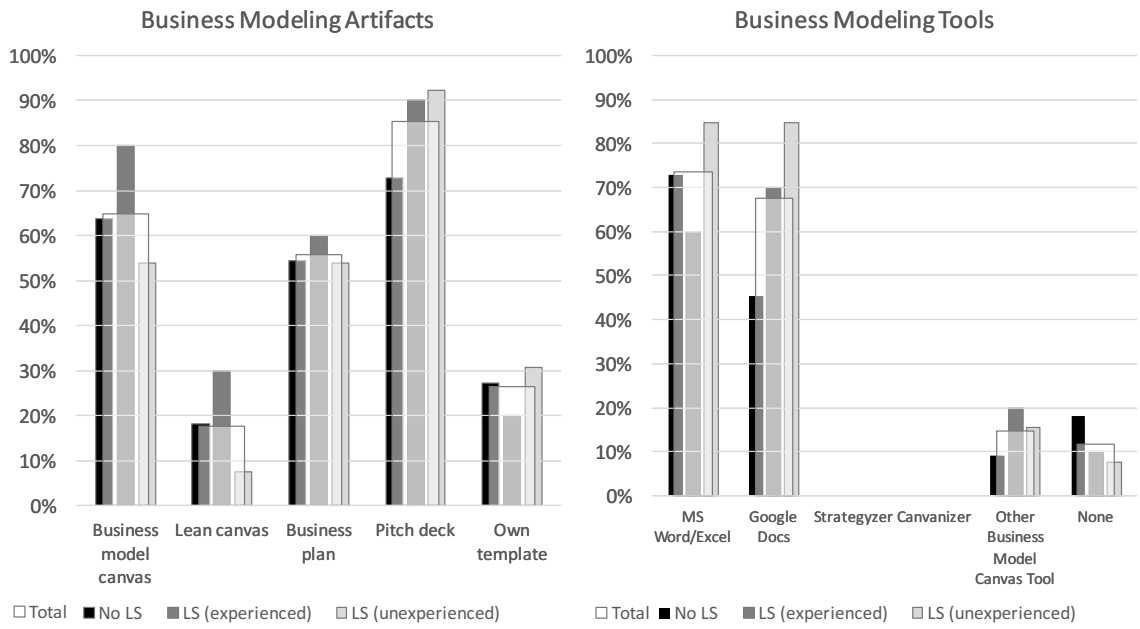

Figure 4.11.: Business Modeling Artifacts and Tools

Business modeling is almost only supported by generic tools like MS Word or Excel (used by 74% of participants) and Google Docs (used by 68% of participants). Although there is a common structure in a business plan or pitch deck, which would lend itself to the usage

of structured support, having a general orientation for the structure by examples seems to be enough and therefore does not require more than text and number processing.

Although the BMC is used widely, actual software support by existing canvas tools was lacking and only supported by 15% of participants. The most common software like Canvanizer and Strategyzer (created by Osterwalder) were not used at all.

With regards to the experimentation and development process, 88% of respondents did not use any specific artifacts suggested by the LS approach in the form of validation boards, suggesting that it is either not known or more flexibility may be required. Only 40% of experienced LS practitioners used generic artifacts like a Kanban board compared to less than 15% for the other groups. With 44% support most respondents did not use any artifact or relied on own templates (support by 35%) for experimentation or development purposes.

Regarding the form of use of the mentioned artifacts, 65% respondents already use some form of software support. Nevertheless analog versions, e.g., in form of large posters, still play an important role for experienced LS practitioners (63%) and Non-LS practitioners (60%). Only unexperienced LS practitioners do not seem to see the value in analog versions (only used by 20%). This is in line with the results of the interviews.

With 71% and 68% support, overall project management and product/software development is already the area of a business that is supported by software the most, which shows a willingness to use software support. However, with 47% support, a significant part of project management is still analog, so apparently there is still value seen or no better alternatives are available yet.

Asking about other used tools did not reveal any major insights relevant for the thesis.

Summary - Artifacts and Tools:

- Multiple artifacts are used depending on purpose and recipient, with pitch decks being perceived as the most important one.
- Artifacts specific for LS and experimentation process found little support.
- Business planning is only supported with generic tools.
- Analog tools are still important for applying the BMC and project management.

5. Implications and Guidelines for IT Support of the Entrepreneurial Process

5.1. Implications for Lean Startup Specific Support

LS seems to be popular amongst founders, as most of them know about it and claim to apply it. Looking deeper, the data shows that there is a wide variety of ways how people try to implement it. The theory of LS suggests a very clear and structured process, however only on a very high and abstract level in form of the BML cycle. This is not as instructive as needed for most unexperienced founders. Although different examples are given in the book, apparently there is still a gap between theory and how to implement LS in a very specific case.

This discrepancy between people claiming to use it and how they actually apply it suggests that to a certain degree LS is only providing a new terminology. Peer pressure encourages people to use the new terminology but basically for the same activities to adhere to the new standard in the startup world. Certain means could be attributed to the application of LS but are ultimately not what drives the benefits of LS. Everything that is prematurely released is considered an MVP and every change in a business model now is a pivot. However, prototypes were used in the past too, and founders constantly learned and adapted to changing situations. So for certain aspects of a startup LS now only provides a common terminology, but this is not where the value of the approach lies.

Especially in the early phases, being characterized by a rather chaotic set-up, having too many tasks at hand, formalization and having a structure can be necessary to make the chaos bearable. Although there is value in formalization and documentation of specific aspects and processes, too much of it can be counterproductive due to a wrong allocation of resources. As there is usually more to do than time available a trade off between how much to formalize and how much value the formalization brings or where efforts rather need to be focused on, needs to be made. Founders need the flexibility and would reject being forced into a structure. The difficulty is to balance the degree of formalization without just falling back on a very broad interpretation, as empirical findings suggest, making the whole concept meaningless.

As illustration certain aspects that were mentioned are discussed with regards to a possible support.

Experimentation is one of the central aspects of LS and difficult to implement for unexperienced practitioners. Potentially this could be more formalized and supported, e.g., by defining and tracking experiments, digitally replicating the concept of a validation board or integrating certain measurement capabilities into the support. However, it is questionable how many and how fine grained the experiments are actually conducted and, if used at all, an extensive tracking is required.

Regarding the use of the MVP concept, the biggest challenge was perceived as defining the feature set, i.e. finding the right balance between minimal required features and too much implementation costs of adding unnecessary features without compromising learning capability. In this case a stronger formalization is probably not helpful compared to simply providing guidelines for how to define the feature set. Ultimately, it is a decision based on judgement and out of experience, and it is not necessarily enhanced if formalized stronger or documented in an IT tool.

Similar for the customer interaction, a lack of guidance through the interview and problems with asking the right questions was mentioned. Simply having support to document interviews can be helpful but similar to the MVP challenges, the actual problems are not necessarily solved by stronger formalization but by providing guidelines and experienced guidance.

Besides those examples, no specific use case was mentioned or identified that is lacking support or can explicitly be enhanced by support. All of these aspects theoretically could be supported, but the question remains, if this is actually valuable or just nice to have. I argue for the latter. Further, the problem is seldom a lack of tools, as for most use cases tools exist, like a software support for canvas creation, MVP builders, etc. However, at least in the current sample those tools were barely used, which could suggest that they are simply not known, not perceived as useful or people possibly do not know how to effectively work with the tools.

Most of the aspects of LS are ultimately not exclusive for LS but are aspects of the entrepreneurial process in general, like how do I best build a product, how do I engage with customers or how do I measure certain aspects. Therefore, I suggest to broaden the perspective from a LS focus to cover the entrepreneurial process in general. A basis for formalization needs to be established but not as narrow and structured as covered in the mentioned examples. Flexibility to choose the degree of formalization needs to be provided. Further sharing of knowledge and enabling social exchange are important themes in this context as described in the following section.

5.2. Observations

Mainly out of the interviews, several observations, i.e. challenges or characteristics that define the environment of a potential system support, could be collected. These observations need to be addressed by the high-level design guidelines, that are presented afterwards. The final observations are presented in more detail in the following section.

A mapping is provided between observations and conducted interviews. The number in parentheses represents the number of interviews this observation is based upon, i.e. 7 of 11 means that this was mentioned by 7 interview partners out of the total 11 interviewed persons. The codes in parentheses refers to the interview codes as introduced in section 3.1.3 and indicate the source of information. Direct citations refer to the respective paragraphs of the transcript. As the interviews were conducted in German the respective paragraphs and translations are attached in the appendix for easier reference (see Appendix A.5).

