Course Book

LEAN STARTUP

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LEAN STARTUP

MASTHEAD

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SIGNPOSTS THROUGHOUT THE COURSE BOOK

This course book contains the core content for this course. Additional learning materials can be found on the learning platform, but this course book should form the basis for your learning.

The content of this course book is divided into units, which are divided further into sections. Each section contains only one new key concept to allow you to quickly and efficiently add new learning material to your existing knowledge.

At the end of each section of the digital course book, you will find self-check questions. These questions are designed to help you check whether you have understood the concepts in each section.

For all modules with a final exam, you must complete the knowledge tests on the learning platform. You will pass the knowledge test for each unit when you answer at least 80% of the questions correctly.

When you have passed the knowledge tests for all the units, the course is considered finished and you will be able to register for the final assessment. Please ensure that you complete the evaluation prior to registering for the assessment.

Good luck!

BASIC READING

Croll, A., & Yoskovitz, B. (2013). *Lean analytics: Use data to build a better startup faster*. *The lean series*. O'Reilly Media. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=cat05114a&AN=ihb.52503&site=eds-live&scope=site

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Ries, E. (2017). *The startup way: How modern companies use entrepreneurial management to transform culture and drive long-term growth*. Currency, an imprint of the Crown Publishing Group. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=cat05114a&AN=ihb.52724&site=eds-live&scope=site

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Blank, S. G. (2020). *The four steps to the epiphany: Successful strategies for products that win* (5th ed.). John Wiley & Sons. Chapters 1 and 2http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=cat05114a&AN=ihb.49178&site=eds-live&scope=site

UNIT 2

Bortolini, R. F., Nogueira Cortimiglia, M., Danilevicz, de Moura Ferreira, A., & Ghezzi, A. (2018). Lean startup: A comprehensive historical review. *Management Decision*, *59*(8), 1765–1783. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edsemr&AN=edsemr.10.1108.MD.07.2017.0663&site=eds-live&scope=site

UNIT 3

Osterwalder, A., Pigneur, Y., Bernarda, G., & Smith, A. (2014). *Value proposition design: How to create products and services customers.* John Wiley & Sons. Chapter 1 http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=nlebk&AN=945730&site=eds-live&scope=site

Vargas, B. P., Signoretti, I., Zorzetti, M., Marczak, S., & Bastos, R. (2020). On the understanding of experimentation usage in light of lean startup in software development context. In *Proceedings of the evaluation and assessment in software engineering.* ACM. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edsbas&AN=edsbas.23D4D3BB&site=eds-live&scope=site

UNIT 4

Kohavi, R., & Longbotham, R. (2017). Online controlled experiments and A/B testing. In G. I. Webb (Ed.), *Encyclopedia of machine learning and data mining* (pp. 922–929). Springer-verlag. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edsvle&AN=edsvle.AH29696937&site=eds-live&scope=site

UNIT 5

Croll, A., & Yoskovitz, B. (2013). *Lean analytics: Use data to build a better startup faster*. *The lean series*. O'Reilly Media. Chapter 6 http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=cat05114a&AN=ihb.52503&site=eds-live&scope=site

UNIT 6

Parker, G. G., & van Alstyne, M. W. (2005). Two-sided network effects: A theory of information product design. *Management Science*, *51*(10), 1494–1504. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edsjsr&AN=edsjsr.20110438&site=eds-live&scope=site

FURTHER READING

UNIT 1

Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: A handbook for visionaries, game changers, and challengers*. Wiley & Sons. Chapter 1 http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=cat05114a&AN=ihb.45837&site=eds-live&scope=site

UNIT 2

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Mazzarol, T., & Reboud, S. (2020). *Entrepreneurship and innovation*. Springer. Unit 3 http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=nlebk&AN=2533131&site=eds-live&scope=site

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Moogk, D. R. (2012). Minimum viable product and the importance of experimentation in technology startups. *Technology Innovation Management Review*, *2*(3), 23–26. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edsdoj&AN=edsdoj.38e2b13f233547bb92736260db86b679&site=eds-live&scope=site

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Pereira, C., Santos, A., Machado, L., & Zaina, L. (2022). How developers feel about tools: An investigation on software startup professionals experience with virtual Kanban boards. In *2022 IEEE/ACM 15th International Workshop on Cooperative and Human Aspects of Software Engineering (CHASE), Cooperative and Human Aspects of Software Engineering (CHASE), 2022 IEEE/ACM 15th International Workshop on,* pp. 1–10. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edseee&AN=edseee.9796283&site=eds-live&scope=site

UNIT 5

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Flechas Chaparro, X. A., & de Vasconcelos Gomes, L. A. (2021). Pivot decisions in startups: A systematic literature review. *International Journal of Entrepreneurial Behavior & Research*, *27*(4), 884–910. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edsemr&AN=edsemr.10.1108.IJEBR.12.2019.0699&site=eds-live&scope=site

UNIT 6

Song, P., Xue, L., Rai, A., & Zhang, C. (2018). The ecosystem of software platform: A study of asymmetric cross-side network effects and platform governance. *MIS Quarterly*, *42*(1), 121–142. http://search.ebscohost.com.pxz.iubh.de:8080/login.aspx?direct=true&db=edo&AN=127748825&site=eds-live&scope=site

LEARNING OBJECTIVES

The **Lean Startup** course book teaches you the essential concepts of this topic. You will first learn about the origins and fundamentals of lean startup and its predecessors, lean management and customer development, and understand why startups often fail. Then, you will gain insight into the concept of lean startup as a new entrepreneurial management method that uses validated learning and the build–measure–learn feedback loop as core elements.

Building on this, you will realize the role of experiments, hypotheses, and minimum viable products in lean startup. You will explore innovation accounting and learn about tools and techniques that can be used to apply it in the business. Then you will learn when it is time to change course (pivot), what growth engines can be used, and how an organization should be structured for sustainable growth – called adaptive organization.

Finally, you will learn how companies are successfully using the lean startup methodology in practice, using it to innovate in a customer-centric way and to be sustainably competitive.

UNIT 1

FUNDAMENTALS OF LEAN STARTUP

STUDY GOALS

On completion of this unit, you will be able to ...

- explain the emergence and fundamentals of lean startup and its predecessors, lean management and customer development.
- specify the difference between lean startup and classic development methods.
- understand why startups often fail.

1. FUNDAMENTALS OF LEAN STARTUP

Introduction

Starting a new business is the dream of many, but it is much more difficult than assumed. About 90 percent of startups fail, of which 20 percent fail in the first year (Chernev, 2022). However, the founders of these startups are usually motivated; have a brilliant team; good timing; and, most importantly, a great product. In other words, everything successful entrepreneurs claim would be necessary to succeed, yet the products fail to sell as planned. What goes wrong? Perhaps the more appropriate question is “When did it go wrong?”

Especially when young companies want to enter an existing or new market with an innovative offer, they usually concentrate too much on developing their “perfect” product before they really know the problems and needs of their customers. Often, countless hours and euros have been spent on development and the product fails to find a buyer (Chesbrough & Tucci, 2020; Ries, 2011). The key in product development, especially in an environment of high uncertainty and inability to plan, is to know the real customer needs as early as possible. This requires involving the customer in the earliest stages of the product development process until the product has developed from a lean prototype to a market-ready blockbuster and the startup has become a company with a viable business model (Blank, 2020; Ries, 2017).

The lean startup method includes exactly this approach and is based on the fundamentals of lean management and customer development. In this course book, you will learn the essence of the lean startup method, how it has emerged, and how it differs from classic development methods. You will also discover the origins and concepts of its predecessors – lean management and customer development – and understand what has been adopted from these methods for lean startup.

1.1 The Emergence and Definition of Lean Startup

This section will describe the emergence, principles, and critics of lean startup; differentiate between lean startup and classic development methods; and describe why startups often fail.

Origin and Background

The lean startup method was developed in 2008 by Eric Ries, a multi-founder and best-selling author, initially for the founding of fast-growing technology companies (Blank, 2013). It is a method for developing products with the shortest possible product development cycles to find out quickly whether the planned **business model** is viable. In this process, the product is iteratively developed from a lean minimalist prototype (minimum

viable product) with constant customer feedback until it is ready for the market. In this way, it can be ensured from the very beginning that the customer's needs will be satisfied and that the product will not be developed without the customer in mind. Conventional methods, such as the waterfall model, which is often used in product development at established companies or even the **business plan** originally designed for founders and investors, usually present the finished product to customers after a long development period, without ever having validated the product with them beforehand. There is a high risk that the product will not find any customers, especially in the case of innovations with a high uncertainty factor, as is the case with startups (Blank, 2020; Ries, 2017).

Business model
A business model defines how a company creates, captures, and delivers value for its customers.

Business plan
A business plan is a document that includes a business idea with its goals, strategies, framework, and activities.

Lean startup is based on several well-known management and product development methods (Ries, 2011) and is aligned with the principles of its predecessors: lean management (avoidance of waste and optimization of the use of resources) and customer development (customer-focused development and validation of business ideas in startups; Blank, 2013; Chesbrough & Tucci, 2020). Both methods are described in detail in the following sections.

Ries has learned from his own experience, observations, and discussions that the success of a startup does not depend on being in the right place at the right time with a brilliant idea. It is the result of a systematic and repeatable process. However, the classic methods of product development used in general business at established companies usually don't work for startups (Ries, 2011). One of the reasons for this is that established companies generally concentrate on satisfying the needs of their existing customers in the direction of higher market segments. The degree of uncertainty for acceptance among customers and markets and the resulting success is, therefore, significantly lower than in the case of startups that want to enter an unknown market with a completely new product that is being discovered and developed along the way. The innovative capacity in these companies is, thus, mostly focused on **sustaining innovations** that can be realized in the existing market using conventional management and product development methods (Christensen, 2016; Ries, 2017). These companies and methods are not designed to address unknown customers with a completely new offering. The essential aspect of startups is that they operate in an environment with a high degree of uncertainty, which is difficult or almost impossible to calculate and plan (Ries, 2017).

Sustaining innovations
A sustaining innovation, in contrast to a disruptive innovation, incrementally improves the product performance of an existing product.

Other founders have also realized that the classic business and product development methods do not work in a highly innovative setup, and have then tried the exact opposite: to develop a product and to build a business model creatively, impulsively, and unmanaged. But just acting blindly rarely works. A process is needed that is designed for the inability to plan and uncertainty of startups (Ries, 2011). Uncertainty can affect a wide range of areas, such as the market to be served, the product to be developed, and the associated risks (Bortolini et al., 2018). Lean startup provides such a process. The core of the method is validated learning through specific hypothesis-driven experimentation with real customers and iterative product releases, all while applying flexibility and calculable affordable loss (Mansoori et al., 2019).

Ries (2011) defines a startup independently of the state of maturity in which the company is situated: A startup is a human institution designed to create a new product or service under conditions of extreme uncertainty (p. 27). Although the lean startup method was ini-

tially created for startups, it is also increasingly being used in large companies. However, large companies cannot simply be regarded as large versions of startups, as they face completely different challenges in terms of the allocation of resources, interests of various **stakeholders**, and decision-making processes, among other things (Blank, 2013; Chesbrough & Tucci, 2020; Ries, 2017).

Stakeholder
A stakeholder is a person, group, or organization that is directly or indirectly affected by the activities of a company and has a legitimate interest in these activities.

Difference Between Lean Startup and Classic Development Methods and Models

To clarify the difference between lean startup and other classic development models (which are usually used in large companies), as well as why the lean startup method can be considered more successful for startups, we will now compare the business plan and the waterfall model to the lean startup method as examples.

Ries was not the first to note that startups need their own methods. Authors such as Baker and Nelson (2005), Blank (2007), McGrath and MacMillan (2000), and Sarasvathy (2001), for example, had questioned the classic business plan as the basis for starting a business (Bortolini et al., 2018). Startups were once (and are often still) advised to create a business plan that covers all areas of the company. This should be followed until new information comes in, and then the plan should be updated accordingly. This involves developing and launching the product according to the original plan and predetermined specification. Startups were advised to act like small versions of large companies (Chesbrough & Tucci, 2020). In the classic sense, the business plan includes a five-year forecast of sales, cash flows, etc. It is written to conceptually reduce uncertainties and convince investors of the business idea before the product is even designed and approved by a customer. In general, enormous amounts of money and time are spent on the development of the planned product and then an attempt is made to sell it. In most cases, it is discovered that customers do not need most of the product features and are unwilling to pay for them. The key to the success of a startup is to learn from early and quick failures, then adjust the ideas, assumptions, and product features behind them based on regular direct customer feedback (Blank, 2013). Investors often require a business plan. This should, for example, be used as a basis for financial hypotheses in customer development and not as a method for developing the startup (Blank, 2020).

Another classic model is the waterfall model, which is often used in product development. This is a linear procedure in which one phase is carried out exactly after the other. There are no backward steps. First, requirements and milestones are defined, then the product is developed and presented to the customer with a big launch, and any errors that occur are corrected. Here, obtaining customer feedback is also only planned at the end of the process (Chesbrough & Tucci, 2020; Ries, 2011). This may be appropriate for products that can be planned and calculated well, for example, with sustaining innovation; however, it cannot be used in a rapidly changing and uncertain business environment (Ries, 2011). An iterative, step-by-step development of the product that does not waste resources would be useful here, unlike the typical year-long product development cycles where customer needs are largely unknown (Blank, 2013). Agile software development, for example, is performed in sprints. The **specification** is written in code in regular cycles of one to two weeks, which is then tested with the customers. Based on their feedback, the specification

is adjusted and tested again in the next sprint with the revised code. Agile methods make a product whose customer needs are not yet clear much more likely to succeed than when waterfall models are used (Chesbrough & Tucci, 2020).

Specification
A specification is a document, directory, or similar, in which the requirements for the attributes of a product, software, service, etc. are listed in detail.

Even though the lean startup method is not a guarantee for success, Blank (2013) observed that more startups are successful with it than those using traditional methods. Often, companies fear that early release of their unfinished product could put them at a competitive disadvantage. However, in most industries, quick customer feedback brings more profitable opportunities than secrecy until the big launch (Blank, 2013).

The Five Principles of the Lean Startup Method

To gain a basic understanding of the lean startup method, Ries (2011) summarized five principles, as explained in the following paragraphs.

"Entrepreneurs are everywhere"

You don't necessarily have to start a business in a garage or basement to be an entrepreneur. According to his definition of a startup, entrepreneurship is a basic attitude that is assumed by developing a new product or service under extreme uncertainty. This can be the case in a newly founded company, as well as in an established one. The lean startup approach thus works regardless of the company's maturity, size, and industry (Ries, 2011, p. 8).

"Entrepreneurship is management"

A startup cannot be limited to its innovative offering; it is defined by its entire organization in the context of extreme uncertainty, so it also requires appropriate management and leadership methods and competencies. Since there can be entrepreneurs everywhere, companies that depend on innovative strength for growth should also create and fill corresponding positions (Ries, 2011, p. 8).

"Validated learning"

The core mission of a startup is not to produce products and services, make money, and satisfy customer needs. Their achievement is to learn to build a viable and scalable business model. This learning takes place through regular experiments, where the entrepreneurs scientifically validate every component of their entrepreneurial vision (Ries, 2011, p. 8).

"Build–measure–learn"

An offer is developed from an initial idea, the success of the offer is measured with the customers, and lessons are learned from this to modify the offer again, if necessary. This feedback loop of build, measure, and learn is essential for a startup to develop into a sustainable and **scalable business model**. Accordingly, all processes must be designed to

Scalable business model
With a scalable business model, sales can be increased disproportionately in relation to the investments and costs involved.

accelerate this loop to have the offer on the market that best satisfies customer needs as quickly as possible. This feedback loop is not just run through once; it repeats itself and adapts to the respective customer needs (Ries, 2011, p. 9).

"Innovation accounting"

Lean startup also requires classic accounting activities that are adapted to the characteristics of a startup. This is the only way to sustainably improve entrepreneurial results and support those responsible for innovation in their personal accountability. For example, key figures and milestones are defined differently and tasks are prioritized differently than in accounting in large companies (Ries, 2011, p. 9).