5.2.1. General Observations

A important observation, that is often influencing the entrepreneurial process, is the resource restrictions startups have to face. As already mentioned there are always more things to do and the critical resource most often is the available time. Many activities therefore fall short because of lower priority and due to low perceived value for the startup. Founders have to take a very pragmatic approach and as mentioned in the interviews, unnecessary tasks or too much formalization and fixed processes may produce too much overhead that is not valuable and rejected in the beginning.

***O1 - Resource restrictions**: Founders face resource restrictions and have only limited time available. (3 of 11; AS, HV, ML)*

Often interview partners mentioned that each startup is individual and as HV put it "there is no blueprint" (HV, §2) of how to build a company. Given the fact that by definition a startup is doing something new and innovative and further considering the different influencing factors presented in the theory chapter, the result is often an unstructured, chaotic and fast changing environment with low predictability of outcomes. There is seldom a protocol or process to follow, but rather a pragmatic approach has to be taken to handle the high degree of uncertainty a startup faces. This manifests itself in a required high degree of flexibility, how the process evolves, which tasks to perform, which information to capture and process, etc.

***O2 - Individuality**: Each startup is individual and requires a high degree of flexibility with regards to the performed tasks and processed information. (7 of 11; AS, DA, HV, LM, LM, TF)*

As mentioned by incubators, providing support for the founders is necessary and helpful, but initiative and motivation must be driven by founders, i.e. the advisor can not push a team to be successful if they do not have the drive to achieve success themselves. Most often the support is therefore on a request basis, as TF mentioned "we see ourselves as service provider for the startups and only give recommendations, the decision has to come from the startup itself" (TF, §28). This also seems to be an important trait to be successful in the longterm and the alternative can be counterproductive if a team is just executing what someone else tells them.

This was also mentioned by founders, that they want to remain in control and drive the development and not be forced by a process or third party to do something or use some tools they do not want to. This has to be balanced as they still have to be receptive to feedback and ultimately make the right assessment.

***O3 - Founder initiative**: Founders want and need to take the initiative and have the deciding power.(7 of 11; DA, ES, HV, LM, ML, TF, W)*

5.2.2. Knowledge-Related Observations

Given the complexity of the entrepreneurial process and the required tasks at hand it is hardly possible to know everything up front. Especially unexperienced founders lack processual knowledge, i.e. what to do and how to do or approach things. As mentioned they try to use their own judgement what to do or try to educate themselves, but often due to a lack of time (see O1) it is not possible to perform an elaborate research on the best practice for a specific task and therefore resort to trial and error and rather incorporate gained knowledge over time. Even experienced founders, due to the uncertainty of the process face new situations where they may not be knowledgeable. So in general there often is a lack of relevant knowledge that is helpful to be acquired to be successful, like best practices that could at least serve as a reliable starting point.

O4 - Process knowledge*: Founders often lack relevant knowledge about the entrepreneurial process and best practices. (5 of 11; AC, AS, DA, ST, TF)*

Besides factual knowledge, the most valuable knowledge is often tacit, i.e. it is hard to explain or codify. This knowledge is based on experience and could be to assess a situation and give a recommendation for a decision. It is often not possible to break this decision making process down into simple and generally applicable rules, due to the complexity of different factors that have to be taken into account. This is a value add of advisors and mentors and why the personal interaction and support by experienced people is considered to be important in this context. W for example emphasized the importance of coaching and asking the right questions (W, §78a). This experienced-based knowledge might be a differentiating factor as it is difficult to replicate.

O5 - Tacit knowledge*: Most valuable knowledge is often tacit and based on experience. (7 of 11; AS, HV, ST, TF, W)*

Although most information and knowledge is not a secret, the difficulty more often is to make an effort finding and accessing it (W, §78b). As mentioned most of the information is available somewhere on the internet or in books and blogs. However, this distribution makes it burdensome to find a specific information, assess the validity and if it is applicable in a given situation. Even then it is often difficult to transfer the theory into practice and implement it just by reading.

O6 - Knowledge sources*: Information and knowledge is often spread across different sources and difficult to find. (4 of 11; AC, AS, LM, W)*

There are problems that are specific for each startup and depending on the product, business model or degree of innovation. However, it was mentioned that overall there are also problems that are recurring across startups. A startup may only face this problem once or a few times and therefore sees no need to capture or even share such knowledge. Although it could be helpful for other startups there is no real incentive to share this. An example could be how to set up a legal structure, which is only done once in the beginning. Such knowledge

is often provided by people interacting with multiple companies like mentors or incubators that can transfer such knowledge between companies. As an example incubators provided this through strategy days (LM, §6) or lists describing what to consider when founding a company (HV, §14b).

***O7 - Recurring knowledge**: Certain problems are recurring between startups but not necessarily within a single startup. (4 of 11; ES, HV, LM, ML)*

As mentioned in the interviews, different types of knowledge exist. Besides knowledge that is quite static, like information on legal topics, often the relevant topics are subject to change (LM, §34) which makes it difficult for captured knowledge to remain relevant. As examples topics like online marketing or new emerging technologies were mentioned. Knowledge in these areas is created and updated very often and new knowledge emerges regularly. The difficulty therefore becomes to balance the efforts of collecting and formalizing such knowledge with the created value of doing so.

***O8 - Knowledge creation**: Certain knowledge is created fast or subject to change. (3 of 11; HV, LM, TF)*

5.2.3. Tools- and Artifacts-Related Observations

As already mentioned and voiced in the interviews, there is no lack of tools for a given use case or task. It was mentioned that founders rather feel overwhelmed by the offer and it is difficult to identify relevant and useful tools, as DK put it "I think there are too many tools, we are testing tools all the time" (DK, §36). Some tools are trending or considered standard in certain areas, however, it remains up to the founder to assess if it is suitable for a given situation and worth testing. Besides generally known tools there seems to be a lack of transparency of more specific tools. Further it was mentioned that tool decisions are influenced by the exchange of experience with peers.

***O9 - Multiplicity of tools**: Many potential tools are available, which requires assessment of suitability. (5 of 11; DK, LM, ML, TF, W)*

As mentioned in the interviews but also supported by the survey, various artifacts are created and used in the course of the entrepreneurial process. As an example, for business modeling purposes a pitch deck, BMC or some form of business plan is created but mostly supported with generic tools that do not provide much structure. Therefore, the structuring needs to be provided by the user, e.g., by using other example documents as templates.

***O10 - Multiplicity of artifacts**: Multitude of artifacts are created and used in the course of the entrepreneurial process. However, they are often only supported with generic tools that provide little structure. (5 of 11; AC, DK, ST, TF, W)*

Some artifacts, like the BMC or a business plan, are perceived as a standard amongst startups and are sometimes even mandatory to assess the business model (TF, §24). However, there sometimes seems to be a lack of experience on how to create and work with these artifacts. As mentioned by ST, he used the BMC but did not see a value by just filling the form (ST, §40) or W mentioned they used templates and examples provided by advisors to create the artifact (W, §84). The idea of most artifacts is to convey a certain thinking about a problem by providing a structure. However, if people do not know how to effectively use this structure the artifacts lose their purpose.

***O11 - Artifact knowledge**: Founders do not necessarily know how to effectively use certain artifacts. (3 of 11; DA, ST, W)*

As found in the interviews and survey due to several reasons analog tools seem to play an important role for specific artifacts and for project management purposes. Apparently there is still value in using these forms instead of working completely digital. Especially in agile methods and using the LS approach, the use of posters of boards and special artifacts is common as supported by the empirical data. If a team is co-located it might be easier to work this way as mentioned in the interviews. It is more suitable for group work and in person discussions, due to better visibility, although with the right equipment this could be replicated digitally. However, there remains a gap when trying to integrate the analog version in a digital workflow. As mentioned by DK the analog versions gets out-dated and loses its usefulness if the form is switched (DK, §20 and §22), so there remains an issue with synchronizing the different forms.

***O12 - Analog tools**: Founders see value in analog tools, but it is difficult to keep them updated and synchronized with digital information. (4 of 11; AC, AS, DK, W)*

5.2.4. Social Exchange-Related Observations

Due to the knowledge often being tacit and advice being contextual, different forms of interaction and knowledge transfer are required. Lacking the ability to be codified this interaction often happens through personal meetings and discussions. This is also supported by O15, i.e. that some form of confidentiality is required. As was mentioned in the interviews, the exchange benefits from a more informal setting and that is often why incubators organize events (ES, §61) or try to have startups be co-located to foster exchange (ML, §41), as it increases the willingness to share information.

***O13 - Informal exchange**: Exchange of knowledge and experience is often informal, i.e. through personal interaction and with little structure (between peers but also advisors/mentors). (9 of 11; AS, DA, ES, HV, LM, ML, ST, TF, W)*

As mentioned most valuable knowledge is often tacit and held by experts and experienced people. Due to their expertise, experienced people are usually sought out and due to their limited time it is often difficult to get in touch. Even before an actual meeting, it is often difficult to identify the right expert who might be a good fit, as there might not be transparency about the area of expertise and actual knowledge that the person could provide. As mentioned by incubators this match making process is one of the most important value adds, i.e. identifying the right fit and giving introductions to overcome this barriers founders usually face. They provide this through alumni networks (LM, §26) or other forms of partner networks (ML, §43).

***O14 - Expert access**: Founders often lack access to experienced people like mentors/experts/etc. (7 of 11; DA, ES, HV, LM, ML, TF, W)*

In interaction with advisors, mentors and other people that need deep insights into the company to give useful advice, sensitive information is shared. Especially in the beginning when there is often not more than an idea, founders fear revealing proprietary information and get their intellectual property stolen. As mentioned by LM, "it is important, that startups have trust in their mentors" (LM, §42). Founders may be hesitant to codify and share certain information and knowledge, as they want to have control over who has access to it (LM, §42). In a similar way, it was mentioned that advisors might share confidential material too, to provide examples of documents or information that might be helpful for founders but need to be kept confidential (W, §84).

***O15 - Sensitive information**: Sensitive information needs to be handled and bears the fear of founders of revealing proprietary information. (3 of 11; LM, TF, W)*

5.3. Design Guidelines for the IT Support of the Entrepreneurial Process

To address the mentioned observations, design guidelines for the IT support of the entrepreneurial process were developed and are presented in the following section. Their mapping to the previously presented observations is indicated by the code in parentheses. For a better understanding of the relationships the mapping between observations and design guidelines is further visualized in figure 5.1.

DG1 - Workflow integration: Integrate system usage into existing workflow to minimize the effort of using it. (O1)

DG2 - Contextual accessibility: Enable contextual accessibility of the knowledge base, i.e. where and when it is needed, to minimize the barrier and required effort of switching between learning and doing. (O1)

DG3 - Goal setting: Support setting goals and milestones collaboratively with stakeholders to create accountability but still achieve flexibility compared to a fixed defined process. (O2, O3)

DG4 - Structuring flexibility: Ensure flexibility and adaptability of the system, with regards to captured data, information and structuring capabilities of the process to address the individuality of the startup. (O2, O3, O10)

DG5 - Suggestion-based support: Support needs to remain on a suggestion basis. Control and final implementation needs to remain with founders to increase the acceptance of a support by not restricting the founder's freedom of action. (O2, O3)

DG6 - Medium gap: Enable bridging the medium gap between analog and digital tools to combine the benefits of both forms, i.e. ease of creation and interaction of analog forms with ability to share and collaborate across locations of digital forms. (O12)

DG7 - Knowledge emergence: Enable the emergence of knowledge and best practices through the use of the system to minimize the effort of knowledge explication. (O1, O5, O8)

DG8 - Knowledge explication: Incentivize explication and sharing of knowledge to keep the knowledge base up-to-date with valid knowledge and thereby relevant for the founder. (O1, O5, O8)

DG9 - Knowledge base: Provide a shared knowledge base with relevant information for the entrepreneurial process (e.g., best practices for common processes, suggested tools for use cases, etc.) to compensate for the difference in knowledge and establish a common understanding. (O4, O6, O7, O9, O11)

DG10 - Knowledge adaptability: Enable the content of the knowledge base to be easily adaptable to account for the changing nature of information and knowledge. (O8)

DG11 - Shareability: Enable easy sharing of information with other stakeholders to lower the barrier of knowledge transfer and simplify creating a context for discussion. (O1, O13)

DG12 - Social exchange: Incentivize social exchange and engagement between users to support relationship building and improve the knowledge transfer of tacit knowledge. (O5, I13)

DG13 - Expert identification: Simplify the identification and access to people with relevant knowledge and expertise to enhance the matching process and reduce the necessity for human intervention. (O14)

DG14 - Trusting space: Create a space of trust and confidentiality by giving transparent access control to the data owner to support the willingness of users to share information. (O15)

Figure 5.1.: Observation - Design Guideline Mapping

6. Conclusion, Limitations and Future Work

6.1. Conclusion

LS is still not extensively covered and little research exists specifically evaluating the validity and success of the approach. However, research on aspects in adjacent areas, like strategies on how to deal with uncertainty or value of planning, can be used to evaluate it indirectly. This research supports the idea of an experiment based approach suggested by LS. However, it is no silver bullet and solution for everything. Limitations and criticism (see section 2.3.8) have to be considered and it has to be evaluated when it is more valuable to apply and when not. It can be beneficial to diverge and follow a different path but following a lean mindset and being inspired by the LS concepts is a good guideline.

Founders and practitioners have an ambiguous understanding of LS ranging from a very broad interpretation of a mere mindset to a very strict interpretation of a clear process. The result is a similar wide range of ways to implement it. On a high level it is often difficult to distinguish the approaches of LS practitioners vs. Non-practitioners. What they are doing is not necessarily different, e.g., involving customers or using MVPs. It is more how they do these things and the reasoning behind it that makes the difference. On this level of analysis it was difficult to get these detailed insights to provide a better differentiation.

Regarding an IT support, I find no need for a support specifically for applying LS. However, given the findings I widened the focus on the entrepreneurial process in general and found three main ways of support that can potentially be enhanced through IT: 1) provide structure but still enable flexibility, 2) provide knowledge and 3) foster social exchange. Instead of specifying a solution, guidelines were derived that should shape a potential implementation and should be investigated further.

On a more technical level concepts like a hybrid wiki or a solution based on Adaptive Case Management principles could serve as a foundation to achieve the required flexibility still providing enough structure and ability to evolve. However, this is still up for evaluation in further research projects, if these ideas are the right fit and actually realize the value.

Specifically addressing the entrepreneurial process, various tools and platforms already exist that support my findings and suggest that there is a need for potential solutions in this space. For example, DIVVII[1] offers a platform for startup mentoring, providing a network to match startup with mentors for various situations in which advice is needed. Another example, Startdeck.io [2] is a tool to support the LS process, provides checklists, contextual learning, community chosen resources and uses a gamification based reward system to motivate usage. These are illustrative examples indicating that there might be potential value in such a support.

[1] for further details see http://divvii.com
[2] for further details see http://startdeck.io

6.2. Limitations

6.2.1. Explorative Approach

As I have taken an explorative approach in this thesis, I started with a quite broad topic and tried to narrow it down over the course of the project. This approach made it difficult to balance the breadth and depth of the research given such a broad object of study, i.e. entrepreneurship and LS. The used research methods in themselves have their shortcomings that limit the results. Interviews were used in an explorative first step and the following survey was conducted to get a more representative insight with a higher sample size. However, the results are more restricted than in an interview. Ultimately the results and guidelines remain on a higher level and need to be specified and explored in further research. Overall, the research would have benefitted by a more specific area of research to cover. However, as this type of research is quite new, narrowing it down too early would not have been useful.

6.2.2. Possible Coverage Error

Due to time and resource restrictions the empirical study only has a limited number of interviews and survey participants, which which makes it prone to be biased due to coverage errors. The sample of incubator interviews is a good mix and given the limited number of institutions operating in Germany, the sample can be seen as a good representation. Startup interviews on the other side are not necessarily representative, as I focused on quite young and inexperienced founders. This could be balanced with input from more experienced or already successful ones. As the interviews were the basis for the survey, this has an impact on the answer categories, as other answers might have been given. I tried to account for this by giving the chance for open answers, however, participants were often reluctant and used the proposed answers.

The survey is a good mix of business models, and different participants (see section 3.2.4). The sample size is not necessarily deciding for being representative for the overall population of startups, as one needs to have information about the population distribution. However, a more narrow sample set, e.g., focused only on a specific business model, a specific type of product, etc., could provide more specific insights, which is a possibility to get more depth and specific recommendations to reduce the danger of becoming too generic and thereby irrelevant.

6.2.3. Evaluation of the Developed Guidelines

Due to time restrictions, it was not possible to further solidify the findings and evaluate the results. Conducting another round of interviews or a short survey to test if the relevant stakeholders agree with the findings would help to build a better foundation for further research. This is still open for further studies that should be conducted.

6.3. Future Work

Out of the performed work and building onto the results of this thesis several areas for further research were identified and are presented in the following section.

6.3.1. Account for Limitations

One obvious area for further research is to account for the mentioned limitations and compensate for potential shortcomings. The performed research can be extended with a bigger number of participants or a more focused approach in terms of researched topic, i.e. focusing only on a certain phase or a certain process. Another approach would be to focus on a more specific sample, i.e. a specific type of startup in terms of business model or product. Various combinations of the two are thinkable.