Criticism of Lean Startup

Lean startup does not seem to be a tool for every use case and is discussed accordingly in the literature. Felin et al. (2020), for example, question whether the concept is suitable for radical or highly innovative ideas and products. They criticize the following points in particular (Chesbrough & Tucci, 2020):

- the transfer of concepts from lean manufacturing to lean startup due to the different framework conditions (incremental improvement of processes and products versus radical or disruptive innovations)
- customer feedback as a driving force in radical or disruptive innovations whose scope customers cannot assess or evaluate
- the usefulness of the most commonly used **business model canvas** by Osterwalder and Pigneur (2010) as a tool for hypothesis generation, as it is not specific enough for startups and has a very high complexity and correspondingly high level of detail

Business model canvas
The business model canvas is a structuring tool that is typically used to systematically understand, develop, and implement a business model, always focusing on the value proposition to the customer (Osterwalder & Pigneur, 2010).

From their point of view, lean startup is particularly appropriate where ideas are developed into products that can be easily and quickly tested by customers (Chesbrough & Tucci, 2020; Felin et al., 2020).

Furthermore, it is not a trivial task to apply the concept in a grown company. Although Ries (2011; 2017) claims it can be used everywhere, special framework conditions must be created here. A large company is not a large version of a startup, just as a startup is not a small version of a large company. Large companies, unlike startups, usually already have an existing business model by which they operate, multiple projects among which they allocate resources, a mindset that is opposed to rapid lean developments, etc. (Chesbrough & Tucci, 2020). All of this must be considered if lean startup is to be applied to an established company. In its fundamental concept, lean startup is based, among customer development, on the principles of lean management, which we will now take a closer look at.

1.2 Lean Management

This section will help you to be able to explain the emergence, concept, and principles of lean management, one of the predecessors of lean startup.

Emergence and Definition of Lean Management

"Lean management" is an approach to operational optimization for the entire value chain that was developed in Japan and is increasingly being used worldwide. It can be applied regardless of industry or company size (Helmold, 2020).

The origins of lean management date to the beginning of industrialization. Here, processes and workflows were already being improved step by step. However, it was Henry Ford who, in 1913, looked at the production process as a whole (Dekier, 2012; Helmold, 2020). He introduced assembly line production for the first time and arranged the work machines in a process- and sequence-oriented order. Although this led to rapid throughput and production times, which significantly improved efficiency, the range of variants was severely limited. Ford's T-model ("Thin Lizzie") was only available in black and also only in a limited number of body styles (Helmold, 2020). As customers increasingly demanded different versions and models, this car concept was too bulky. Other automotive manufacturers tried to adapt this approach to current conditions with more machines and different processes, but this in turn slowed down lead times and significantly increased inventories (Helmold, 2020; Dave, 2020). Toyota then addressed this problem with its first beginnings with innovative approaches in the 1930s (Helmold, 2020) and with the development of just-in-time production in the 1950s (Dekier, 2012). Then, in the 1990s, a group of scientists from the Massachusetts Institute of Technology (MIT), as part of the International Motor Vehicle Program, studied the differences between development and production conditions in the automotive industry. At Toyota, they found a development and production system optimized in terms of quality and efficiency. The underlying principles were called lean production and are not purely technical, but mainly organizational in character. They are also known as the Toyota Production System because of their origin, are based on the concept of continuous improvement (*kaizen*), and have long been considered the benchmark for lean production (Dekier, 2012; Helmold, 2020). Lean production differs from traditional manufacturing concepts particularly in that throughput times are reduced, inventories are kept as low as possible, and non-value-adding activities are permanently eliminated throughout the value chain (Helmold, 2020).

Over time, the methods of lean production were no longer used only for production, but were increasingly extended to various concerns of management, which has led to the term "lean management." Lean management thus complements lean production, as it does not focus on waste-free optimization of production but takes a holistic view of the company and beyond. It is comprehensive and affects areas in corporate policy and public relations (Dekier, 2012; Helmold, 2020).

Concept of Lean Management

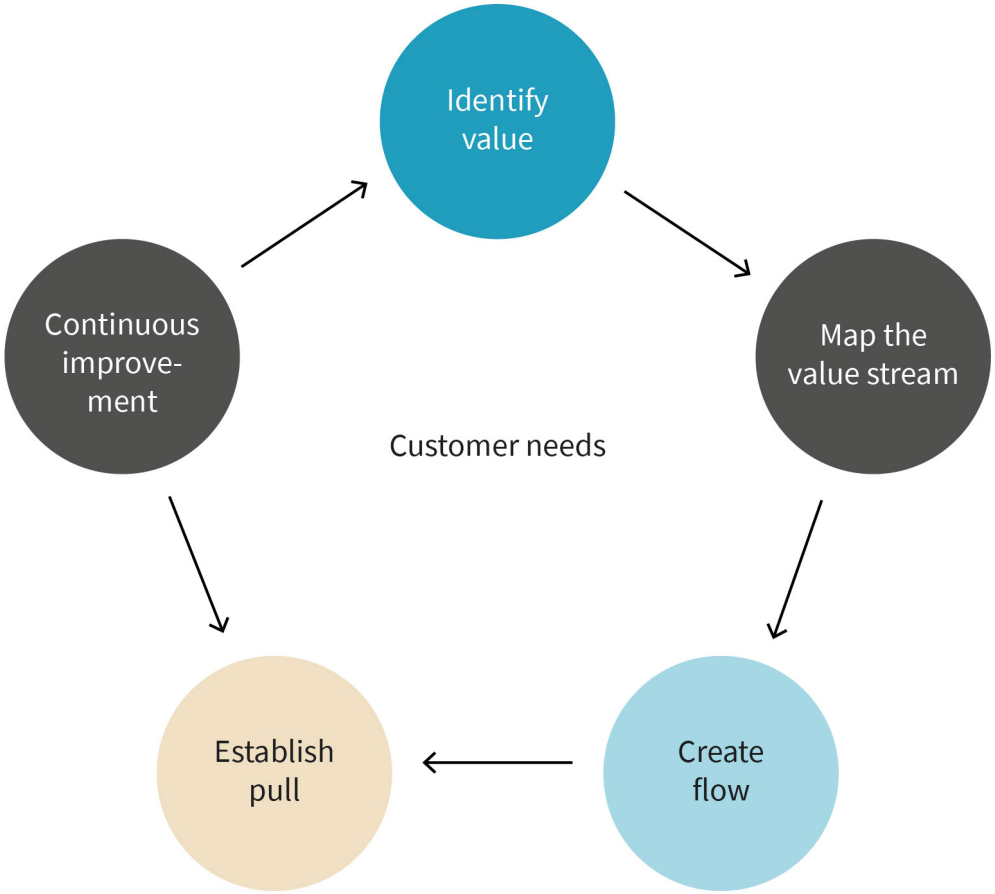
Lean management is a concept for process optimization that considers the entire value chain, from the supplier to the company's own operations to the customer, and places the customer at the center of all actions. It aims to create value for customers by optimizing the resources used and to create a constant workflow based on customer needs. The goal is to eliminate any waste by identifying all inefficiencies (e.g., activities, processes, products, and product components, for which a customer is unwilling to pay) and then revising, eliminating, or converting them into value-creating activities (Helmold, 2020).

The introduction of lean management provides significant benefits. Among other things, the company will be more productive and efficient because it only conducts value-creating activities and saves resources accordingly. As the customer is always in focus, it also helps identify new customer needs in good time and to be able to serve them accordingly (Dekier, 2012; Helmold, 2020; Kanbanize, n.d.).

The Five Principles of Lean Management

Based on the Toyota Production System, lean management consists of five principles that should serve as a guideline for companies to implement (Dekier, 2012; Helmold, 2020; Kanbanize, n.d.). They will now be briefly explained and visualized in their context in the following figure (Kanbanize, n.d.).

Figure 1: The Five Principles of Lean Management



Source: Abduljabbar Asadi (2020), based on Kanbanize (n.d.).

“Identify value”

Lean management always focuses on customer needs. A customer only pays for that which offers them value; everything else is considered unnecessary. Accordingly, the value desired by the customer must first be defined (Dekier, 2012; Helmold, 2020; Kanbanize, n.d.).

“Map the value stream”

The next step is to identify the value stream for each product that delivers the value and to document all related workflows from the start of production to delivery to the customer, including participants and responsible parties (Dekier, 2012; Helmold, 2020; Kanbanize, n.d.). A value stream mapping will be used to identify the parts that contribute to the pre-defined customer value and the ones that do not, or do so insufficiently. The inefficient parts will be adjusted or eliminated accordingly (Helmold, 2020; Kanbanize, n.d.).

“Create flow”

The task now is to implement and practice ideal workflows according to the optimal value stream (Dekier, 2012; Helmold, 2020; Kanbanize, n.d.). It should be noted that a smooth workflow means time, practice, and routine (Helmold, 2020; Kanbanize, n.d.). Especially for cross-functional teams, smaller process sections for organization and a graphical visualization of the processes can be helpful (Helmold, 2020).

“Establish pull”

To ensure that the workflows initiated now are as efficient as possible, work is only requested when it is actually demanded by the customer (Dekier, 2012; Helmold, 2020; Kanbanize, n.d.). This applies to the steps where a continuous flow is possible. Accordingly, customer demand determines production utilization (Helmold, 2020).

“Continuous improvement”

To ensure that the concept remains sustainably efficient, it must also be constantly reflected upon and improved in accordance with the *kaizen* principles (Dekier, 2012; Helmold, 2020). This is not only about obvious production failures, but also about improvements in daily work and routine. Various measurement methods and key performance indicator (KPI) systems contribute to being able to achieve the perfection this concept strives for. The aim is to continuously reduce the number of steps and effort required to satisfy the customer (Helmold, 2020). This only works if all employees at all levels are involved in continuous improvement (Helmold, 2020; Kanbanize, n.d.).

Market demand and customer value must also be continuously questioned and re-evaluated. Thus, the cycle begins anew and lean management contributes permanently to high customer satisfaction and corresponding operating results (Helmold, 2020).

Lean management must not focus exclusively on production (lean production). It can be applied in all areas of the company, for example, in product development (lean development) or in maintenance (lean maintenance). Lean concepts are also used when starting a business, which leads us to lean startup. Here, lean startup has adopted the basic idea of creating value and serving customer needs through continuous improvement and, ideally, with as little waste as possible (Ries, 2011). In addition to lean management, the lean startup method is also based on customer development, which we will now take a closer look at.

1.3 Customer Development

This section will desribe the emergence, concept, and model of customer development, one of the predecessors of lean startup.

Emergence and Definition of Customer Development

"Customer development" is an iterative approach in which startups systematically analyze and develop their business ideas to design and implement a scalable business model based on continuous customer feedback. This method makes it possible to quickly and cost-effectively find out whether a planned product will meet the corresponding demand. It has proven to be a success-promising process model for company founders all over the world (Blank, 2020).

The method was developed in the 1990s by Steve Blank, a US-American entrepreneur and professor of entrepreneurship at Stanford University, based on his years of experience at both successful and failed startups. His concerns were that the business and marketing functions of a startup should be as important as the technology and product development. Thus, these functions would also need a consistent methodology to manage them (Blank, 2020; Ries, 2011). Blank (2013) views startups like Ries, in which he does not explicitly emphasize the high level of uncertainty. He speaks of "a temporary organization designed to search for a repeatable and scalable business model" (Blank, 2013, p. 67).

Concept of Customer Development

In customer development, the product and business model are tested, modified, and validated in direct customer contact based on **hypotheses** about what the startup's business model and value proposition could look like. This takes place as long or as often as necessary until customer needs are met and an attractive offer and scalable business model have been created on the market (Blank, 2020). It is essential here to act empirically as early as possible and proactively get out of the office to potential customers (Blank, 2013). The method is not designed to replace classic linear product development, but according to Blank (2020) it solves the ten mistakes that arise when startups apply the product development method 1:1 to develop their product and business (Blank, 2020):

Hypotheses
In customer development, hypotheses are clearly formulated assumptions that are assumed to be true, can be tested or verified, and turn out to be true (verified) or false (falsified/rejected). For example, a hypothesis at a startup for innovative mobility could be "our customers are young adults aged 25–35."

1. Product development knows the customer and focuses on new products, but startups usually don't know their customers yet.
2. Product development focuses first on customer ship date and works backwards, but startups first need to understand customer needs and know their customers and the market, which is almost impossible to calculate in terms of time.
3. Product development is execution-oriented, but startups need learning and discovery.
4. Product development is technically oriented and structured; it lacks the meaningful milestones for sales, marketing, and business development that startups focus on for learning and discovering.
5. Product development is not suitable for forecasting and measure sales for startups with high uncertainty about customers and markets.
6. Product development is not suitable for startups to plan, manage, and measure marketing activities because of the late interaction with potential customers premature scaling.
7. Product development focuses on scaling the business model at an early stage, before the real customer needs are known and the corresponding feedback from the customer has been obtained.

8. A product launch that originates from product development and is not designed for the high uncertainty of startups (e.g., customers unknown, scaling too early) leads to a death spiral of too little revenue and rising costs for marketing, infrastructure, personnel, etc.
9. Product development ignores the fact that not all startups are the same and that serving different customer groups and markets or market segments requires different strategies and approaches.
10. The use of product development in startups leads to unrealistic expectations regarding customer needs, milestones, product launches, revenues, growth, etc.

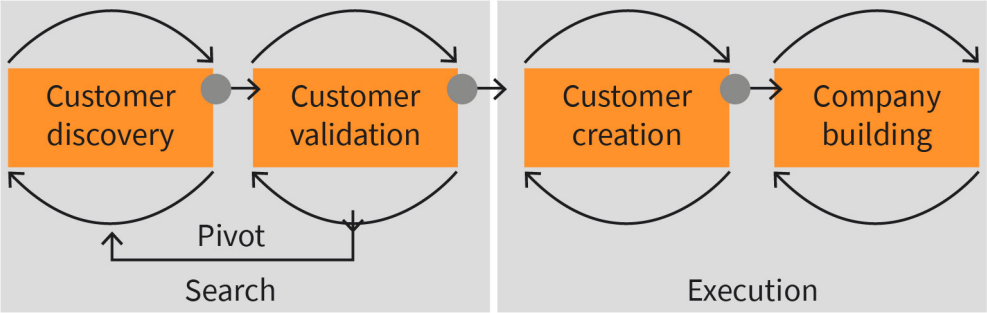
The concept of customer development also addresses the basic idea of open innovation of using impulses outside one's own company for one's own competitive advantages. In this way, customers are involved in the product development process as external knowledge providers at an early stage and the project is already significantly faster to market than would be possible using classic methods (Chesbrough & Tucci, 2020).

The Customer Development Model

The customer development process consists of four steps: customer discovery, customer validation, customer creation, and company building, each of which still has iterative phases, and each flows seamlessly into one another (Blank, 2020; York & Danes, 2014). The activities that a startup must undertake in search of a scalable business model (search) are located at the beginning. This is followed by the activities necessary to successfully establish this business model on the market (execution; Blank, 2020; Bortolini et al., 2018).

The first two steps, customer discovery and customer validation, require a task-oriented organization rather than a functional one, as is common in established companies that have existing products and customers. This is because the first two steps perform the very tasks required to find the right customers and markets for the new product in the first place. The team required for this is called the "customer development team" and should be led by a founding member. It operates in a customer-centric way and goes out of the building to the customers, conducts the interviews, explores distribution channels, etc. The team that stays in the office and works on the development of the product is called the "product development team." It is a key aspect of customer development that, even though the product idea comes from the founders and the product development team, they look for the right customers and markets for it. Both teams – customer development and product development – are in continuous intense exchange, as will become clear in the following. Only later, during company building, when the initially unknown is known, are classic functions such as sales, marketing and corporate development introduced with corresponding titles and job descriptions (Blank, 2020). The following figure shows the four steps that will now be discussed in more detail (Blank, 2020, p. 25).

Figure 2: Overview of the Customer Development Model



Source: Blank (2020). Used with permission.

Step 1: Customer discovery

The first step is to identify the customers who have an interest in buying the startup's product. The focus here is on understanding the customer problems and needs (York & Danes, 2014). At the beginning, a common understanding of all parties involved about the framework conditions, corporate mission and vision, etc. is ensured once, before the iterative phases subsequently begin (Blank, 2020).