6.3.2. Deepen Research on Guidelines

Another area for potential research is to build on the presented results and deepen the research on the raised challenges addressed by the guidelines. Some of these aspects that need to be researched are the following:

- **Incentive mechanisms**: As such a system lives from an engaged user base, incentive mechanisms need to be explored to encourage users to create documentation, share information and participate in exchange.
- **Stakeholders**: Given the high number of stakeholders involved in the entrepreneurial process, it needs to be evaluated which stakeholders to involve or focus on that get the most benefit out of using such a system.
- **Technical solutions**: Besides developing theoretical concepts, at some point in time these concepts need to be implemented. Transitioning from conceptualization to implementation might raise technical problems that were not necessary to be addressed earlier.

These are just examples for potential areas of further research and are not exhaustive.

6.3.3. Build and Evaluate Solution

After finishing the conceptual research and solving the technical challenges, the main task that remains is to implement the developed solution according to the researched findings and evaluate if it actually is valuable in the practical application, e.g. using a design science approach.

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Appendix

A. Appendix

A.1. Interview Guideline - Incubator

Area	Leading question	Detailed questions
Person	Could you introduce yourself?	What is your experience in the field of entrepreneurship? What is your role and responsibility? How do you define incubator?
Organization	Could you tell more about your organization?	Is there a parent company or partnering company? What is the goal of the organization? How old and how big is the organization? How is the organization structured? How many startups were incubated?
Application	How is a company admitted to the program?	How does the application process work? Who is involved? Who makes the final decision?
Start-Up Journey	How is the journey of a startup through the incubation process?	How long is the incubation period? Could you explain the process with an example? Is there a “normal” process? How are the startups supported? Which stakeholders are involved over the process? What is the usual form of communication? Is this process being developed further? Do you work according to certain principles or frameworks like Lean Startup?
Graduation	When is a company leaving the incubator?	Is there a goal or graduation criteria?
Stakeholder	Which stakeholders are involved in the process?	What kind of stakeholders exist? (Employees, consultants, coaches, mentors) When are they involved? Do you have a specific network? How is it organized? What are the specific tasks? What is their motivation? What is the usual form of communication?
Information	Which information is collected and important for your decision making process?	Which information? Explicit documents, that occur repeatedly Certain metrics? Standardized reports?
Measures	Which measures are offered or implemented?	Which kind of support is offered? (Coaching, events, mentoring) What is the content of potential events? How is the business model being developed? How are decisions made, what to do? When is this decision being made?
Tools	Which (IT) tools are used?	Which tools are used for which processes and tasks? Are they in any way integrated? Examples: Communication, Collaboration, CRM, social software

A.2. Interview Guideline - Startups

Area	Questions
Person	Could you introduce yourself?
Experience with LS	How familiar are you with LS? What is your experience with LS?
Definition	How do you define LS? What is LS for you? What is the goal of LS? What are the most important principles for you?
Implementation	How do you apply LS in your case?
MVP	Have you tried to apply the MVP concept? If yes, which type of MVP did you use? Did you use specific metrics for validation?
Customer Involvement	Did you involve customers along the process? If yes, how did you involve them?
Artifacts	Are there special artifacts that belong to LS? Did you use specific artifacts in the process of building the startup? (BMC, Lean Canvas, Validation board, etc.? If yes, how have you used them? When? In which form?
Tools	Are there specific (IT) tools that you applied to support the process? For what aspect? Any other (IT) tools that were helpful?
Criticism	What criticism do you see with regards to LS? Do you see any limitations for the application of LS?
Success factors	What success factors do you see that help in applying LS?
Potential	Do you see a potential for further support of LS? Are there any learnings you realized in retrospect?

A.3. Survey Questions

Type explanation:
SA = Single answer, only one option possible
MA = Multiple answers, multiple options can be chosen

#	Question	Type	Options
General			
1	How did you hear about this survey?	SA	LinkedIn Facebook Xing Personally addressed Other…
2	What is your current role?	SA	Founder (technical background) Founder (business background) Product manager Other…
3	Are you familiar with the Lean Startup approach?	SA	Yes No (Skip to question 13)
Lean Startup - Understanding			
4	How would you describe your theoretical knowledge about Lean Startup	SA	No knowledge Basic knowledge (e.g. briefly read books, blogs, …) Advanced knowledge (e.g. attended a seminar, studied multiple books, …) Consider myself an expert
5	How often have you already applied the Lean Startup approach?	SA	Not used yet Used in 1 project Used in 2-4 projects Used in 5+ projects
6	What best describes Lean Startup approach for you?	SA	Just having a lean mindset Loose guidance of tools and methods you could use Clear process to follow but that is adaptable Strict process to follow in order to achieve your goal Other…
7	In your opinion, what are advantages of the Lean Startup Approach?	MA	No advantages Efficient process Speed of process Sustainability of resulting business model Customer oriented outcome Transparent process Traceability of decisions Other…
8	What criticism against Lean Startup do you see or agree with?	MA	No criticism Too much overhead if you want to implement it Process is too rigid Methods are not applicable in my case Not accepted method by investors, banks, etc. Only useful if I was able to gain prior experience Fear of false negatives, method invalidates valid ideas Other…

#	Question	Type	Options
9	What factors do you think are required for successfully applying the Lean Startup approach?	MA	Solid knowledge foundation of the principles and theory Gained practical experience in projects Participation in meet-ups to exchange experience Flexibility in applying the principles Ability to embrace failure Openness for outcome Other…
10	In your opinion are there any restrictions in applicability of the Lean Startup approach?	MA	No restrictions Restricted to specific industries Restricted to specific business models Restricted to specific product categories Restricted to a certain size of company/startup/project/team Restricted to specific aspects of the founding process Other…
11	What in your opinion are the key principles and their difficulty to implement?	Ordinal (No, easy, medium, difficult)	Question your assumptions Talk to customers Get out of building Validate learning Build minimum viable products (MVP) Iterate rapidly Pivot as necessary Reduce risk of failure Clear measurement of the reached target Avoid premature scaling
12	Are there any other principles you would add?	Open	
Startup - Characteristics			
13	Are you currently working on a startup or product development project?	SA	Yes No (Skip to question 53)
14	Could you briefly describe the idea or provide the website for the project?	Open	
15	What business model is your startup/project pursuing?	SA	B2B (Business-to-Business) B2C (Business-to-Consumer) Other…
16	In which stage is your startup/project at the moment?	SA	Ideation/Concepting Validation Scaling Establishing
17	How long are you actively working on the startup/project?	SA	<6 months 6-12 months 1-2 years >2 years
18	How big is your team?	SA	1 2-5 6-10 >10

#	Question	Type	Options
19	How would you assess the product risk (i.e. can we technically build the product) of the idea at the beginning?	Ordinal	1 (no risk) -5 (high risk)
20	How would you assess the market risk (i.e. are there users/customers for the product) of the idea at the beginning?	Ordinal	1 (no risk) -5 (high risk)
21	How would you assess the business risk (i.e. can we make money selling the product) of the idea at the beginning?	Ordinal	1 (no risk) -5 (high risk)
22	How is the startup/project financed?	MA	I don't want to disclose finance Own savings Family & friends Public grants and scholarships Venture capital or other institutional investors Other…
Measuring and validating			
23	Do you document assumptions regarding your business model? If yes, about which aspects?	MA	I don't document assumptions [Business Model Canvas categories] Other…
24	If you document assumptions, do you explicitly test those?	SA	Yes No
25	Is there a metric you consider most important? Which one and why?	Open	
26	How do you determine if you make progress?	MA	No measurement of progress Classic project metrics (e.g. milestones, assignments, working releases, …) Customer metrics (e.g. number of customers, survey, feedback) Lean Startup principles (e.g. amount of validated learning, number of pivots/interviews/MVPs) Product/Service metrics (e.g. level of functionality, transactions per user) Revenue metrics (e.g. overall revenue, revenue per customer, number of paying customers) Self-assessment (e.g. actionable steps, qualitative assessment) Time/Cost metrics (e.g. time and cost to deploy first prototype or certain functionality) Web-related metrics (e.g. pirate metrics, number of unique visitors/users, activity, bounce rates) Other…
27	Did you use a structured process to validate if the problem you are trying to solve is actually important to potential customers?	SA	Yes No
28	If yes, would you briefly explain how?	Open	

#	Question	Type	Options
29	Did you talk to potential customers before beginning of product development? If yes, in which way did you engage?	MA	I didn't engage with any potential customers before product development Information interviews Structured and detailed interviews Survey conducted in person Survey conducted online Other…
30	If you engaged with potential customers, how many people did you interact with?	SA	I didn't engage with any potential customers before product development <10 10-50 51-100 >100
31	Did you talk to and involve potential customers during product development? If yes, in which way did you engage?	MA	I didn't engage with any potential customers before product development Information interviews Structured and detailed interviews Survey conducted in person Survey conducted online Other…
32	If you involved potential customers, how many people did you interact with?	SA	I didn't engage with any potential customers before product development <10 10-50 51-100 >100
33	If you involved customers along the process, which aspects were most challenging?	MA	I didn't involve customers Finding potential customers Finding the right customers Asking the right questions Documenting the findings Interpreting the findings Other…
Lean Startup - Implementation			
34	Do you try to apply the Lean Startup approach?	SA	Yes No (Skip to question 42)
35	(If no) Why not?	Open	
36	How do you apply Lean Startup approach?	MA	Set the focus on learning Using minimum viable products (MVP) Using agile software development Iterate in small increments Involve the customer Designing and conducting experiments Other (specify in following field)
37	Are there other ways how you apply the Lean Startup approach?	Open	

#	Question	Type	Options
38	Where do you apply the Lean Startup approach?	MA	During initial idea validation During prototyping and product testing phase During ongoing product development Other…
39	In which way did you benefit from applying Lean Startup?	MA	There are no real benefits I do not see the benefits yet I made progress faster I abandoned aspects of my business or product faster Gained more insights about customer Gained more insights about my business model Other…
40	Would you recommend applying Lean Startup to others?	SA	Yes No
41	What are the most helpful resources for Lean Startup?	MA	Blogs Forums Seminars Meet-Ups Other founders Mentors Other…
MVP – Prototype			
42	Did you try to implement the MVP concept?	SA	Yes No
43	Which form of MVP or pre-product version did you use and test with potential customers?	MA	Low fidelity mockup High fidelity mockup Video Landing Page Wizard of Oz MVP Concierge MVP Functioning Prototype None of the above, I directly built the full product Other…
44	What challenges did you face regarding the MVP?	MA	I did not face any challenges Choosing the right form of MVP Deciding on feature set of MVP Implementing the MVP Validating the MVP Other…
Artifacts			
45	Have you used any of those artifacts to capture the main aspects of your business model?	MA	None Business model canvas Lean canvas Business plan Pitch deck Own template with individual structure Other…
46	Which one do you consider the most useful? Why?	Open	

#	Question	Type	Options
47	Have you used any of those artifacts to support the experimentation and development process?	MA	None Existing template of Validation/Experimentation Board Existing template for Kanban Board Own template to structure the process Other…
48	If you used any of those above artifacts, in which form do you use them?	MA	Large print-out poster Small print-out paper Software supported Other…
Tools			
49	Which areas of the business do you support with specific software tools?	MA	No software support General project management Product/Software development process Customer relationship Business modeling Other…
50	Which tools do you regularly use for general project or task management?	MA	None, we don't do project management Analog tools (Pen&Paper, Whiteboard, etc.) Asana Trello Podio Atlassian Jira Other…
51	Which specific tools do you use to support business modeling?	MA	None, MS Word/Excel, Google Docs, Strategyzer, Canvanizer, Other Business Model Canvas Tool, Other…
52	Are there other IT-tools that you regularly use? For which purpose?	Open	
Personal Information			
53	What is your name?	Open	
54	What is your email?	Open	
55	Age?	SA	<25, 25-34, 35-44, 45-54, >54
56	Highest educational degree	SA	No formal education, High school graduate or equivalent, Bachelor's degree or equivalent, Master's Degree or equivalent, Doctoral Degree, Other…
57	How many years of professional experience do you have?	SA	<1 year, 1-5 years, 5-10 years, 10-20 years, >20 years
58	How many startups or projects did you start or join as an early employee?	SA	0, 1, 2-5, >5
59	Would you be available for a short follow-up interview?	SA	Yes No
60	Would you like to receive the results of the survey?	SA	Yes No
61	Do you have any feedback regarding the survey?	Open	