Next, the founders address the vision of their business idea and, using the Business Model Canvas by Osterwalder and Pigneur (2010), formulate clearly defined hypotheses concerning the product itself, the customers and their problems, the distribution channels, pricing, creation of demand for the product, market type (existing market, niche entry, low-price segment, or new market), and the corresponding competitive situation (Blank, 2013). Then the real customer needs are obtained in the form of interviews or similar. It is essential here that the founders get out of their own four walls to talk to the potential customer – but even more importantly, to listen to them (Blank, 2020; York & Danes, 2014).

Customer interviews are categorically underestimated. It is all too easy to have false assumptions confirmed suggestively and not to dig further for the one essential customer value, then to develop the product in the wrong direction and ultimately not to find any customers. The way to conduct customer interviews – to ask the right questions with the appropriate approach and sensitivity – requires knowledge and practice, which is not intuitive but can and must be learned (Fitzpatrick, 2013) because this is where the founders get to know the potential customer with their problems and needs. Here they build an understanding of the customers and the market they are in so that they can validate, adjust, or reject the hypotheses they have established (Blank, 2020; York & Danes, 2014). The findings are aligned with product development (Blank, 2020).

The next step is to test the hypotheses about the product with potential customers and sales partners (Blank, 2020). This can be done, for example, by a presentation or by a **prototype**, i.e., a (first) iteration of the planned slimmed-down product, which is also called the minimum viable product (Blank, 2020; York & Danes, 2014). Here, it is again important to talk and listen to customers in an unbiased and, above all, non-suggestive manner to find out whether the product in its planned form meets customer needs, whether essen-

Prototype
A prototype is a narrow, unfinished version to test a hypothesis of what the company wants to offer later.

tial features are missing or superfluous, how it differs from potential competitors, etc. Hypotheses on pricing and distribution channels can also be tested at this time. The new findings are then compared again with the product development team (Blank, 2020).

After focusing on the hypotheses concerning the customers and the product, the business model is now validated. The first step is to determine, as a team, whether the problem has been fully understood, the product features are clear, and the customer needs are met. If this is not the case, the team has to go back to the customer and investigate further. But if these points are clear, it is important to find out according to which plan money can be made. Here, the business plan, which is often presented to investors when the startup was founded, is considered the financial hypothesis. It is checked based on previous customer feedback. This reveals if there are inconsistencies and further iterations need to be run, or whether the product and the business model are scalable on the market and the next step can be taken (Blank, 2020). Because only when the system works with many customers can the startup be scaled up into a large, profitable company (Blank, 2020; Ries, 2011). It is crucial that this step is only completed when there are already paying customers for the product, i.e., when a real purchase intention can be proven (Chesbrough & Tucci, 2020).

Step 2: Customer validation

After the customer needs and corresponding product features are clear, the product or service and related business model are tested to see if they are scalable in the market (Blank, 2020; York & Danes, 2014). Thus, the startup searches for more paying customers, for a common pattern of buyers, and for the ideal market segment (Chesbrough & Tucci, 2020). All preparations are made to be able to sell the product. The first step is to formulate the value proposition to the customer and the company's **unique selling proposition**. Based on this, a set of preliminary sales and marketing materials is created. Next, based on the updated sales channel hypotheses, a plan for using the selected sales channels is created and a preliminary sales roadmap is developed with a clear focus on who the customers are and how they will buy the product. With this, selected (visionary) customers and sales partners are targeted first. The product is tested on them to find out if it really meets the customer's needs and whether it can be sold as planned. This allows the sales roadmap and the plan for the sales channels to be validated and refined. It is still possible to counteract these problems cost-effectively before a lot of money has been invested in setting up a sales department and producing larger volumes. It is now a matter of positioning the product and one's own company in the target market. To do this, the position must be communicated to and discussed with relevant analysts, influencers, etc. Again, open and honest feedback is essential.

Unique selling proposition
A unique selling proposition describes what differentiates the company from others and why its product is worth buying.

Before moving on to the next step, all assumptions about the product, sales plan, sales channels, and scalability and profitability of the business model must be checked again. If there are inconsistencies in the sales process, for example, the previous phases must be repeated. It may also be that the target group is unclear, for example, or that a different set of product features is more promising, in which case it is necessary to go back to the customer discovery step completely. Customer validation is a key checkpoint to ensure that the developed product meets the needs of paying customers and that there is a corre-

sponding sales and growth plan for the startup. For this reason, the figure “Overview of the Customer Development Model” also shows a further iteration, the pivot, back to customer discovery (Blank, 2020).

Step 3: Customer creation

Now that the first revenues have been generated from early customers, the aim is to reach the planned end customer and build up a broad customer base (Blank, 2020; York & Danes, 2014). This is where money is invested, particularly in marketing, and the sales channels are expanded (Blank, 2020; Chesbrough & Tucci, 2020).

To plan the go-live, an overall strategy for all activities is designed in a first step. The choice of market to be served is essential here. Whether the market selected from the previous step is ideal can be found out, for example, by conducting surveys among existing customers. Once the ideal market type has been selected, a one-year strategy including sales targets can be derived depending on this. The company’s value proposition defined in the last step and the clearly defined key features of the product are now elaborated. To be able to communicate this professionally to customers and the market, it is advisable to engage the support of an advertising or press agency that also has an appropriate understanding of and sensitivity for the company and product. The positioning, which is then communicated externally via all channels, should be sharpened in internal and external audits using questionnaires and interviews with customers, press representatives, influencers, and market analysts, among others. The result of the audits is then compared with the previously selected market type. This means that the company and product can now be launched. Planning for this is essential, because what is once communicated to the outside world can no longer be changed (so easily). The first customers to be addressed and the choice of messengers to convey the message to the customer groups are also planned. Here in particular, the press agency is a great support, as it knows the right channels and multipliers, such as experts or influencers. The message must be “memorable and sticky” (Blank, 2020, p. 195) and aligned with its context for the respective media used. Even if the measurement of marketing activities is not as trivial as that of sales values, for example, it is essential to measure the already defined goals after the launch in order to be able to recognize and implement appropriate adjustments at an early stage (Blank, 2020). For example, if the distribution costs are too high or the distribution channel is too long, then the startup can try a different distribution channel (Chesbrough & Tucci, 2020).

At the end of customer creation, the aim is to generate demand from the end customer and communicate the message via the appropriate channels. The strategy for this is aligned and measured against the one-year strategy and its goals. This is also an iterative process and is constantly adapted to new findings (Blank, 2020).

Step 4: Company building

Now, the startup has been successfully launched and the product is known and purchased by customers. Classic operational structures, such as marketing and sales, can be introduced and the startup develops into a real company (Blank, 2020; York & Danes, 2014).

First, depending on the selected market type, activities are carried out to make the leap from early adopters to mainstream customers. Then the focus is on the scalability of the company from an organizational perspective. It is necessary to master the leap from a startup with the first early adopter customers to a company operating on the mainstream market, which demands different requirements from the corresponding employees (CEO, executive staff, etc.) than at the beginning when the company was founded. If necessary, the corresponding positions have to be re-staffed. The customer development team is also affected and will be restructured. While it can address early customers in its existing form, it cannot serve the mainstream market. The tasks also include ensuring that the company formulates a clear mission and creates a corresponding corporate culture. To be able to scale the company, the sales, marketing, and business development departments, etc., are created. There, derived from the corporate mission, departmental mission statements are formulated with which every employee can identify. However, it should again be noted that the specific roles and activities of the departments differ greatly in some cases for the different market types (Blank, 2020).

The company is now (almost) organizationally capable of selling its offering, scaling its business, and rapidly growing its customer base (Chesbrough & Tucci, 2020). Now it's time for the finishing touches. All areas are organized accordingly so that agile and rapid actions and reactions lead to competitive advantages. According to Blank (2020), this is ideally achieved via bottom-up decentralized management and decision-making and with the observe, orient, decide, and act (**OODA**) method. The growth-oriented mindset must be anchored in management, because young companies, which are competing with a high degree of uncertainty, must react quickly and flexibly. In this context, employee initiative, proactive assumption of responsibility for the company, transparent communication and fault tolerance are decisive for an agile company (Blank, 2020).

OODA method
The OODA method is a rapid decision-making tool that originated in the military environment. The four iterative steps in the OODA loop are observe, orient, decide, and act.

In lean startup, you will find, in particular, the earliest possible direct interaction with customers, the hypothesis-based search for real customer needs and the iterative validation of the product developed step by step from customer development (Ries, 2011).

SUMMARY

The lean startup method is designed to develop companies and products with high uncertainty and difficulty in planning. Here, product development cycles are as short as possible to find out quickly and early on whether a planned business model is viable and scalable. This is achieved through hypothesis-driven experimentation, iterative product releases with the least possible waste, and validated learning with direct customer contact.

The lean startup method builds on different management and product development methods and is inspired by its predecessors, lean management and customer development. Lean management is a concept that concerns the entire value chain, from suppliers to the company's own

operations, to the customer. The goal is, by optimizing the resources used, to create value for customers and based on customer requirements to create a constant workflow.

Customer development is an iterative approach in which startups systematically analyze and develop their business ideas. Based on hypotheses about what the startup's business model and value proposition could look like, the product and business model are tested, modified, and validated in direct customer contact as early as possible until the customer needs are met, and an attractive offering and scalable business model have been created on the market.

From lean management, lean startup has adopted the concept of putting the customer needs at the center of all activities, concentrating on what offers significant added value, and eliminating all non-essential activities, product features, etc. The philosophy of continuous improvement and learning is also part of this concept. Similar thoughts also originate from customer development. In addition, product and business model development was adopted through iterative, hypothesis-driven experimentation in direct customer contact as early as possible with step-by-step refined prototypes. All of this enables early and cost-effective learning and customer-centric development, which is especially promising for startups in an environment with high uncertainty.

UNIT 2

LEAN STARTUP: THE CORE CONCEPT

STUDY GOALS

On completion of this unit, you will be able to ...

- understand the concept of lean startup as a new entrepreneurial management method.
- understand the concept of validated learning and its importance for successful development.
- describe the build–measure–learn loop and its relevance for building a startup in an insecure market environment.

2. LEAN STARTUP: THE CORE CONCEPT

Introduction

In the lean startup method, innovative products and companies are developed so that the real customer needs are known as early as possible; the product is further developed step-by-step and in a waste-minimizing manner based on regular customer feedback until it is ready for the market and a stable business model can be realized. To achieve this, the startup needs a mindset for innovation under high uncertainty and a correspondingly structured approach from the very beginning. This concept is called "entrepreneurial management" (Ries, 2011; 2017). Since the startup operates under high uncertainty, especially at the beginning, it needs to continuously learn how to best satisfy customer needs without investing a lot of money and time. The idea behind this is called "validated learning" and is one of the core activities of a startup (Mansoori et al., 2019; Ries, 2011; 2017). In this process, a loop of developing the product based on previous customer feedback (build), measuring and evaluating the new customer reactions against the revised product (measure), and reflecting on the lessons learned to further develop the product with the new findings (learn) is repeated in ever shorter cycles (Bortolini et al., 2018; Ries, 2011; 2017).

In the following sections, you will learn what is behind the terms "entrepreneurial management," "validated learning," and the "build–measure–learn loop" in detail and why these concepts are essential for the success of a startup.

2.1 Entrepreneurial Management

On completion of this section, you will be able to understand the concept of lean startup as a new entrepreneurial management method.

Differentiation of the Terms Entrepreneur and Management

The concept of entrepreneurial management is a central element of the lean startup approach. According to Ries (2011), a combination of the basically opposing principles of "entrepreneurship" and "management" is crucial for the long-term success of a company. Before we go into detail about what entrepreneurial management means in the context of lean startup, we will first look at both terms separately.

The terminology of entrepreneurship is on everyone's lips these days, but it is not uniformly defined (Mazzarol & Reboud, 2020). We are now primarily guided by the Organization for Economic Cooperation and Developemt–Eurostat (OECD) approach (Mazzarol & Reboud, 2020; OECD–Eurostat Entrepreneurship Indicators Programme, 2009) extended and refined by the addition of Ries (2011; 2017): "Entrepreneurs are those persons (busi-

ness owners) who seek to generate value through the creation or expansion of economic activity by identifying and exploiting new products, processes or markets" (Mazzarol & Reboud, 2020, p. 15; OECD–Eurostat Entrepreneurship Indicators Programme, 2009, p. 8).

Ries (2011, 2017) further sharpens the understanding that entrepreneurs can be found everywhere – regardless of company size or development stage (foundation or already established), and industry, with his definition: "A startup is a human institution designed to create a new product or service under conditions of extreme uncertainty" (Ries, 2011, p. 27). The key factor here is the high degree of innovation and corresponding unknown customers and markets. This distinguishes a startup in a largely known terrain (customers, markets, products, etc.) from highly innovative startups (startup or separate unit in an established company), where the traditional methods and models designed for an environment with (few) unknown components do not work. In the scope of lean startup, with the term "entrepreneur," we clearly address the highly innovative entrepreneurs who work under extreme uncertainty. Therefore, entrepreneurs usually provide a competent team of motivated people, a strong vision of their business idea, and the willingness to take risks to develop innovative solutions. But that's not all: There also needs to be a process for turning that into breakthrough success, which is often lacking because the classic business and management methods don't work under high uncertainty (Ries, 2011).

Further, in the context of entrepreneurs, the terms "entrepreneurial activity" and "entrepreneurship" are also often mentioned. A entrepreneurial activity "is enterprising human action in pursuit of the generation of value through the creation or expansion of economic activity by identifying and exploiting new products, processes or markets" (Mazzarol & Reboud, 2020, p. 15; OECD–Eurostat Entrepreneurship Indicators Programme, 2009, p. 8). This can be the founding of a company (startup) or corresponding activities within an already existing organization. Whereby "the phenomenon associated with entrepreneurial activity" (Mazzarol & Reboud, 2020, p. 16; OECD–Eurostat Entrepreneurship Indicators Programme, 2009, p. 8) is called "entrepreneurship."

The term "management" is derived from the Latin word *"manu agere"*, which means "to lead with one's hand" and give instructions. Thus, management includes activities in strategic planning, setting goals, managing resources, measuring, and documenting results, among others. Although there are many different management theories and approaches, they generally share elements, such as autocratic leadership style, a clear chain of command, and plannable, predictable behavior (Mahmood et al., 2012). Most classical management tools are designed for a largely plannable process with widely known customers and markets, rather than for use under conditions of extreme uncertainty. However, there are still many startups that work with detailed business plans, product milestones, etc. (Ries, 2011).

Do the terms "entrepreneur" and "management" fit together at all, when entrepreneurial thinking and acting is oriented toward ideals, such as flexibility, creativity, and intrinsic motivation with a high degree of uncertainty, and management is oriented toward numbers and data, structured according to defined rules in a plannable environment? The answer is yes – absolutely (Ries, 2011)! Entrepreneurs seem to have a natural resistance to management. But entrepreneurs in particular need clear management to develop their innovative ideas into offerings that are in demand on the market in a structured process.

Entrepreneurial management is not intended to replace traditional management. It is designed for management under high uncertainty, as is the case with entrepreneurial activities (Ries, 2017).

We will now take a closer look at how the two disciplines fit together. In doing so, we distinguish where entrepreneurial management is located – in a recently founded organization or in an already established large company – because it always means different framework conditions.

Entrepreneurial Management in Startups

The secret of a successful startup is rarely to have been in the right place at the right time with a groundbreaking product idea and a motivated and intelligent team, even if this is what media reports or movies like to suggest (Ries, 2011). The success of a startup depends largely on following a planned, structured process designed for the needs of startups – innovating under very high uncertainty. This makes innovation and company foundation possible (Ries, 2011, 2017).

But the classic methods for product and business development, like the waterfall model, usually do not work for startups due to the many uncertainties regarding potential customers, markets, product features, and limited resources (Ries, 2011). Realistic planning and forecasting are nearly impossible in this setting. The classical methods are designed for and work in an business environment that has an established a business model and is gradually adapting products to increasing known customer needs in an equally well-known market (Christensen, 2016; Ries, 2017).

The alternative, to get started without management, strategy, and method, usually ends in chaos and is just as unpromising for success (Ries, 2011). The key is to choose a method that is geared to the needs of startups and to manage the process accordingly. Lean startup is such a method. It is a structured approach in which assumptions about customer needs are validated and further refined in direct customer contact with rapid development cycles until a ready-to-market product has been created that customers are willing to buy. A crucial point is that the startup with usually highly limited resources must find its true added value for customers as quickly, cost-effectively, and reliably as possible. Flat hierarchies and a task-oriented approach support this method. Stiff functional structures, even though they make sense in established organizations where products and markets are known, would not lead to success.

All that changes after the “getting-started” phase. Because problems often occur when the initially successful startup grows and scales quickly, the startup needs to adopt a “real” organizational structure to optimize its processes. Since “no startup wants to structure itself” (Ries, 2017, p. 122), it becomes clear that this also requires a clear management structure designed for this progression. But even after that, the company must have the ability to continuously develop and transform itself to permanently meet new challenges and remain competitive (Ries, 2017).

If you look at the following problems of entrepreneurs in established organizations, you will also get further insights on what it means to work under high uncertainty and that it requires a special kind of management.

Corporate Entrepreneurs: Entrepreneurial Management in Established Organizations

Often, large organizations face the dilemma of aligning their products and strategies with the needs of their existing key market customers. In doing so, they often overlook opportunities to address customers who are not currently their main customers. Their needs are then often served by companies that develop these **disruptive innovations**. In the worst case, the companies with the disruptive innovations drive the companies with the classic products out of the market (Christensen, 2016).

Disruptive innovations
In contrast to sustaining innovation, disruptive innovation deals with a new set of product features with the aim of replacing an existing product or service and driving its respective seller out of the market.

Christensen (2016) first drew attention to this problem with his book *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail.* Various authors and practitioners have addressed the issue and developed solutions. Christensen and Raynor (2017), for example, in their book *The Innovator's Solution: Creating and Sustaining Successful Growth*, propose startup-like structures to deal with disruptive innovations. Since then, much research and practice has also developed in this direction.

Lean startup is a suitable approach to solving this problem. Even though the method was originally developed for startups, it can also be used in large companies if the conditions for it are in place (Blank, 2013; Chesbrough & Tucci, 2020; Ries, 2017). To be sure, large companies are not large versions of startups. A key difference is that startups are looking for a business model for their vision, whereas established companies usually already have this and are developing it along with its portfolio of offerings (Chesbrough & Tucci, 2020). Due to **ambidexterity**, large companies have very different requirements for resource allocation and project portfolio planning than a small startup company with only one product, and correspondingly fewer difficulties in allocating resources (Chesbrough & Tucci, 2020), but with often almost no resources overall.

Ambidexterity
The ability of a company to be simultaneously efficient (by improving existing products and processes), innovative, and, thus, flexible (by entering new business areas) is referred to as organizational ambidexterity.

For established companies to identify new business areas and grow continuously with different types of innovations, appropriate structures and clear responsibilities are required (Blank, 2013; Ries, 2011; 2017). Entrepreneurship can be seen as a core discipline for this. Therefore, an extra role in the company should be created for it (Ries, 2011, 2017). They are often referred to as "intrapreneurs" (Ries, 2011) or "corporate entrepreneurs" (Ries, 2017). These people have the relevant expert knowledge and are responsible for the use of entrepreneurial methods throughout the company. They also have an overview of the internal startups. These are independent units that operate separately from the other project teams. These internal startups must be systematically integrated into the organization and corporate culture as a separate function (Ries, 2017). They need an environment with appropriate resources that encourages developing ideas and experimenting (Chesbrough & Tucci, 2020; Ries, 2017). This is easier said than done, of course. Usually, established companies lack relevant organizational capabilities that need to be created (Ries, 2017). Ries (2017) suggests seven aspects to address this, as discussed in the following paragraphs.

Create space for experiments with accountability standards

The autonomous team working on a new business idea primarily needs an environment that allows it to develop ideas and conduct experiments without incurring huge costs. This environment is often referred to as an "island of freedom" or a "sandbox," in which there is also a fixed budget that can be freely used under certain accountability standards. Companies must first understand the need for this freedom before they can create and fill it with life (Ries, 2017). It is particularly important that the top management level is also 100 percent behind the concept (Chesbrough & Tucci, 2020).

Fund and support projects without knowing the return on investment

Since this is a wholly learning environment that uses experiments to pursue a vision with a generally very high uncertainty factor, it is also not possible to forecast (financial) success. Especially for a large company, not being able to calculate from the outset can be somwhat disconcerting (Ries, 2017). Large companies tend to prefer to allocate more resources to projects, especially short-term and incremental ones, where profitability can be better calculated because customers and markets are already known and can be calculated accordingly (Chesbrough & Tucci, 2020).

Create a new class of milestones

In traditional product development, traditional management tools are used to set milestones and forecast success. If the milestones are not met or the expected success does not occur, this usually results in draconian measures. However, it cannot work in this context because there is still too much uncertainty. The internal startup would regularly fail to achieve its goals under such targets, and the projects, as well as the internal startup, would be discontinued. A new type of milestones is needed here, against which the development of the startup can be measured without being able to see precisely into the future (Ries, 2017).

Support your employees in developing their entrepreneurial skills

Entrepreneurs need professional support to develop their skills. In traditional human resources (HR) development, these people would probably fall through the cracks because their path is marked by failures, which is understandable in an environment of high uncertainty. Yet, it is the failures from which these people have learned. They need mentors and coaches who can develop them from these points of view (Ries, 2017).

Provide corporate entrepreneurs a network they can identify and grow with

In traditional corporate structures, there is no anchor or personal orientation for corporate entrepreneurs. For this position to develop as a function in its own esteem within the company, it needs appropriate internal and external support. They need to be able to interact with colleagues, superiors, and like-minded people inside and outside the company to identify and grow as a corporate entrepreneur (Ries, 2017).

Get the right person on the team

It is obvious that most managers commit to projects they believe will be successful and beneficial to their careers. Accordingly, in projects under great uncertainty, it is difficult to persuade talented employees to participate in a project that may (or often very likely will) be a big flop. An active failure culture and an entrepreneurial mindset support these employees in participating in such projects (Ries, 2017).

Create new incentives and advancement

Many startup projects fail. That's why many successful entrepreneurs have a long list of failures behind them, without having been incompetent or unprofessional in any way. It would, therefore, be wrong to measure personal success based on successfully implemented product ideas. What is needed here is a different view of what makes a successful employee (Ries, 2017).

Other significant aspects that endanger the concept of lean startup at large companies are, for example, that developers who come from a quality-driven organization and use methods such as six sigma and total quality management regard a minimum viable product as unfinished, sloppy, or similar, and do not want to use it. Another point is that the commission-driven sales department does not want to bother the customers with unfinished products that are, ultimately, not produced (Chesbrough & Tucci, 2020). In entrepreneurial management – whether within a startup or an established company – one concept is particularly important for success: validated learning. This will be discussed in the next section.

2.2 Validated Learning

On completion of this section, you will be able to understand the concept of validated learning and its importance for successful development.

The Term Validated Learning

Even though the goal of a startup is to turn an idea into a sellable product and scalable business model, the path to get there is crucial for success. Since the startup operates under a high degree of uncertainty, especially at the beginning, it must continuously learn how it can best satisfy customer needs and build a sustainable business model without investing a lot of money and time right away. This concept is called "validated learning" and it is one of the core activities of a startup (Ries, 2011; 2017).

Basics from Lean Management and Customer Development

Lean startup has its roots in the methods of lean management and customer development. Lean management, as we know it today, originated with a focus on production from the principles of the Toyota Production System. It now covers the entire value chain across all areas, including suppliers and customers (Dekier, 2012; Helmold, 2020). The aim of this

inter-company optimization approach is to always focus on the customer and their needs, continuously eliminate any waste (activities, product features, etc.) for which the customer is unwilling to pay, and optimize work processes accordingly. The concept is firmly anchored in the corporate culture; every employee actively contributes to identifying waste and striving for perfection (Helmold, 2020). Lean startup has adopted the philosophy of creating value for customers with as little waste and continuous improvement as possible, and constantly learning from it (Chesbrough & Tucci, 2020).

The entrepreneur Steve Blank has also determined that it is crucial for a company's success to focus on the customer and their needs, to involve them as early as possible in the development process, and to iteratively improve the offering. This is why Blank (2020) developed the concept of customer development in the 1990s. He observed in numerous failed startups that areas, such as product development, were accurately managed and received appropriate attention, while other business areas, such as marketing, remained largely unmanaged. He was convinced that a startup could only be successful if these areas were also given appropriate methods for management (Blank, 2020; Ries, 2011). His concept is based on the idea that real customer needs must be identified as early as possible to iteratively develop the product and the business model. Blank relies on validating initial hypotheses about customers, sales channels, product features, etc. in direct interaction with customers, e.g., via interviews and experiments on prototypes, to learn from them and adapt the product or business model accordingly (Blank, 2020). This basic idea has been adopted by lean startup (Ries, 2011).

The Concept of Validated Learning

Validated learning occurs through iterative, hypothesis-driven, and empirical experimentation with real customers and corresponding incremental product development using the principles of value creation, waste elimination, flexibility, and affordable losses (Mansoori et al., 2019; Ries, 2011; 2017). It is, therefore, much more concrete, accurate, and faster than **market forecasts** or business plans (Ries, 2011).

Market forecasts
A market forecast is a core component of a market analysis. It forecasts estimated numbers from different areas, such as the number of potential customers, based on market research data.

In lean startup, experiments with prototypes, simple landing pages, or product videos are based on "minimum viable products" (MVP). They represent a slimmed-down version of what the current idea is that the product should become. The MVP gets its name from the fact that it leads to the fastest possible learning of real customer needs with minimal cost and waste (Ries, 2011). The product is developed to such an extent that it can be used to scientifically validate, adapt, or reject the hypotheses about the business model made at the beginning. In the process, it is further developed and tested repeatedly based on customer reactions (Bortolini et al., 2018; Ries, 2017). The decisive factor is that the further developed product creates significant value for the customer compared to the previous version (Ries, 2017). For example, after validating the hypothesis "the means of travel must be technically safe," a travel company could test the hypothesis "customers would like to travel as cheaply as possible." In this way, the startup is moving step-by-step toward the optimal travel solution for the customer, which will ultimately be its product.

To be able to learn continuously from experiments and customer feedback, the procedure must be data-oriented and **metrics**-based. Only in this way can the product and business model be scientifically analyzed and developed based on real customer needs (Bortolini et

al., 2018; Ries, 2011; 2017). Based on the results from the experiments, if enough has been learned, a decision is made regularly in pivot-or-persevere meetings whether to continue with the current strategy and the next experiment (persevere) or to change the strategy without adjusting the underlying corporate vision (pivot). Each pivot means that the hypotheses on which the experiments are based are changed and the validation process starts anew (Ries, 2011; 2017). Validated learning uses a feedback loop of building, measuring, and learning (Ries, 2011). We will now take a closer look at this.

Metric
A metric is an indicator or quantitative measure that can be used to measure and evaluate the success or failure of business processes.

2.3 The Build–Measure–Learn Loop

On completion of this section, you will be able to describe the build–measure–learn loop and its relevance for building a startup in an insecure market environment.

The Concept Behind Build–Measure–Learn

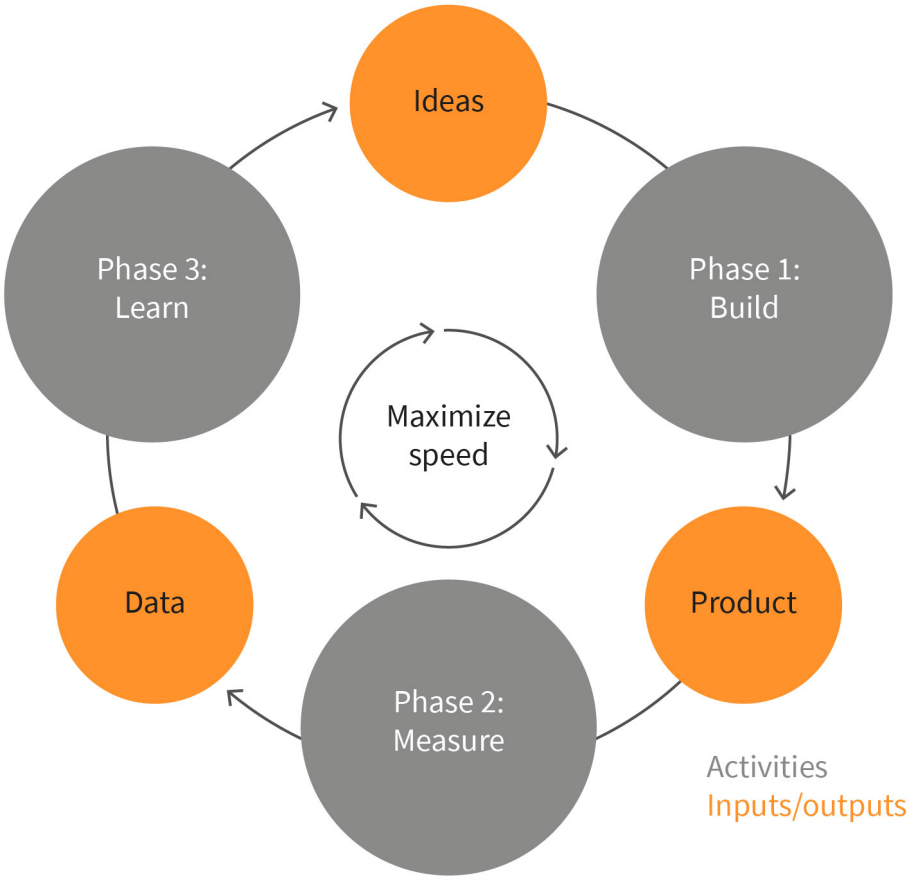
The main activity of a startup is to create a product based on an idea, capture and measure customer reactions to it, and then learn whether the product needs to be adapted or developed further (Ries, 2011). This build–measure–learn approach is not a one-time event. It is run through in a loop as many times as necessary until enough is learned to develop an attractive product that customers are willing to buy. In the process, the loop is to be run through in increasingly shorter loops, with the goal of having found the viable business model that realizes the entrepreneurial vision as quickly as possible (Ries, 2017).

At the very beginning of the business activity, the startup addresses the entrepreneurial vision it wants to realize with the business idea in the idea generation phase. This takes place even before the feedback loop is started and is not part of the build–measure–learn cycle. The vision should persist permanently and only be changed if the experiments cause too much negative feedback (Bortolini et al., 2018). One vision of an innovative mobility startup might be “our vision is to provide mobility to everyone and everywhere at affordable prices.”

The Process of Build–Measure–Learn

The build–measure–learn loop consists of the phases build, measure and learn, and the corresponding outputs of ideas, product and data, which serve as input for the following phase (Ries, 2011). The following figure shows you this feedback loop from build–measure–learn (Ries, 2011, p. 75), which will now be described in detail.

Figure 3: The Build–Measure–Learn Feedback Loop



Source: Sabine Pur (2023), based on Ries (2011).

In-/output – Ideas

After the company vision is known, the planned business model is described at the beginning of the feedback loop (Bortolini et al., 2018) and assumptions are made about customer needs, product features, distribution channels, etc., which are formulated as hypotheses and leap-of-faith assumptions (Ries, 2017). A suitable tool for this is the Business Model Canvas by Osterwalder and Pigneur (2010), in which all aspects of a business model are clearly presented on one page and with the value proposition to the customer at the core (Blank, 2013; Ries, 2017). To sharpen the value for customers, the Value Proposition Canvas by Osterwalder et al. (2014) can be used as a tool to start. It was developed to ensure that product and market fit together by looking in detail at two of the nine building blocks in the Business Model Canvas: value proposition and customer segments. You can also start by working with other tools, such as the "Strategyzer Canvas", which applies the idea behind the "three lenses of innovation" (created by IDEO) to the Business Model Canvas and provides a simplified starting point. It summarizes the nine building blocks into three elements: desirability, feasibility, and viability (Jeffries, 2016).