A.4. Descriptive Analysis

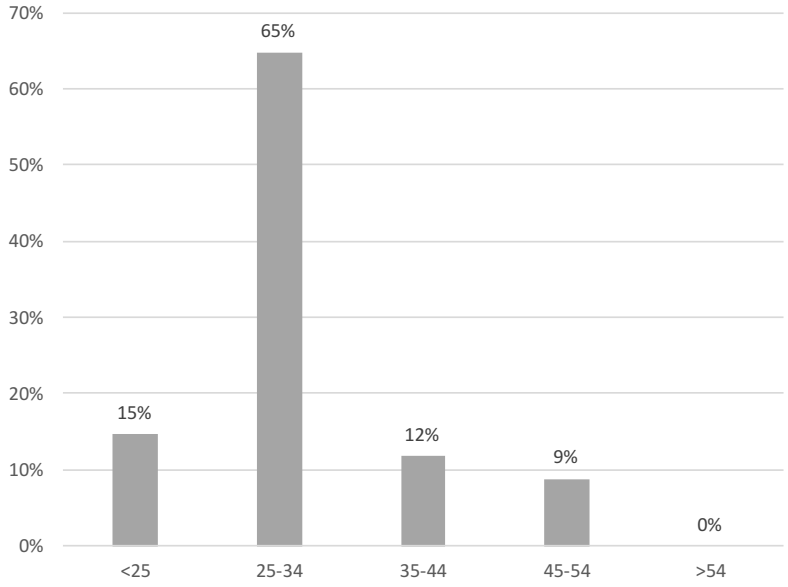

Figure A.1.: Age

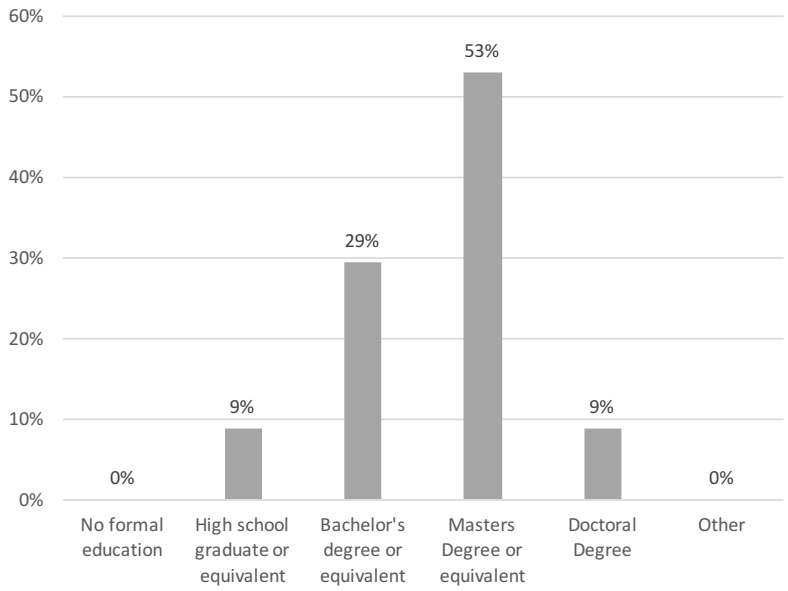

Figure A.2.: Highest Education

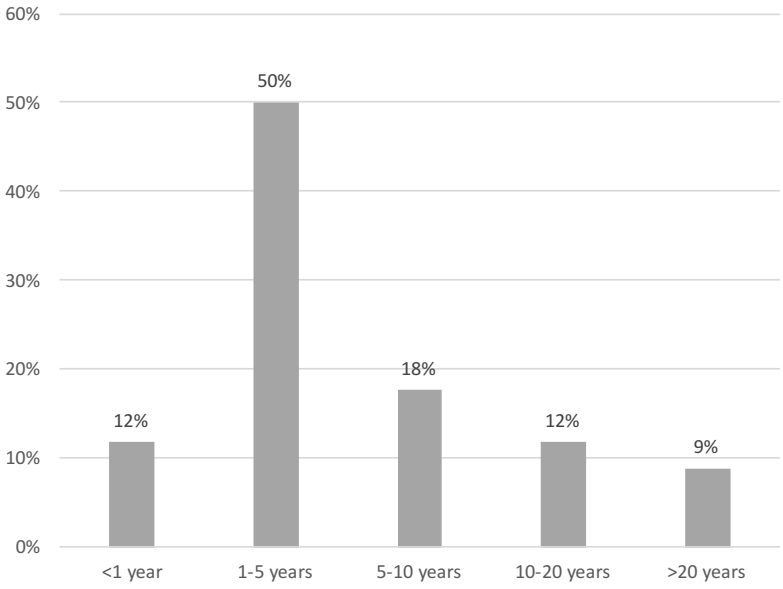

Figure A.3.: Professional Experience

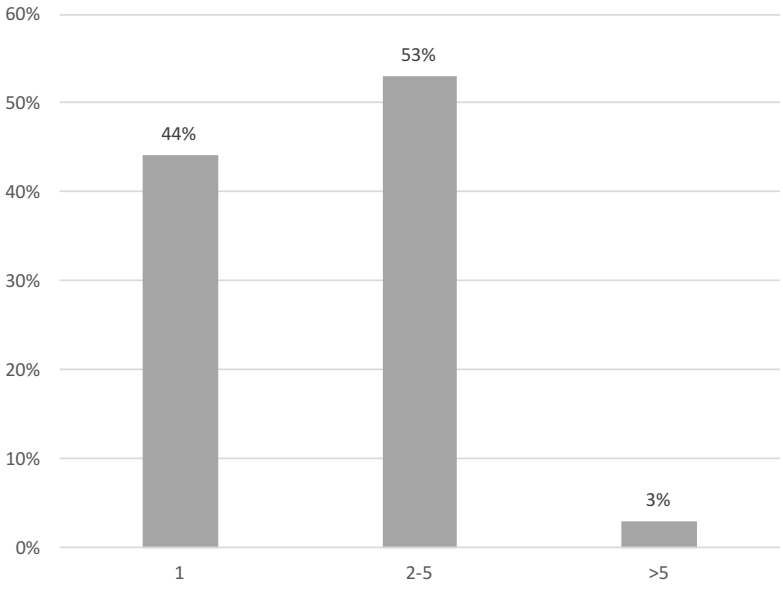

Figure A.4.: Number of Startups Founded

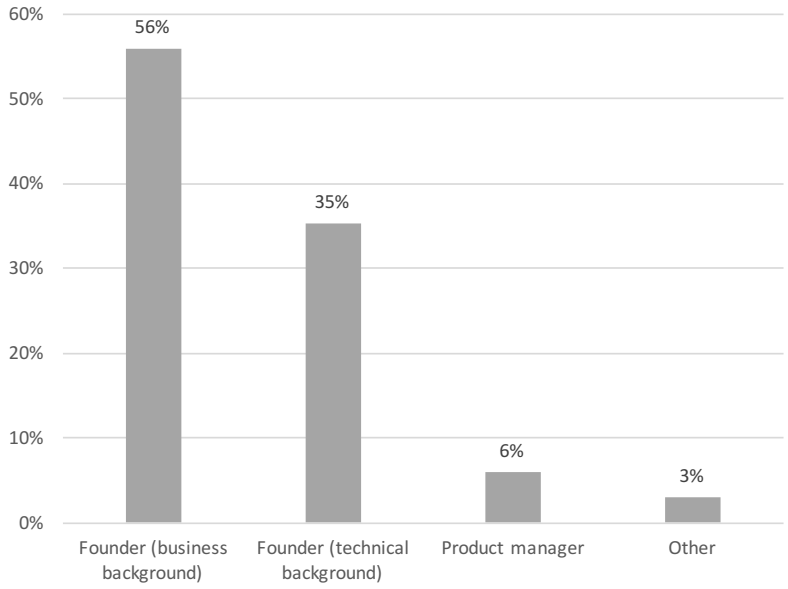

Figure A.5.: Current Role

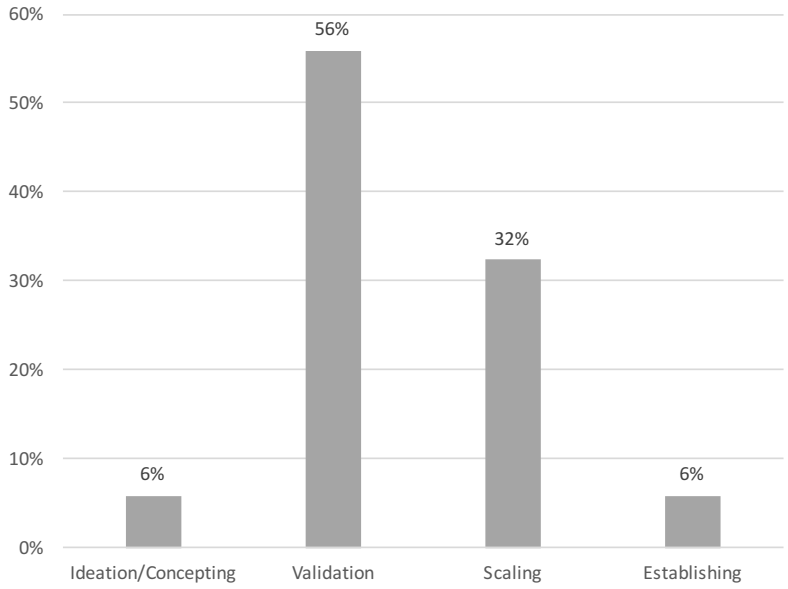

Figure A.6.: Stage of Startup

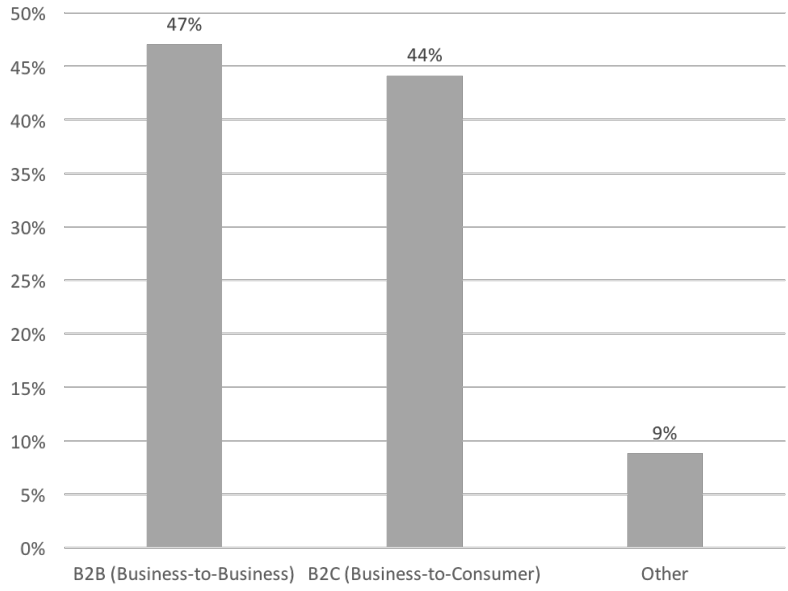

Figure A.7.: Business Model

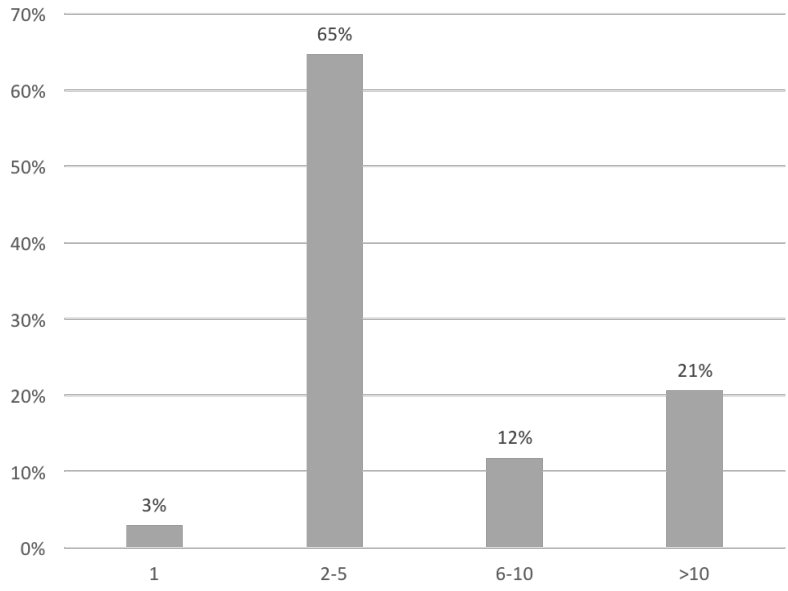

Figure A.8.: Team Size

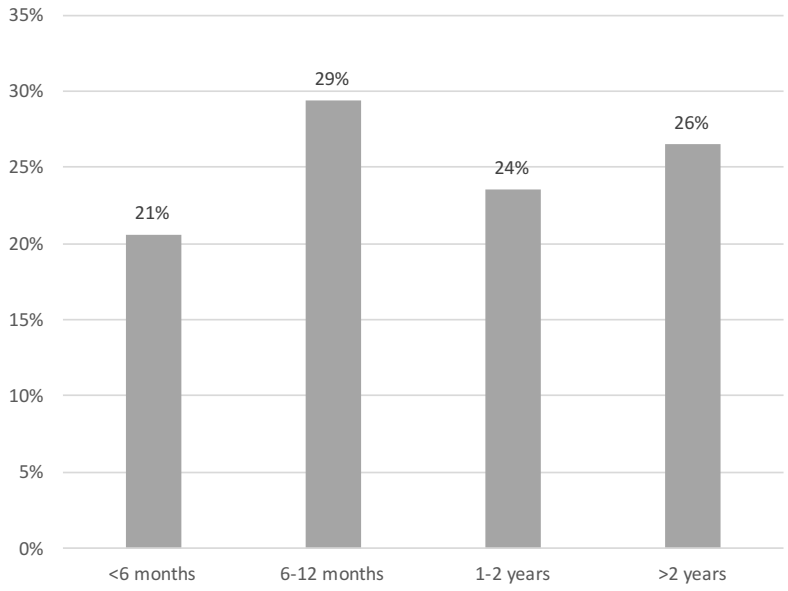

Figure A.9.: Age of Startup

A.5. Excerpts of Interview Transcriptions

Explanation

For reasons of anonymity and better readability only the relevant sections of the transcripts of the interviews are added here. "Ref" refers to the respective paragraph reference in the full transcript. "Usage" repeats the used references, translation or context used in the thesis. "Transcript excerpt" provides the respective section of the original transcript in German the reference or translation is based upon.

AC

Ref	Usage	Transcript excerpt
§30	Some organizations established a knowledge base in form of wikis describing process steps, possible tools and how to apply them	Answer to a question about providing knowledge about the process: "...dafür haben wir momentan Podio, und recht gut strukturierte Dokumentation bei uns zu unterschiedlichen Themen..."
§34	"one or the other is annoyed, especially practically oriented people, but afterwards everyone is happy that he did it"	"...Fortschritt tracken, indem wir die Methoden eine nach der anderen durchgehen, den tracken wir schon und kontrollieren dann Ergebnisse, das ist methodische Arbeit, Strategiearbeit, die den ein oder anderen nervt, vor allem für praktisch orientierte Leute, aber hinterher ist jeder froh, dass er es getan hat, wenn er dann durch den Prozess durch ist, dann hat er alles voll vor- und aufbereitet vor sich liegen..."

DA

Ref	Usage	Transcript excerpt
§24, §28	Some organizations established a knowledge base in form of wikis describing process steps, possible tools and how to apply them	§24 - "...Innerhalb jeder Phase haben wir Hilfestellungen zusammengestellt, z.B. in Modelphase eine Liste von Tools, die man verwenden kann, Business Model Canvas, Customer Journey, etc. Standard KPI Strukturen, KPI Driver Trees, Mini MBA, das man sich nach dem Cherry Picking Prinzip auswählen kann für das eigene Projekt, Meilenstein orientiert, Endergebnis der Phase wird vorgegeben, aber wie man das findet geben wir nicht vor..." §28 - Answer to a question how the knowledge is provided: "...Intranet, Wiki, wenn man Projekt anfängt bekommt man Zugang..."

DK

Ref	Usage	Transcript excerpt
§20, §22	As mentioned by DK the analog versions gets out-dated and loses its usefulness if the form is switched	§20 - "...Riesengroßes Ding selber gemacht und hängt an der Wand und wir haben immer Post-Its reingeklebt und darüber überlegt, am Ende haben wir es noch digital erfasst mit kleinen Zeichnungen..." §22 - "...so wie es (BMC) momentan an der Wand hängt ist es nicht mehr aktuell, hat sich währenddessen auch immer mal wieder ein bisschen gewandelt ... aber es is nicht so, dass wir permanent damit arbeiten, momentan zum Beispiel gar nicht mehr..."
§36	"I think there are too many tools, we are testing tools all the time"	"...ich glaube da gibt es momentan zu viele Tools, wir sind dauernd am Tools testen, ich glaube das ist einfach rausgehen und lernen von den Leuten, und dafür brauchst du eigentlich kein Tool..."

ES

Ref	Usage	Transcript excerpt
§61	the exchange benefits from a more informal setting and that is often why incubators organize events	"...informell, es gibt ein Sommerfest, alle Startups werden eingeladen wo man sich kennenlernen kann..."

HV

Ref	Usage	Transcript excerpt
§2	"there is no blueprint"	"...Keine Blaupause, was wir versuchen am Fließband zu machen, spannende Themen zu finden, die zu verifizieren ob sie wirklich spannend sind..."
§14a	"the biggest challenge in my opinion"	Answer to a question about knowledge transfer and how knowledge is transferred to a new team: "...Größte Herausforderung meiner Meinung nach, wir versuchen durch alles auf Servern in der Cloud, Dropboxordner, da entsteht gemeinsamer Ordner je Projekt, wo alle ihre Sachen reinlegen und du kannst zusammen arbeiten, Google Docs, etc. ist aber jedem Team selbst überlassen..."
§14b	lists describing what to consider when founding a company	"...wir haben auch Listen, das typische Gründen, worauf muss man achten mit HV, ist ein lebendes Dokument, wenn man als Gründer neu hinkommt, dass man weiß was sinnvolle Tipps und Tricks sind, eher grobe Sachen, kein Anspruch auf Vollständigkeit, eher lebend wird immer wieder gefüllt..."
§16	Recommendations for tools and exchange of other experiences often happen in an informal setting and is individual and personal as the choice is mostly contextual to the situation and setting of the startup	"...da sind Erfahrungsberichte, z.B. was sind gute Dienstleister was sind schlechte, trotzdem in so einem formalisierten Bericht nie rausfinden wie wenn man mal ein Bier zusammen trinken geht mit jemandem der die selbe Problemstellung hatte und darüber redet, was war gut, was war schlecht, das wirst du immer nur im persönlichen Austausch gut rüberbringen..."
§28a	those efforts often fail due to missing incentives and participation of teams as there is an asymmetry in interest between people having and people needing the information	"...Man hat so viel zu tun, und dann kommt einer und sagt du musst dich noch ein bisschen mit den anderen austauschen, Prioliste ganz weit unten, das nervt, außer es ist für dich von Interesse dann ist es ganz oben..."
§28b	Besides the interaction with mentors, coaches and experts the exchange between startups was another supporting factor	"...deswegen sind wir dahinter den regelmäßigen Austausch zu fördern, dass sie selbst merken es war sinnvoll dass wir uns getroffen und geredet haben..."
§46	"the founding team has to bear it (the startup) ... otherwise it is going to be difficult"	"...Gründerteam muss das tragen, ihr Baby, wenn wir das Gefühl haben wir müssen nachlegen, werden wir das auch tun, Experten die sich dann in die spezifischen Themen einbinden, aber hauptsächlich intrinsisch von den Gründern, sonst wird's schwierig..."

LM

Ref	Usage	Transcript excerpt
§6	Knowledge through strategy days	"...Startups die nicht da sind kommen vorbei für Coaching, Weiterbildungsangebote, die wir anbieten, kondensieren wir ziemlich stark auf einen vollen Tag im Monat, d.h. 6 Tage (Strategietage) die wir füllen mit Vorträgen zu Themen wie Gründung..."
§26	Provide connections through alumni networks	Answer to a question about partner networks: "...Ja definitiv, viel mit Alumni, wo wir einzelne vernetzen, dann gibt es Menschen die mit uns zusammenarbeiten, Firmen, Sponsoren, die Experten sind in einem bestimmten Bereich, sei es rechtliche Themen, oder Onlinemarketing, dann gibt es einfach Leute die sehr viel Erfahrung haben..."
§32a	therefore the incubators often do not want to push specific tools on the startups	"...ansonsten keinen zusätzlichen internen Kanal aufgemacht, da jedes Startup selbst bereits mit den unterschiedlichsten Tools arbeiten, zum managen des Teams, sei es Asana, Slack, oder so, und nicht noch zusätzlich etwas von uns dazubekommen sollen..."
§32b	Others tried to established some form of knowledge base	"...es kommt oft immer ein bisschen von den Startups selber, eins wollte ein zusätzliches kleines Wiki aufbauen über Asana, mit den verschiedenen Fragen, hängt immer an ein paar Menschen und der Plattform..."
§34	Besides knowledge that is quite static, like information on legal topics, often the relevant topics are subject to change; "we work in an environment where topics change quickly, every half year with a new batch the topic are completely different"	"...wir arbeiten in einem Bereich wo sich Themen schnell ändern, eigentlich alle halbe Jahre bei einem neuen Jahrgang sind die Themen ganz anders sind, die rechtlichen Themen bleiben gleich, da haben wir unsere Partner die vorbeikommen ... aber so Themen wie Onlinemarketing oder Lean-Startup Prozesse, klar bleiben die von der Philosophie her gleich, aber es gibt immer wieder neue Tools die man verwenden kann..."
§40	"most tools are very overloaded"	"...sobald es großer Mehraufwand ist benutzt es keiner, könnte Austausch gut fördern, zu Themen die für alle relevant sind oder Dokumente die für alle relevant sind ... meisten Tools sind sehr überfrachtet..."