There will always be too many assumptions rather than too few. Therefore, it is important to focus on the few relevant ones that are most critical to the company's success in the near future. We distinguish between two types of assumptions: value hypotheses and growth hypotheses. The value hypotheses should be focused on first, which concern the acceptance of the product by the customers (e.g., "customers want to travel as cheaply as possible"). The growth hypotheses, which contribute to business growth after it has been established that initial customers appreciate the product, are secondary (e.g., "regular customers will recruit new customers if they are offered a discount in return"; Ries, 2017).

Phase 1: Build

Based on the hypotheses of the business model, a slimmed-down early version of the planned product is designed as an experiment (Ries, 2017). These quick, low-cost experiments are based on minimum viable products and can be designed in different ways, for example, as qualitative interviews, prototypes, or websites (Bortolini et al., 2018). In this process, different versions can also be developed in parallel to test them simultaneously (Ries, 2017). It is essential here that the experiments are scientific and data-driven in design, where the changes in the independent variables can be detected and measured through the manipulation of controlled variables (Bortolini et al., 2018).

In-/output: Product

The minimum viable product is used to test customer reactions. In the process, customers are observed as they interact with the product. In the case of interviews, for example, non-suggestive questions are asked with the aim of determining the customer's needs by listening (Ries, 2011). Asking the right questions can be very difficult. Fitzpatrick (2013) offers a practical guide with many helpful examples.

Phase 2: Measure

In this step, customer feedback on the minimum viable product is measured. The results of the experiments are compared to the previously defined hypotheses using data analysis and statistical methods (Bortolini et al., 2018). For this reason, the measurement results or the reports of them should fulfill the three A's (Ries, 2011):

1. Actionable: It must be possible to clearly identify the cause and effect of the measurement results.
2. Accessible: The measurement results are simple, understandable, and available to everyone in the company.
3. Auditable: The measurement results can be validated with customer feedback and are credible.

In-/output: Data

The evaluated measurement results from the data basis for the next step (Ries, 2011).

Phase 3: Learn

This is where the validated learning takes place. In this process, the hypotheses formulated at the beginning are confirmed or rejected based on the results of the experiments. It is the central concept of a startup in its initial phase (Bortolini et al., 2018). The challenge here is that the results are seldom black and white – it is usually a "grey-zone" where you have to try to not get stuck in a permanent iteration and not wait too long to decide to pivot. The goal of the experiments with the minimum viable products is to regularly decide in previously scheduled pivot-or-persevere meetings whether the product will be retained, developed, or discarded based on revised leap-of-faith assumptions (Ries, 2017).

Bortolini et al. (2018) break down pivot-or-preserve decisions even further in this regard, naming four categories (Bortolini et al., 2018, p. 1772):

1. Pivoting: Radical changes are made to one or more elements of the business model due to the rejection of a hypothesis after an experiment has been conducted. New hypotheses are then formulated and validated by new experiments (Bortolini et al., 2018).
2. Iteration: A positive trend can already be observed, but minor adjustments need to be made to the business model, resulting in testing of the revised hypotheses (Bortolini et al., 2018). However, you can quickly run the risk of waiting too long for a pivot to be made (Ries, 2017).
3. Escalating: If all test results are positive and the business model and product searched for are found, the startup prepares its launch (Bortolini et al., 2018).
4. Giving up: The last option is to abandon the project if the business model does not seem promising (Bortolini et al., 2018).

SUMMARY

The concept of entrepreneurial management is a central element of the lean startup approach. A combination of the basically opposing principles of "entrepreneurship" and "management" is crucial for the long-term success of a company. Newly founded organizations need management methods that address the initial uncertainty and non-plannability of their venture. Established companies need to create extra roles in the company and appropriate framework conditions.

Validated learning is one of the core tasks of a startup. Since the startup operates under a high degree of uncertainty, it must continuously learn how it can best satisfy customer needs without immediately investing a lot of money and time. From lean management, the philosophy of creating value for customers with as little waste and continuous improvement as possible and learning from this constantly was adopted. Customer development posits the basic idea that customer needs should be understood early on to iteratively develop the product and the business model, which should be based on the validation of hypotheses and prototypes by means of direct customer contact.

The main activity of a startup is represented by the build–measure–learn loop, with the phases build, measure, and learn, and the corresponding out/-inputs ideas, product, and data. A prototype of the planned product is designed based on an idea with which the customer reactions are captured, measured, and compared with the hypotheses defined at the beginning to learn whether the product needs to be adapted or developed further. This procedure is run in a loop until enough has been learned to develop an attractive product that customers are willing to buy. The loop is to be run through in increasingly shorter increments, with the goal of finding the viable business model that realizes the entrepreneurial vision as quickly as possible.

UNIT 3

THE BUILD PRINCIPLES

STUDY GOALS

On completion of this unit, you will be able to ...

- recognize the necessity and importance of experimentation in lean startup.
- understand the role of hypotheses and assumptions in lean startup and how to formulate, structure, and prioritize them.
- define a minimum viable product and explain its mission in the validated learning process in lean startup.

3. THE BUILD PRINCIPLES

Introduction

Vision
A vision describes the ideal state of a company in the future to which it would like to develop. It is an overarching goal that is framed positively, motivates, and sets the direction.

At the beginning of every business idea is a **vision**. This is the founders' dream, in which their product changes the world and delights countless customers. The vision is based on various assumptions about future customers, the specific product features that will excite them, the revenues that will be raised in the coming years, the international distribution channels, and much more. Founders quickly find themselves asking crucial questions like, "How do we actually know who our customers will be and what they'll really like?" and "Is our idea also sustainable and can we build a viable business model on it?" One thing is obvious here: Customer acceptance for the product and the startup's growth opportunities must be ensured as quickly as possible. For new versions of existing offerings, for example, one could hire a market research institute to conduct surveys. But do the founders – without existing offerings and unknown customers – get valid statements on which they can build? Or is this more a matter of theoretical prognostic possibilities? For a startup working under extreme uncertainty, it is clearly more goal-oriented to check its assumptions as early as possible, with regular direct customer feedback, and to develop the product step by step until it is ready for the market. To achieve the big vision, a first small product must be built "think[ing] big, start[ing] small" (Ries, 2011, p. 57).

In the following sections, you will learn why experiments are so important for startups and how they can systematically capture, categorize, and prioritize their assumptions on which the experiments are based. In addition, you'll learn how to test the assumptions that are most critical to the startup's success in the near term, called "leap-of-faith assumptions," with quick and inexpensive experiments based on minimum viable products.

3.1 An Experiment is a Product

On completion of this section, you will be able to recognize the necessity and importance of experimentation in lean startup.

Experiments: Essential for Startups

Product development according to classic methods (which existing companies use for products that can be thoroughly planned with known customers and markets) does not work for startups due to their high level of uncertainty and unpredictability (Blank, 2020; Moogk, 2012; Ries, 2017). Startups do not yet know their customers; nor do they know, for example, which product features are essential for their customers and which are superfluous. They should ask themselves which features they should prioritize in development and which they should address later. Simply developing without knowing the customers usually leads in the wrong direction. A product that is developed based on unvalidated hypothetical assumptions costs an enormous amount of development time and money,

and it is unclear whether there will ultimately be a market with paying customers for it. When this happens, great amounts of money are invested in a product that no one is willing to buy (Ries, 2011). Both money and time are usually not available to a startup; or, if they are, only to a limited extent.

Validated learning is the key in this respect. To achieve this, the product must be developed stepwise with early and regular customer feedback and adjustments. It is precisely this that requires experiments, enabling the increasingly developed product to be tested with customers (Moogk, 2012; Ries, 2011). The use of experimentation helps the team build a better understanding of the problem, get quick feedback, and validate assumptions, allowing them to minimize development effort and better prioritize development activities continually (Vargas et al., 2020). The important point here is to always avoid and eliminate non-value-added and redundant activities. Only what adds value to the customer will feed into the product (Ries, 2011).

Classic Market Research Versus Experimentation

In contrast to classic planning or market research methods, lean startup does not base the development of the product on hypothetical expectations of what might be successful in the market, e.g., by surveying customers who have never interacted with the product or an early version of it (Ries, 2011; 2017). This is because there is a big difference between what customers say they would do or need and what they actually do or use (Ries, 2011; 2017; Vargas et al., 2020). The development of the product in lean startup, in contrast, is based on real and actual customer feedback and a correspondingly detailed specification of what is to be built (Ries, 2011; 2017). Experiments allow objective observation of how customers react and interact; they bring several advantages over traditional planning and market research (Ries, 2011):

- obtaining real data about actual customer demand
- interacting directly with customers and partners, and learning about real customer needs and problems
- expanding one's own scope in terms of assumptions about customers (features not planned for)
- testing hypotheses directly, immediately, and in detail
- starting immediately, without a drawn-out planning phase

Therefore, Ries (2017) gives the advice to not "... ask customers what they want. Design experiments that allow you to observe it" (p. 89).

Scientific Approach to Lean Startup Experiments

All scientific experiments are built on theoretical information. In lean startup, this information includes hypotheses that formulate predictions about the startup's business. The goal of the experiments in lean startup is to find out how a sustainable business can be built based on the company's vision (Ries, 2011). This can create competitive advantages for the startup over other organizations, often without much developmental effort or technical infrastructure (Vargas et al., 2020).

In lean startup, when we talk about experimentation, we are talking about more than just a theoretical study. It is also about a real first product that gets tested (Ries, 2011). If an experiment is successful, then further steps can be taken, like more customers are addressed, the next iterations in product development can take place, etc., until the product has finally developed into a ready-to-market product (Moogk, 2012; Ries, 2011). In this context, every activity a startup engages in is an experiment designed to test the startup's strategy. Experiments that do not produce the desired results indicate problems with the chosen strategy. But that's no reason to give up right away. Quite the opposite – "if you cannot fail, you cannot learn" (Ries, 2011, p. 56). In this case, it is important to reset the sails, evaluate immediate feedback from the experiment participants, and start a next experiment based on this (Ries, 2011; 2017; Vargas et al., 2020).

A major challenge is to overcome the management thinking that is often still prevalent and based on completely thought-out planning. This approach only works for known products, customers, and markets in companies with a long and steady corporate history, and not for startups, which operate under a high degree of uncertainty (Ries, 2011). Therefore, established companies must have a culture that supports entrepreneurial thinking and action, and allows experimentation to continuously innovate and be permanently competitive (Chesbrough & Tucci, 2020; Ries, 2011; 2017).

Case Study: Zappos

In 1999, Nick Swinmurn, the founder of Zappos, an American online retailer for shoes and fashion, dreamed of a central website that would offer a wide selection of shoes and provide customers a new and better shopping experience. At that time, it was absolutely uncertain whether there would even be a market for it. Instead of doing classic market research with customer surveys about potential purchases, he decided to experiment (Ries, 2011).

Swinmurn developed the hypothesis that customers are willing to buy shoes online. To test this, he first asked local shoe retailers if he could photograph their shoes and list them for sale on a central website. Once a customer buys them, he would come back to the store, pay full price for the shoes, and ship them to the customers. The shoe retailers agreed, and so Nick Swinmurn started with a small, simple version of what his vision would be. By doing so, he tested his hypothesis that there was sufficient demand for buying shoes online. In the process, however, he tested not just one assumption and aspect of the business plan, but other aspects as well, such as payment processing, handling returns, and customer support. Over time, the learning also extended to interacting with other customers, working with partners, etc. (Ries, 2011).

The company developed from the initial product or experiment into a large organization through permanent learning and appropriate adjustment. In 2009, Amazon bought Zappos for $1.2 billion (Ries, 2011). The basis for being able to systematically conduct experiments and learn from them are the various assumptions about the startup's business model. We will look at how these can be formulated, categorized, and prioritized in the next section.

3.2 Business Hypotheses and the "Leap-of-Faith Assumptions"

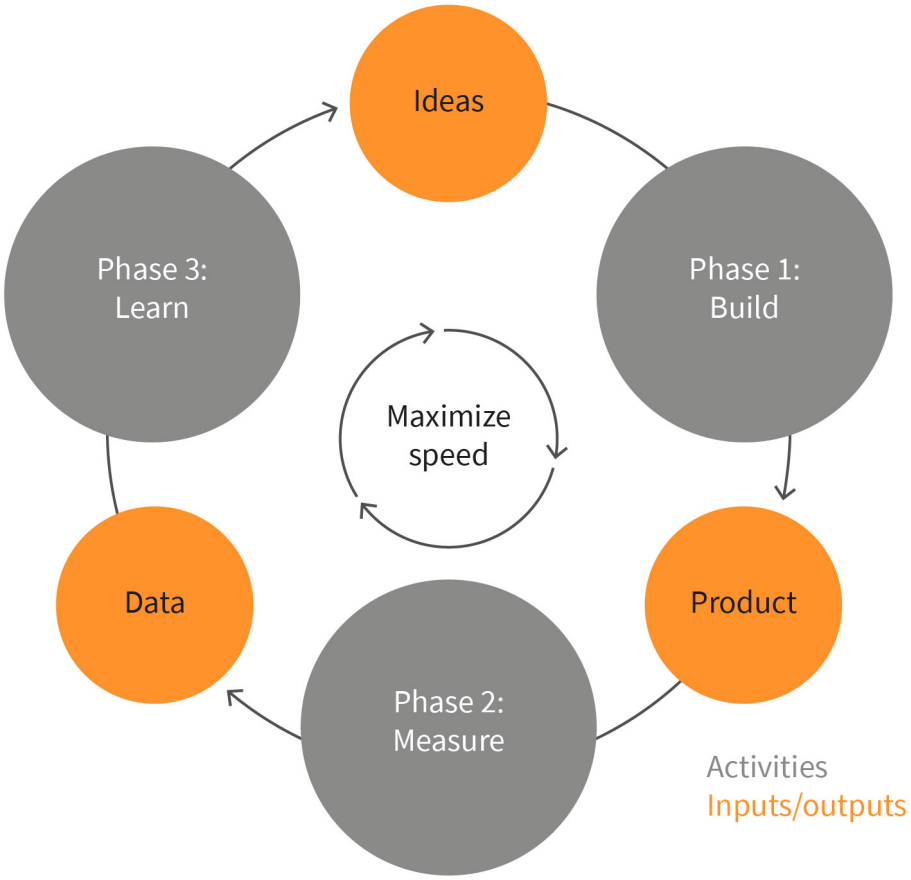
On completion of this section, you will be able to understand the role of hypotheses and assumptions in lean startup and how to formulate, structure, and prioritize them.

Every Business Idea is Based on Assumptions

Every business idea is based on a certain number of assumptions (Ries, 2011; 2017). Since these are purely hypothetical and unvalidated, it is essential, especially for a (very) early-stage startup that does not yet know its customers, to test them as quickly as possible. In doing so, the startup has to build an organization in which these assumptions are systematically and continuously tested and adjusted on the basis of experiments, so that it learns how to develop the product and the company further. In the process, it is always important to keep the vision in mind as a big picture (Ries, 2011).

Once the vision of the startup is known, the planned business model is described at the beginning of the build–measure–learn feedback loop (Bortolini et al., 2018), which you can see in the following figure. In this unit, our focus is on "build" in the build–measure–learn feedback loop, but you will also encounter the other phases and corresponding inputs/outputs at the respective points in the context.

Figure 4: The Build–Measure–Learn Feedback Loop



Source: Sabine Pur (2023), based on Ries (2011).

Assumptions about customer needs, product characteristics, and distribution channels, among others, are formulated as hypotheses (Ries, 2017). The classic business plan, which the startup has prepared at the beginning, is based, among other things, on ideal values, market research results, empirical values, and logical conclusions. It numerically forecasts the uncertain venture for the next 3–5 years, which requires stable assumptions that hardly allow for deviations. It enables founders to identify and rethink important aspects of the business, create communication materials for the venture, and convince investors and business partners. At first glance, it makes the whole venture seem less risky. But it is precisely the deviations that are necessary for the development of a startup, as it is in a constant learning process about future customers, markets, and the product. A business plan is indespensible for startups, but because of the constant changes in the learning process, it must also be updated accordingly (Ries, 2011).

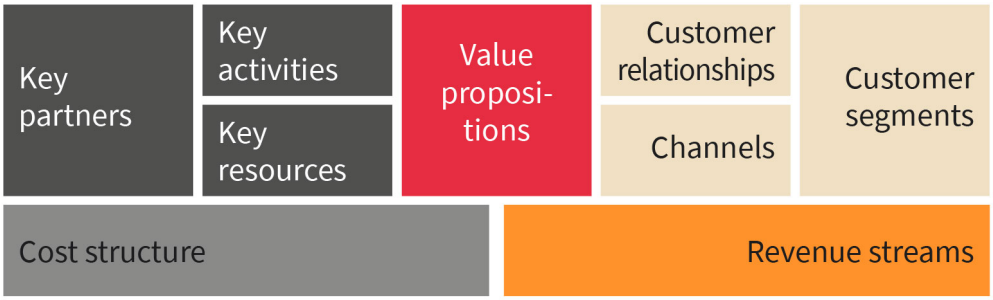
Tools to Formulate Assumptions

There are various ways to formulate and structure assumptions in lean startup so they can be tested qualitatively and quantitatively.

Business Model Canvas

Instead of writing the assumptions directly into a business plan, it makes sense for start-ups to put them into the Business Model Canvas by Osterwalder and Pigneur (2010), for example. The Business Model Canvas is a conceptual tool that describes the core strategic elements of a company as nine building blocks and their relationships. Typically, it is printed on a poster and the individual building blocks are filled with content by colleagues working together using sticky notes, text markers, or the like (Osterwalder & Pigneur, 2010). Of course, this can also be mapped digitally. The Business Model Canvas should not be seen as a static tool. It can be used in a very early start-up stage, but also later, for example, to support discussions and deliberate changes. The Canvas is particularly suitable here because all aspects of a business model are covered, they are clearly presented on one page, and the value proposition to the customer is the central focus (Blank, 2013; Ries, 2017). The following figure shows the Business Model Canvas with its nine building blocks. The building block "value propositions" includes the company's offering that provides value to the customer (gray box). The building blocks key partners, key activities, and key resources impact the company's cost structure (blue boxes), while the building blocks customer relationship, channels, and customer segments influence revenue streams (yellow boxes; Osterwalder & Pigneur, 2010).

Figure 5: Business Model Canvas



Source: Sabine Pur (2023), based on Osterwalder & Pegneur (2010).

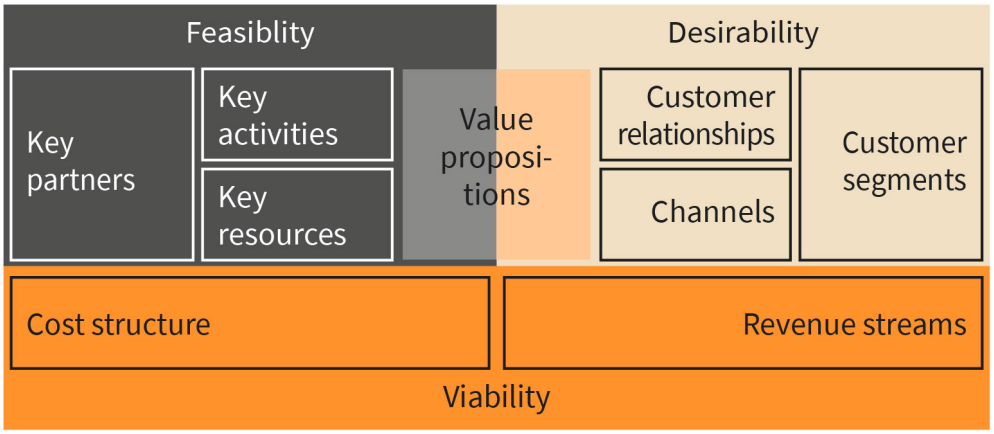
Strategyzer Canvas

For a simplified view of the Business Model Canvas, you can work with the "Strategyzer Canvas." It applies the idea of IDEO's "three lenses of innovation" to the Business Model Canvas and summarizes the nine building blocks into three elements (Jeffries, 2016):

1. Desirability: The customer is looked at in detail, specifically, what motivates them to buy the product, through which channels they hear about the startup, how they receive the product, and so on. This can be different for each target group.
2. Feasibility: This is about the right resources, activities, and partners.
3. Viability: Here, it is about how much is taken in and how much is spent.

The following figure shows the Strategyzer Canvas as three fields (lenses) covering the Business Model Canvas.

Figure 6: Strategyzer Canvas



Source: Sabine Pur (2023), based on Jeffries (2016).

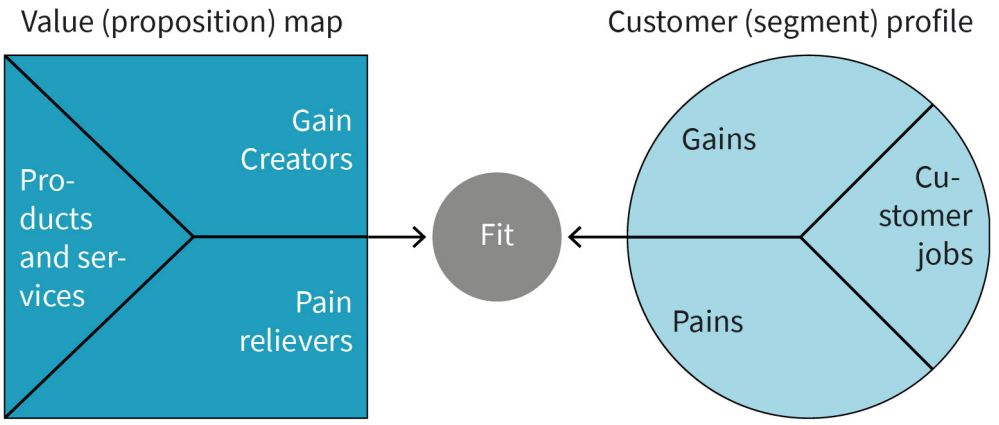
Value Proposition Canvas

If the value for customers is to be sharpened first, the Value Proposition Canvas, another tool by Osterwalder et al. (2014), can be used. It was developed to ensure that product and market fit together by looking in detail at two of the nine building blocks in the Business Model Canvas of Osterwalder and Pigneur (2010): value propositions and customer segments (see the Business Model Canvas figure above for reference). There are two sides of the Value Proposition Canvas (Osterwalder et al., 2014):

1. Value (proposition) map: This map is on the left side of the Canvas and shows how the company creates value for a specific customer segment. It is divided into three areas, which are filled in separately: offerings (products and services), gain creators, and pain relievers.
2. Customer (segment) profile: This visualization is on the right side of the Canvas and defines a specific customer segment of the company. The profile is also divided into three areas (corresponding to the value proposition map): customer tasks, gains, and pains.

A fit is achieved when both sides are compatible (Osterwalder et al., 2014). The following figure illustrates the relationships and can, again, be used as a practical template for a collaborative discussion in the team. The color of the value (proposition) map and the customer (segment) profile shows their origin, as the two building blocks from the Business Model Canvas.

Figure 7: Value Proposition Canvas



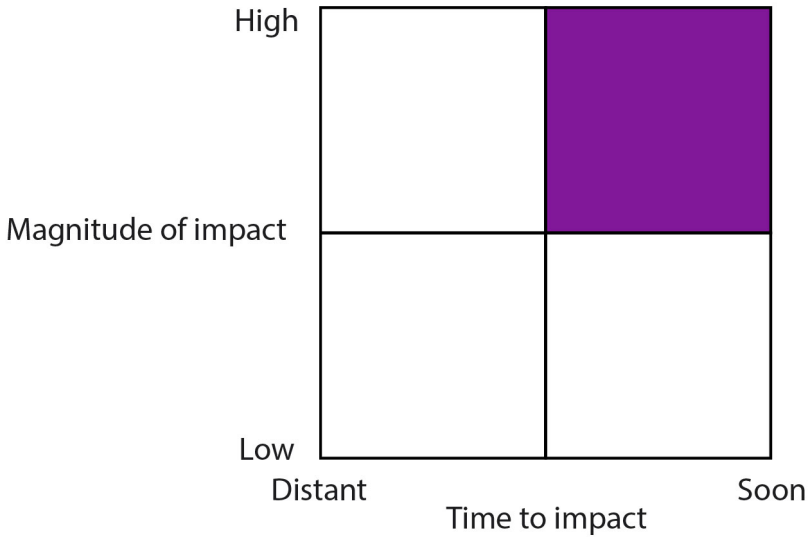
Source: Sabine Pur (2023), based on Osterwalder et al. (2014).

There are numerous other tools that can be used to formulate and collect one's assumptions in a structured way. The ones already mentioned are only intended to give an insight into how something like this can be done. If you want to use these canvases in practice, you can easily find them online.

Prioritizing Assumptions

Experience shows that too many assumptions rather than too few tend to be made. Therefore, it is important to first focus on those that are most critical for the success of the startup in the near future. They are called "leap-of-faith" assumptions (LOFA) in lean startup because the success of the entire venture depends on them (Ries, 2011, 2017). To categorize LOFA and become aware of their relevance, they can be mapped onto a graph with four quadrants, where the magnitude of impact is shown on the vertical axis and the time to impact is shown on horizontal axis (Ries, 2017). The LOFAs filled in the red quadrant in the upper right are the ones that need to be tested the fastest. The following figure illustrates the scheme.

Figure 8: Prioritizing Leap-of-Faith-Assumptions



Source: Sabine Pur (2023), based on Ries (2017).

Value and Growth Hypotheses

It is important to distinguish between the two most important types of LOFA: the value hypotheses and growth hypotheses (Moogk, 2012; Ries, 2011, 2017). For each LOFA, quantitative forecasts and actionable metrics should be stored in the spreadsheet of the business plan so that their testing can be measured quantitatively (Ries, 2011).

Value hypothesis

With the value hypothesis, customer acceptance is verified (Moogk, 2012; Ries, 2011; 2017). Since this is essential for the startup's existence, it should be focused on first (Ries, 2017). This includes examining whether a product or service delivers real value to customers once they use it. This can be seen, for example, in the fact that customers sign up or register for a free trial version when they get a certain number of promised functions. The corresponding hypothesis could be formulated like this: "We assume that 15 percent will sign up for the trial version" (Ries, 2011).

This information cannot be found out in concrete terms via surveys from market research because surveys are purely theoretical possibilities ("would they"). In an experiment, conversely, customers act directly. The visible result shows whether the product or service is useful and value-creating for the customers (Ries, 2011, 2017).

Growth hypothesis

Next, the hypotheses concerning the startup's growth after the first customers find its product or service valuable are tested (Ries, 2017). They are called "growth hypotheses" and provide insight into how new customers discover the offering and how it can spread

from early adopters to the mass market (Moogk, 2012; Ries, 2011; 2017). For example, one such hypothesis based on customer referrals might be, “regular customers will recruit new customers if they are offered a discount in return” (Ries, 2011).

Once the LOFA are clear, the first experiment, the building of the minimum viable product, is started as soon as possible to test and validate the hypotheses with the first customers (Moogk, 2012; Ries, 2011, 2017). Over time, LOFA or their prioritization will always prove to be wrong or outdated and need to be revisited (Ries, 2011). This is part of the learning process and purpose of the MVP, which we will now take a closer look at.

3.3 The Minimum Viable Product (MVP)

On completion of this section, you will be able to define a minimum viable product and explain its mission in the validated learning process in lean startup.

Definition and Concept of MVP

Based on the LOFA, a slimmed-down early version of the planned product is designed as an experiment as soon as possible to get the learning process going as quickly as possible (Moogk, 2012; Ries, 2017). These quick and low-cost experiments are based on “minimum viable products” (MVP) in lean startup. They get their name from the fact that they lead to the fastest possible learning of real customer needs at minimal cost and waste (Ries, 2011; 2017). In other words, they offer the startup the fastest possible way to go through the build–measure–learn loop with the least amount of effort. Yet an MVP is not necessarily the version of the product with the smallest imaginable set of features. It is the version that contains the smallest possible set of features that is created with the least amount of effort and provides the information the startup needs to confirm or disprove its assumptions. Here lies a key difference compared to traditional product development: where a prototype answers questions about technical or design features, the MVP is designed to verify the LOFA (Ries, 2011).

For a rapid learning process, it is particularly important that experiments are data-driven to ensure that changes in the independent **variables** can be detected and measured by manipulating the **control variables** (Bortolini et al., 2018; Moogk, 2012). After the results are evaluated, the assumptions that were found to be false are replaced with new assumptions and retested. This process continues until a product is created that delivers value to customers and allows the startup to grow (Mansoori et al., 2019; Ries, 2011; 2017).

Dependent and independent variables
Independent variables (e.g., buy button color) are the variables that are changed in an experiment (e.g., effects of button color on purchase rate) to observe the change in the dependent variables (e.g., purchase rate).

Types of MVP

The MVP can be designed differently to test customer reactions, for example, as qualitative interviews, prototypes, or websites (Bortolini et al., 2018; Ries, 2017). In doing so, customers are always observed as they interact with the product. In interviews, for example, it is particularly important to ask non-suggestive questions to find out the customer’s needs by listening to them (Ries, 2011). Asking the right questions can be very difficult and should be planned well (Fitzpatrick, 2013).

Control variables
Control variables (e.g., age) play a subordinate role for the research question of an experiment, but without them the measurement results are less accurate and cause–effect relationships are less obvious. They are kept constant or controlled to not influence the experiment.

The complexity of an MVP ranges from simple smoke tests, for example, where customers can pre-order a planned product or software, to early prototypes that can be extensively tested in real life (Ries, 2011). Experience shows that founders and product developers usually already have so many ideas about their product that they cannot estimate how many functions an MVP should have and they consider too many rather than too few to be essential (Moogk, 2012; Ries, 2011). However, when building an MVP, any additional work that is not required to begin the learning process and that does not serve to increase information is wasteful and should be avoided, even if it was initially deemed important by the founder and development team (Ries, 2011). Often, several versions of a product are developed and tested at the same time (Ries, 2017).

There are various techniques for building and designing an MVP. Ries (2017) describes numerous MVP methods that he used in his company, INTUIT. They are also available for download from his website. In the following, two essential MVP techniques are presented based on two examples from practice.

The video MVP

Dropbox is known today as an easy-to-use cross-platform file sharing software. Originally, the founding team consisted of engineers without any marketing experience. They believed, at the time, that file synchronization was a problem most people didn't know they had. Technically, implementing their vision was very challenging. In addition, they still ran the risk that their software, in its envisioned form, would not find buyers. So, they decided not to take the traditional route of developing a solution, launching it on the market, and then waiting for customers to buy it. They wanted to test customer acceptance of their product beforehand. But their biggest challenge now was that it was difficult to explain the complicated concept. The solution was to produce a video. In a three-minute demonstration of the technology, chief executive officer (CEO) Drew Houston showed how the software works. In doing so, he targeted technology early adopters and used in-jokes and humorous references that they appreciated. The video proved to be the right approach. The beta waiting list grew from 5,000 to 75,000 people overnight (Ries, 2011). You can watch the original video MVP of Dropbox on YouTube. You will notice that many software demos still look similar today.

The concierge MVP

The Food on the Table mobile app creates weekly meal plans and shopping lists based on the foods you like to eat. It also scans regional grocery stores for the best deals on ingredients. This offering is also technically very sophisticated. Keeping up to date with weekly deals and grocery prices requires a lot of know-how in databases, algorithms, etc. The company started its experiment with a single customer. This one early adopter got a concierge treatment. She was personally visited each week by CEO Manuel Rosso, who then worked with the vice president of product development to discuss the offerings at her favorite grocery store and select recipes based on her preferences. Each week, they personally handed her a prepared packet with a shopping list and the appropriate recipes and asked for her feedback. All of this earned them only a weekly check in the amount of $9.95.

At first glance, this approach is inefficient and not scalable in any way. But they kept learning and acquired the next client, who again enjoyed the concierge treatment. After a few more customers, the approach was no longer practical and automation began. Their offerings became a little faster with each iteration of the MVP and they were able to serve more and more customers. For example, delivery of recipes and shopping lists was done via email instead of a personal visit at home, lists of deals were automatically analyzed by software instead of by hand, and payment was done via credit cards online instead of a handwritten check (Ries, 2011).