LM (continued)

Ref	Usage	Transcript excerpt
§42	"it is important, that startups have trust in their mentors"; Founders may be hesitant to codify and share certain information and knowledge, as they want to have control over who has access to it; trust is an issue in this environment and sets a limit for the usage of tools and communication of sensitive information as it is important to know what is and should be disclosed to whom	"...wichtig, dass Startup Vertrauen hat zu Mentor, weil es gibt Menschen die sich als Mentoren anbieten aber nur an Informationen ran wollen ... aber es gibt auch andere die viel Zeit reinstecken nur um den Startups zu helfen, Startup muss selbst entscheiden wem sie vertrauen kann und mit wem sie das teilen möchten, es sind vertrauliche Informationen, sagen auch mir vertrauliche Sachen, Zahlen die sie sonst nie sagen würden ... die würden sie niemals in ein Tool eintragen ... großes Thema bei allen, es gibt eine Schwelle bis wo man Sachen kommuniziert, dann Unsicherheit da was man nach außen trägt, oder mit Investoren redet..."
§45	Having a form of accountability through set milestones and external checks was deemed important	"...es ist sehr gut so Meilensteine zu haben, und sich selber zu zwingen, warum es gut ist einen Mentor zuhaben, wo man immer wieder sagen muss, wo stehen wir gerade, und nicht nur einmal im Monat sondern auch woanders..."

ML

Ref	Usage	Transcript excerpt
§27	Ultimately the initiative has to come from the startup for it to be successful	"...letztlich kann das (Initiative) nur aus den Teams herauskommen, wir leisten nur Hilfestellungen..."
§37	Often there are too many tools available for a task	"...nur Kommunikationstool untereinander, es gibt ja x Tools, die eher individuell im Einsatz sind, gestern was zum Prototyping, da gibt es ja schon 5-6 Tools die im Einsatz sind für App Prototyping..."

ML (continued)

Ref	Usage	Transcript excerpt
§41	Have startups be co-located to foster exchange; "the teams are always on site, which proved to be a great strength, as they communicate a lot amongst each other"; The exchange on the same level is used to share experiences, learn from each other and even help each other out from time to time; Besides the interaction with mentors, coaches and experts the exchange between startups was another supporting factor	"...Die Teams sind immer vor Ort, große Stärke die sich herausgestellt hat, dass sie untereinander extrem viel kommunizieren, extrem gut verstehen, fast gewundert dass es so gut funktioniert, dachte die sind zickiger, dass sie nicht so intensiv kommunizieren, geht so weit dass die Programmierer teamübergreifend beauftragt, super Austausch, sehr positive Erfahrung..."
§43	Provide connections through partner networks	Answer to a question about partner networks: "...Da besteht Kontakt, wir fragen dann individuell an, z.B. ein Team hat mit Radio zu tun, dann fragen wir die Radiopartner ob sie zur Verfügung stehen und beraten sie, da gibt es einen Austausch, was sich ändern muss, solche Sachen, wird auf Nachfrage von uns organisiert..."
§51, §53	The importance of having or providing a broad structure, showing a general direction and most important aspects early in the process was emphasized	§51 - "...wir werden viel mehr von uns aus strukturiert anbieten, waren anfangs ein bisschen naiv, dachten die sagen dann schon was sie wollen, man muss auch einen Rahmen bieten, relativ viel dann vorgeben, was man durchlaufen muss..." §53 - "...das ist eigentlich auch so eine Erfahrung, dass wenn man sich zu lange Zeit lässt mit dem was man glaubt das ist save, dass das Produkt klar genug ist, wenn man das nicht von Anfang an versucht rund zu kriegen und testet hat man fast nicht mehr die Chance in der zur Verfügung stehenden Zeit zu drehen oder was Gescheites zu machen..."

ST

Ref	Usage	Transcript excerpt
§40	he used the BMC but did not see a value by just filling the form	"...Das haben wir mal gemacht, muss aber ehrlich gestehen hat uns außer einer Stunde mal Sachen in Kästchen eingetragen hat es uns nicht wirklich vorangebracht, kein Aha-Erlebnis ... ich glaube die Aha-Erlebnisse finden immer dann statt, wenn man anfängt, bereits Durchdachtes neu zu überdenken, weil man feststellt irgendwas funktioniert da nicht, und in dem Fall war es immer so dass wir das eingetragen haben und dann festgestellt haben, okay jetzt haben wir alles in Kästchen gepackt, aber im Prinzip hat sich unser Konzept dadurch nicht verändert, also scheint es nicht so schlecht gewesen zu sein..."

TF

Ref	Usage	Transcript excerpt
§24	the BMC or a business plan, are perceived as a standard amongst startups and are sometimes even mandatory to assess the business model	"...wir machen am Anfang vom Programm ein Assessment Center, da wird Business Model Canvas gemacht, alle technischen Sachen werden angeschaut, um zu sehen was ist die Ausgangssituation, wenn die aufgenommen wurde ist auch klar wo es hingeht..."
§28	"we see ourselves as service provider for the startups and only give recommendations, the decision has to come from the startup itself"; Ultimately the initiative has to come from the startup for it to be successful	"...wir sehen uns als Dienstleister für die Startups und wir geben nur Handlungsempfehlungen ab, Entscheiden muss das Startup selber..."

TF (continued)

Ref	Usage	Transcript excerpt
§78, §80	Recommendations for tools often happens in an informal setting and is individual and personal as the choice is mostly based on experience and contextual to the situation and setting of the startup	§78 - Answer to question about tool recommendations: "...eigentlich mehr im Gespräch z.B. haben kein CRM Tool, so ein Wissen ist Erfahrung aus den Köpfen, Salesforce vs. Close.io, ist einfacher oder so passt besser..." §80 - "...das Wissen ist halt in uns drin, du kannst halt nicht sagen auf Problem ist XYZ die Lösung, zu viele Faktoren die da reinspielen, Team, Markteinflüsse, interpersonelle Sachen, sehr schwierig ohne ein Mensch zu machen..."
§80, §99	Often tacit knowledge needs to be exchanged, which is mainly done through personal connection as it is difficult to codify or automate	§80 - "...das Wissen ist halt in uns drin, du kannst halt nicht sagen auf Problem ist XYZ die Lösung, zu viele Faktoren die da reinspielen, Team, Markteinflüsse, interpersonelle Sachen, sehr schwierig ohne ein Mensch zu machen..." §99 - "...Persönliches Gespräch brauchst du trotzdem, wann glaubst du schon einem System? Ist ja nur Berechnung, menschlicher Faktor fehlt, in verschiedenen Situationen einschätzen zu können, irgendwann vielleicht mit Machine Learning..."
§86	"we watch closely who to put together in an office space, then they exchange intensively"; Besides the interaction with mentors, coaches and experts the exchange between startups was another supporting factor	"...Teils zwei in einem Büro, hast du auch bestimmtes Problem gehabt, etc. Wir achten darauf wen wir zusammen in ein Büro tun, dann tauschen die sich sehr intensiv aus..."
§89	The idea of providing a toolbox was perceived as useful, but difficult to implement due to above mentioned reasons	Answer to question about assessment of a tool support of the process: "...Sicher sinnvoll für Startup, Logbuch zu haben, aber Problem der Pflege, System ist nur so gut wie man es pflegt, irgendwann muss man so viel bearbeiten, dass es sich nicht mehr lohnt..."

W

Ref	Usage	Transcript excerpt
§78a	emphasized the importance of coaching and asking the right questions	"...was wir hätten brauchen können sind Advisors, das hätten wir von Anfang an brauchen können, die hätten uns direkt die Fragen stellen sollen, wen wollt ihr damit erreichen? Wie wollt ihr euch von anderen absetzen? Eher jemand auf die Finger klopfen sollen, schaut euch mal ganz genau an was es auf dem Markt gibt, haben wir ein bisschen unterschätzt..."
§78b	the difficulty more often is make an effort finding and accessing it	"...Was es an Informationen, Frameworks gibt ... Klar wir wussten nicht, dass es das alles gibt aber das ist da, wenn man da den Ehrgeiz aufbringt und erkundigt und einliest, dann findet man super viele Informationen und Anlaufstellen wo man hingehen kann..."
§84	advisors might share confidential material too, to provide examples of documents or information that might be helpful for founders but need to be kept confidential; W mentioned they used templates and examples provided by advisors to create the artifact	"...aus Datenschutzgründen hätten die das sicher nicht gemacht, auch wenn es vielleicht unbedenklich ist, ich kriege halt von so einem Advisor mal ein Termsheet von einer anderen Firma, das durch ist oder kurz davor ist, die er betreut hat, für meine Ansicht, dann schickt er mir das per Email mit dem Vermerk, bitte Vertraulich behandeln, er würde das nicht auf so einer Platform machen, das hinterlässt Spuren..."