In a concierge MVP, a personalized or even manual service is offered, which is later to be automated. Therefore, this personalized or manual service does not represent the product. It is a pure learning activity that aims to test the LOFA of the growth model. It often turns out that a change in strategy is needed, leading to more growth, if you don't want to settle for a modest growth trajectory. But again, this must be systematically tested with real customers (Ries, 2011).

Customers of MVP: Early Adopter

Before new products can be successfully sold to the mass market, they must be tested with customers. In lean startup, this begins as early as possible to learn from feedback and further develop the product in the right direction (Moogk, 2012; Ries, 2011; 2017). However, it is primarily not the average customers who are addressed, but the early adopters. They are the customer group that has a particularly strong need to use the product – even in an early version. They are characterized by the fact that they are the most forgiving of mistakes and willing to give feedback. Instead of a perfectly developed product, they favor an 80 percent solution and like to imagine the features that are still missing. They enjoy being the first to try out the new product, whether it's because of the thrill of being one of the first users, in the case of consumer products, or the competitive advantage, in the case of corporate products of being ahead of the competition. This is why early adopters are wary of overly sophisticated products, wondering "if it's ready for everyone to adopt, how much advantage can one get by being early?" (Ries, 2011, p. 95). For this reason, it is a waste of resources to develop the early product beyond the demands of early adopters (Ries, 2011).

A real-life example of successfully starting with a small customer base, scaling, and eventually generating a large market power is the peer-to-peer payment service PayPal. The company began by offering to send payments between PalmPilots (the first personal digital assistants). With millions of users worldwide, the target group seemed large and promising, but they were spread across the world, had no common connection, and used their devices only sporadically. So, PayPal's technology didn't gain traction here. The founders changed course to the auction (and now selling) platform eBay. There, within a short time, they were able to attract several thousand heavy users, called "power sellers," as customers because, in contrast to the scattered millions of PalmPilot users, they gained real added value from the technology. It is clearly easier to dominate a non-competitive niche than gain a foothold in a large competitive market. After that, it is recommended to pursue an appropriate growth strategy to expand into more markets and drive business growth (Thiel, 2014).

Fears About the Construction of the MVP

There are always arguments against building an MVP. We will now take a closer look at three widespread fears.

Fear of intellectual property theft

This fear is usually completely baseless. Hardly anyone becomes aware of their own idea at the beginning and during the development of the product. Large established companies are usually busy with good ideas of their own, on which they concentrate, evaluate, and prioritize. But there will always be competition at some point, whether from the ranks of large companies or from other startups (Ries, 2011). That's why you should always be aware: "The only way to win is to learn faster than anyone else" (Ries, 2011, p. 111).

Fear of reputational damage

Established companies often shy away from presenting unfinished defective products to a known group of customers who are used to receiving fully finished and functional products developed using classic product development methods, such as the waterfall model. In these companies, classic methods are used to ensure high quality (e.g., six sigma). Here, however, it is already known which customers are served and which product features they value (Chesbrough & Tucci, 2020; Ries, 2011). In a startup, however, both are still unknown – the customer and the product features that are valuable to them. As Ries (2011) states, "If we do not know who the customer is, we do not know what quality is" (p. 107). In this case, it can be helpful to run the internal startup with its new, highly innovative product under a new brand name (Ries, 2011).

Fear of patent risks

This mainly affects startups that rely on patent protection. Depending on the legal system, the patent application process often begins as soon as the product is released to the public. Depending on the stage of development of the MVP, there could be time pressure here. The time pressure also applies when international patent protection is involved. These procedures are lengthy and have strict requirements, which makes it necessary to plan accordingly. Even if the advantages of fast learning generally outweigh the disadvantages, a startup should always seek legal advice (Ries, 2011).

SUMMARY

Innovative startups operate under a high degree of uncertainty because they know neither their future customers nor their real needs. To identify them and develop a value-creating product, they apply the building principles from the build–measure–learn feedback loop, which include experimentation, hypotheses, and MVPs.

They rely on real experiments with real customers rather than vague market forecasts. These experiments are scientifically oriented. They are based on assumptions about customers, product features, etc., from the business plan. There are various tools to formulate, categorize, and prioritize. However, since there are usually too many assumptions to be able to check them in the given time, the focus is on those that are most essential for the success of the startup in the near future. They are called leap-of-faith assumptions and can be divided into value and growth hypotheses.

Based on leap-of-faith assumptions, a fast and low-cost version of what the founders envision as the final product is built as soon as possible and tested with direct customer feedback. These experiments are based on MVPs, which lead to the fastest possible learning of actual customer needs at minimal cost and waste. They can be designed in a wide variety of ways and primarily address early adopters, a group of customers who have a special need to try out the product and are happy to contribute their feedback for improvement. Often, there are also various concerns about building an MVP, but usually the benefits clearly outweigh them.

UNIT 4

THE MEASURE PRINCIPLES

STUDY GOALS

On completion of this unit, you will be able to ...

- understand what makes it so difficult to quantify the success of startups especially in their early stages and for growth.
- recognize the need for innovation accounting, which is a startup-specific accounting framework with actionable metrics and milestones in the learning process.
- learn tools and techniques to implement innovation accounting in a company.

4. THE MEASURE PRINCIPLES

Introduction

The founding team has already done a great job. The business plan promises great success and has convinced investors of the merits of their idea. The vision is clear, the assumptions about customer needs, product features, etc., have been systematically formulated and tested with the first customers in early product versions. Now the investors expect customers to come in droves as soon as the product is on the market. But the few figures the startup can present so far are still miles away from those in the business plan. How can the founding team convince investors that it's worth going forward? How can it determine for itself whether it is on the right course? Classic measurement methods are only suitable for projects that can be planned well, with known customers and markets. But for highly innovative startups, the focus is on learning, and that's not where these methods work. They need a systematic approach that measures learning progress. Innovation accounting is such an approach. As an alternative to classic accounting, it is specially designed for the situation of startups. It makes startups comparable and helps distinguish the truly successful startups from the ones that, for example, use vanity metrics and only grow by raising additional capital from investors but have not developed a value-added product that is in sufficient demand (Ries, 2011).

In the following sections, you will be shown what makes it so difficult to quantify the learning progress of startups. You will learn about the innovation accounting as a suitable accounting method for this purpose and discover ways to use it successfully and sustainably in the company.

4.1 Understand the Problem

On completion of this section, you will be able to understand what makes it so difficult to quantify the success of startups especially in their early stages and for growth.

High Uncertainty, Small Figures, and Growth

Startups are characterized, especially in the initial phase, by the fact that they innovate under great uncertainty. At the beginning, they neither know their future customers nor what problems and needs customers have that can solved with the startup's planned product (Ries, 2011; 2017).

Their task is to turn their initial ideas into products that are in demand on the market. For this purpose, qualitative and quantitative feedback is obtained in experiments with early customers and initial products. This feedback is used to fuel further ideas, confirm, or refute relevant assumptions; conduct further experiments with more advanced products, and so on. This process is evident in the build–measure–learn loop. It quickly becomes clear that the startup needs to know permanently where it stands and how it needs to

design its experiments to learn how to develop its real numbers toward the desired numbers in the business plan. Since it has little or no data to evaluate, especially at the beginning, it faces two problems. Even if the early adopters are enthusiastic about the still-unfinished product, the startup does not know for sure whether it will also reach the mass market. Here, all the technical know-how, hard work, and personal commitment are useless if the finished product does not offer later customers any discernible added value and does not meet their needs. On the contrary, the founders have to convince their investors that, despite the low numbers that are still miles away from the dream data from the business plan, they have already learned essential lessons for success and that another round of financing makes sense (Ries, 2011).

Another hurdle is in the scalability of the business model. Many founders reach their first customers through iteration of the build–measure–learn loop and testing with minimum viable products (MVPs), and can show some growth, but they can't scale further. They "bumble along in the land of the living dead" (Ries, 2011, p. 114). Here, it becomes clear that there is a need to take a closer look at growth assumptions and measure and learn in this regard (Ries, 2011). Experience has shown that it also makes sense to turn initial customers into partners for further activities and establish more partnerships, thus expanding the scope of activities (Sarasvathy, 2022). One example would be to first develop learning software for schoolchildren. The first customers would be tutoring institutes, then licenses would be issued to schools and universities to develop the software further in terms of technology and content. Eventually, it would be licensed as continuing education software to companies and public authorities, etc. In other words, the startup would enter the new market segments and new markets step by step.

Planning, Controlling, and Measuring in Classic Structures

If you look at the common marketing textbooks, the segmentation-targeting-positioning process is often recommended when you want to develop a new product and bring it to market. In this process, the complete possible market with all possible customers and existing products is first considered. Information about it is collected by conducting market research, surveys, etc., and it is divided into individual market segments based on certain factors, such as age, geographic location, purchasing power, etc. By evaluating, for example, the sales potential in each segment, those that promise the most return for one's venture are selected. Then, using marketing strategies, like competitive analysis, etc., the positioning of one's product is determined. In reality, this top-down approach is rarely used successfully. A highly innovative startup takes the exact opposite approach with the effectuation process. It first learns about its customers and identifies who they are, what they know about them, and what they need. Based on this, the segment can be defined, effective partnerships and first sales are made. After that, it expands its network of partners, conquers further market segments, and identifies growth opportunities with the definition or creation of potential markets. The process is, therefore, stakeholder-dependent and not target- and resource-dependent (Sarasvathy, 2022).

Another issue that becomes critical for startups using classic methods is the measurement of progress and success. To track the development of a startup, it must be quantified. In established companies, with existing products, customers, and markets, standardized methods are used to plan and manage projects as well as measure and evaluate the devel-

opment (Christensen, 2016; Ries, 2011; 2017). There, everything is designed to optimize the offerings. The engineers increase the performance of the products, and the designers make them even more user-friendly. However, the tools used here are unsuitable for highly innovative startups whose customers and their requirements are yet unknown (Ries, 2011). Traditional accounting methods also rate new companies and projects according to the same standards as established companies. But they do not allow reliable forecasts about the future developments of startups. However, especially at the beginning of a startup, data is still missing and the model can still change significantly, so a quantitative financial model specifically designed for startups is needed (Ries, 2011; 2017). So, these tools are useless for startups as well as for entrepreneurs within existing organizations. This is especially fatal in established organizations when classic thinking patterns have become ingrained in managers. Here, internal startups can hardly be successful. After all, using methods for projects that can be planned and calculated well for highly uncertain, innovative projects usually sets in motion a downward spiral. The lack of success seems to result from a discrepancy between the planned and developed product. After all, the planned product promises completely different results than can be seen from the developed one. So the specification becomes more extensive and finely detailed, the developers work harder according to the increasingly detailed product requirements, the planning process is delayed further, and the project and/or those responsible are on the brink of failure (Ries, 2011).

In the meantime, many companies have recognized that a product developed for yet unknown customer needs is much more likely to be successful using Agile methods than if waterfall or similar models are used. Agile software development, for example, enables adjustments to be made to the product in sprints, i.e., in rapid development cycles, based on the respective customer feedback (Chesbrough & Tucci, 2020; Ries, 2011). A key element here is that designers adapt the product based on changing requirements, but they are not responsible for the quality of the business decisions behind it. The focus here is on new functions and technical implementation. This is already a big step away from the classic models, but a learning culture, as called for by lean startup, is often difficult to implement in such teams. From their usual perspective, the learning processes required in lean startup would delay pure development and, thus, diminish productivity, which is usually still what they are measured by (Ries, 2011).

Vanity Metrics and Cumulative Results

Startups that have successfully navigated the build–measure–learn loops to a market-ready product in demand by customers may now be reaching their limits. They have built one or more minimum viable products, successfully tested them with early adopters, and developed it accordingly for the mass market. Then, they have found a business model and are selling their products to initial interested customers. But they lack the working growth engine (Ries, 2011; 2017). The problem is that the current success of activities is a result of the past, not of the current initiatives. But since the classic accounting figures look good, this is unnoticed for the time being. Even if there is a working growth engine, managers still often rely on the wrong metrics and, once the gross numbers are off, try all sorts of tricks to somehow polish them up (e.g., running ads at the last minute). For this reason, such metrics are also called **vanity metrics** in lean startup. However, it is not only the false metrics themselves that are the problem, but also the way they are evaluated

and interpreted. When looking at customers and revenue in a cumulative manner, for example, a field hockey stick curve emerges, and the startup is more than satisfied with its efforts. However, if the customers are evaluated in cohorts, i.e., individual customer groups that have encountered a product independently of one another, a completely different picture often emerges. Here, it can be seen that the surplus earnings, for example, which are always put into new customer acquisition, do not result in any percentage increase in new customers at all. It can also be seen that investments elsewhere are bearing fruit because more and more of the existing customers are using the product several times a day. In a classic diagram with cumulative values, you can see that the growth engine is running, but you can't see in a differentiated way whether the respective fine-tuning is also paying off, i.e., whether the product improvements were important and whether the startup is on a good course to build a sustainable business model (Ries, 2011).

Vanity metrics
In lean startup, metrics that show the rosiest picture of the company possible are called vanity metrics. Top numbers are presented that show, among other things, a field hockey stick curve representing an ideal, fast-growing company.

4.2 Define the Solution

On completion of this section, you will be able to recognize the need for a startup-specific accounting framework with actionable metrics and milestones in the learning process – called "innovation accounting."

Measurement for Startups – Adjusted Parameters and Innovation Accounting

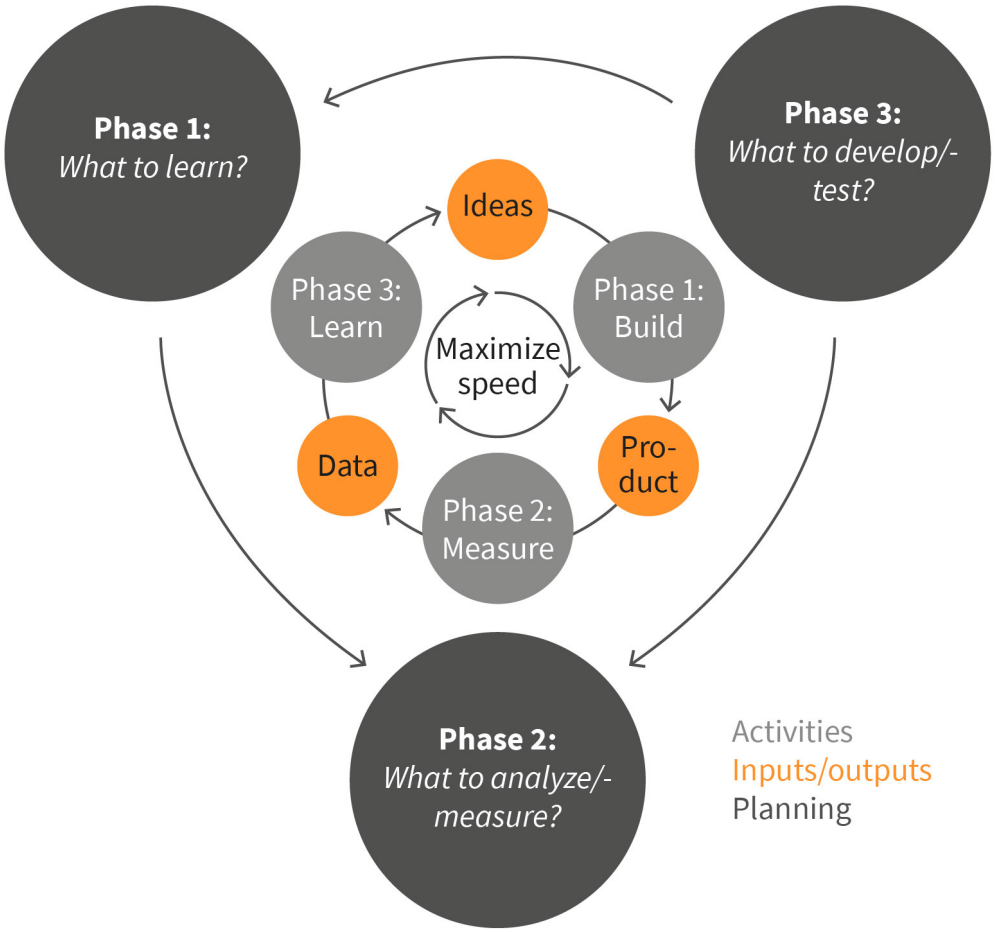
In lean startup, product and business development is specifically designed to meet the needs of startups innovating under high uncertainty (Blank, 2020; Ries, 2011; 2017). This also requires classic accounting activities that are adapted to the specifics of a startup. This is the only way to sustainably improve entrepreneurial results and support those responsible for innovation in their personal responsibility. For this, however, key figures and milestones must be defined differently and tasks prioritized differently than in the case with large companies with known customers and markets (Ries, 2011, 2017).

Thus, for progress to be measured via the development of highly innovative projects, a change in the parameters for measuring success is needed (Ries, 2011, 2017). Instead of using vanity metrics and gross metrics, which give a biased picture of reality, actionable metrics are used. In this context, cohort analyses, for example, provide a differentiated view of developments and show changes in detail. In experiments with split A/B tests, the behavior of two groups can be observed, which allows conclusions to be drawn about the versions used in each case. Instead of classic milestones, milestones are set in the learning process. To ensure that tasks and activities can be systematically coordinated and visualized, a Kanban board is a good choice (Ries, 2011). There are several other approaches that you will get to know in more detail in the next section.

The framework for these activities is provided by the innovation accounting, a quantitative financial model. It creates a uniform vocabulary for managing highly innovative projects and serves to monitor developments and report in financial language (Ries, 2017). This type of accounting can be used for continuous innovation in large companies and makes startups comparable, which is important for continuous investments (Ries, 2017).

Although the activities take place in the order of build–measure–learn, planning proceeds in reverse order, as you can see in the following figure. In this unit, our focus is on "measure" in the build–measure–learn feedback loop, but you will also encounter the other phases and corresponding inputs/outputs at the respective points in the context.

Figure 9: Planning Process at Build–Measure–Learn Feedback Loop



Source: Sabine Pur (2023), based on Ries (2011).

In the planning process, what is to be learned is first explored. Then, the innovation accounting is used to find out what needs analysis and whether validated learning is taking place. Based on this, what kind of product needs to be developed to conduct experiments and reach these measurement results is determined (Ries, 2011). The procedure for the innovation accounting is cyclical and consists of three steps (milestones), explained in the following paragraphs.

"Establish the baseline"

First, an MVP is built based on leap-of-faith assumptions (LOFA) and tested in direct customer contact to receive real data on the project status. The variants can range from smoke tests, where customers can pre-order a planned product, to complete prototypes

that can be extensively tested in real-life. The essential thing at this point is to validate customer interest and set a baseline for the startup's growth model with data, such as conversion rate, number of signups for the test version, etc. (Ries, 2011, p. 118).

"Tuning the engine"

Next, incremental development of the product, with marketing campaigns, etc., ensures that the project has appropriate growth power. Fine-tuning the parameters from the baseline toward the ideal line from the business plan takes place to drive the growth engine (Ries, 2011, p. 119).

"Pivot or persevere"

In this step, a decision is made on whether to stay the course or change it. If the startup has been able to improve its key figures and its baseline is approaching the ideal line from the business plan, it is well on its way to a sustainable business model and can maintain its course. However, if the results show a different picture, then it is time for a course correction and the cycle starts again with the establishment of a new baseline (Ries, 2011, p. 120). The techniques used at innovation accounting are always designed to reduce cycle time to a minimum (Ries, 2011).

Design of Metrics and Reports – the Three A's

A key to successful development of highly innovative products is measuring customer feedback on the MVP and validated learning. This involves comparing the results with the previously defined hypotheses using data analysis and statistical methods (Bortolini et al., 2018; Ries, 2011; 2017). For a learning process to take place and a company-wide learning culture to be established and lived, the measurement results (and the resulting reports) should fulfill the three A's, as outlined in the following paragraphs (Ries, 2011).

Actionable

Reports explain milestones in the learning process. In this context, a report is considered actionable if it clearly shows the connection between cause and effect of the measurement results. It must be clear from them which actions have led to exactly which results. This is the only way to assess what steps to take next. Anything else is vanity metrics. In this case, it is not clear what caused which results. Were the new user numbers caused by the new product features X or by marketing campaign Y? If everything is going well, that's not so bad. But if the numbers plummet or problems occur in some other way, it is impossible to objectively identify the cause(s), what is to blame, and who bears the responsibility. Actionable metrics do not allow a company to get into such a situation (Ries, 2011).

Accessible

Reports should be easy to read and the experiments and results formulated clearly and accessibly to everyone in the company. If the reports are not understandable for the employees, they cannot use them as a decision-making aid. The problem is often that the department that prepares the data for the reports is so deep into the subject and in tech-

nical jargon that it is unaware that there are colleagues who cannot make any sense of it. But if the report refers to cohorts, for example, and, thus, to people and their activities instead of pure mountains of data, the content is clearly comprehensible to everyone. It is also important that employees have the easiest possible access to current and past reports. An email with the current report and an electronic archive on the intranet would be a good approach in this case (Ries, 2011).

Auditable

The reports and measurement results must be credible and verifiable for every employee. This comes into play especially when the data does not correspond to what one would have expected. Or, even worse, if the data mean the end of a favorite project. Therefore, reports should always be created from master data and not intermediate systems. In addition, the data should always be verifiable through real customer contact. But the data collection systems, data protection regulations, etc., must also allow for this (Ries, 2011).

Management of Startups in Established Companies – Growth Boards

To ensure the company's success in the long-term, highly innovative projects, such as those carried out by internal startups, must be managed accordingly. A growth board can fulfill these tasks within an established company. It consists of a permanent team that regularly evaluates project progress and takes financial decisions. It acts like a venture capital fund and works with innovation accounting techniques. The growth board performs the following three tasks (Ries, 2017):

1. They are the central point of corporate accountability for internal startups, regardless of whether they oversee just one or several. They sensitize the internal startups to question their growth process, determine whether validated learning is taking place, and make pivot-or-persevere decisions.
2. They are the central clearinghouse for information regarding the startups. Requests and problems are submitted directly to them, who then provide a clear and direct path to resolution, when necessary.
3. They allocate metered funding to the internal startups. This is a fixed budget either for a specific time horizon or in dollars. The startups can decide how to dispose of the budget. A new budget is only available after strict guidelines and when validated learning has taken place.

If a company decides to initiate a growth board, Ries (2017, p. 291) offers the following additional tips:

- "small group, right people": The growth board should consist of a small group of six to eight executive-level members who are nimble, have authority to act, and can demonstrate to the organization that their work is highly valued.
- "frequent meetings": The group must meet regularly, at least once per quarter. If there are subgroups for more projects, they must meet more frequently.
- "action-oriented": The group must be action-oriented and (usually) make the necessary go and no-go decisions in the meetings.

- “fact -based”: Actions must be fact-based and understandable.
- “no attendance, no vote”: Only those who are present at the meetings have voting rights, which are not transferable.

4.3 Validate Qualitatively and Quantitatively

On completion of this section, you will have learned tools and techniques to implement innovation accounting in a company.

Three Levels of Innovation Accounting

Innovation accounting makes it possible to manage highly innovative projects. Since it is a very complex construct involving a lot of mathematics and numerical value, there are three levels of innovation accounting that increase in complexity. Depending on the stage of development of the various organizations, many remain satisfied at level 1 and, thus, achieve their goals, while others work consistently at level 3 (Ries, 2017).

Level 1: Dashboard

The simplest way to implement innovation accounting is to have a dashboard with simple metrics declared important by the team, focusing on what is essential now without any later-stage variables. It is especially useful for early-stage projects that are still low on budget, and it shows the change in customer behavior from experiment to experiment. The essential factor here is the per-customer input, which can then be presented in different samples, e.g., for one customer, for ten customers, and so on. Often, only about three to five metrics are compared to the learning milestones. Such metrics can be, for example, conversion rate, revenue per customer, or cost per customer. Level 1 is primarily about developing a plan with a manageable set of numbers, measuring the learning process, and recognizing what works and what doesn’t. The idea is to have regular experiments, which should result in, e.g., releases, with regular customer contact. For example, a new MVP can first be tested with five customers, the following week with ten, and so on. If the results do not bring the expected success, the product can be adapted and the number of customers can be reduced to five, for example (Ries, 2017). The following table shows how such a dashboard can look for level 1 (numbers are fictitious).

Table 1: Level 1 Dashboard

Milestones		**Start of advertising campaign X**	**Drop in prices**	**Change in feature Y**	**…**
	Week 1	Week 2	Week 3	Week 4	…
Number of customers	0	5	14	21	…

Milestones		Start of advertising campaign X	Drop in prices	Change in feature Y	…
Conversion rate	0 percent	18 percent	23 percent	17 percent	…
Price of product Z	10	10	8	9.5	…
…	…	…	…	…	…

Source: Sabine Pur (2023), based on Ries (2017).

Level 2: Business case

The Level 2 dashboard already spans the full customer interaction. It is a complete set of metrics that matches the business plan spreadsheet and LOFA (i.e., value and growth hypotheses). Here, each metric should correspond exactly to one LOFA. The value hypotheses illustrate the value that a particular product has to a customer. Here, for example, repeat sales and premium price willingness are measured. The comparison with the planned values in the business plan then shows whether they are developing sufficiently and whether they are converging accordingly in the learning process. The growth hypotheses show the sustainable growth of the product/market fit. If the value hypotheses ensure that the startup's product is valuable to customers, then the question in the growth hypotheses is what customer behavior will motivate other customers to buy the product (Ries, 2017). Here, three "engines of growth" (Ries, 2017, p. 276) are distinguished:

1. "Sitcky engine of growth"(Ries, 2017, p. 276): Users are expected to come back and continue using the product (Croll & Yoskovitz, 2013), so the aim is a high customer retention. The increase in customers through word-of-mouth is greater than the churn (Moogk, 2012; Ries, 2017).
2. "Paid engine of growth" (Ries, 2017, p. 276): Customer revenues are used for the acquisition of new customers (Moogk, 2012; Ries, 2017).
3. "Viral engine of growth" (Ries, 2017, p. 276): New customers are acquired by existing ones as a side effect of their normal product use, through, for example, social networks (Moogk, 2012; Ries, 2017).

A Level 2 dashboard is similar to the Level 1 dashboard, but includes all input metrics that are consistent with the business plan and LOFA (Ries, 2017). For example, it could be structured as shown in the table below (numbers are fictitious).

Table 2: Level 2 Dashboard

Milestones		Start of advertising campaign X	Drop in prices	Change in feature Y	...
	Week 1	Week 2	Week 3	Week 4	...
Number of customers	0	5	14	21	...

Conversion rate	0 percent	18 percent	23 percent	17 percent	...
Price of product Z	10	10	8	9.5	...
...	...	...	...	...	...
Referrals per customer	0	0	2	3	...
Marketing budget	0	100	50	100	

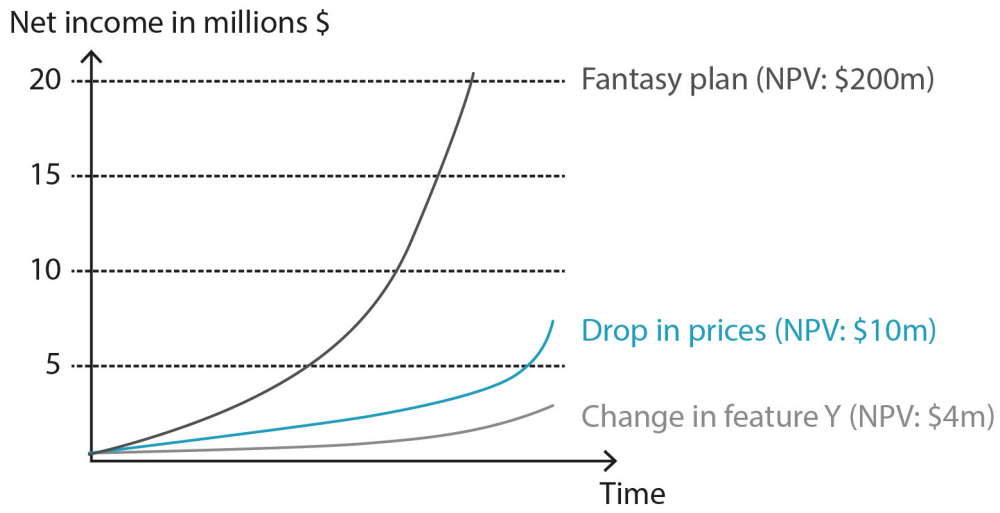
Source: Sabine Pur (2023), based on Ries (2017).

Level 3: Net present value

Level 3 illustrates the financial value of validated learning by re-running the entire business case after each new data point. It is suitable for more advanced projects with more budget and experience in innovation accounting. The numbers about the planned development, as they were written in the business plan's spreadsheet at the beginning, are calculated, extrapolated, and graphically displayed after each experiment with the new set of input values created in the process. These extrapolations can be reproduced with standard finance tools as **net present value** terms, which corresponds to a translation of learning into financial impact. For example, if the conversion rate increases from one to two percent, it is possible to see exactly what will happen if the product continues developing as planned. In this way, the values presented in the business plan can also be enriched with new, increasingly precise data, and with each new MVP, the startup comes closer to its dream plan, i.e., the ideal line from the original business plan. Innovation accounting, thus, provides a playground that quantitatively forecasts progress in a valid way, makes changes in individual data points visible, and helps the team make effective decisions about possible strategy changes (Ries, 2017). The following graphic shows a possible Level 3 dashboard (numbers are fictitious).

Net present value
The net present value is a ratio from the dynamic investment calculation and indicates whether an investment or a project is profitable. It is calculated from all cash flows over a certain future period, discounted to the present day.

Figure 10: Level 3 Dashboard



Source: Sabine Pur (2023), based on Ries (2017).

Innovation accounting enables a common language based on numbers and can be used to account for different innovative projects within a company (Ries, 2011). For this purpose, the dashboards and standards associated with innovation accounting can be used across all levels of the company (Ries, 2017).

Supporting Techniques

In innovation accounting, different techniques are used to ensure validated learning. In the following, three are presented as examples that are frequently used in practice.

A/B Testing

A/B testing enables the startup to draw conclusions about different versions in product development. They originally come from (direct) marketing (Ries, 2011). Here, different versions of a product are issued simultaneously to different customer groups. Customer behavior is observed to draw conclusions about the respective version (Kohavi & Longbotham, 2017; Ries, 2011). For example, half of visitors to a website see a red buy button (version A) and the other half a green one (version B). The two websites differ only in this one feature and are otherwise identical. After a predetermined time, it is evaluated which group (the one with variant A or B) had more purchasing power. This method can be wonderfully integrated into lean startup product development. In doing so, one quickly recognizes whether one's additional function, no matter how important it is considered to be, is also perceived and valued by the customers (Ries, 2011).

Kanban

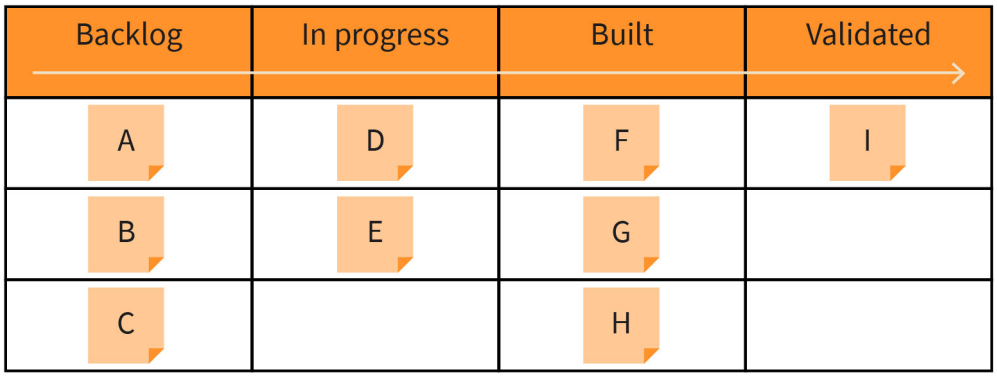
The Kanban method supports the coordination of tasks and visualizes workflows (Pereira et al., 2022). It originally comes from lean manufacturing, where inventories are reduced and material flow is optimized simultaneously, and can be applied very well to lean

startup (Ries, 2011). To use the method, a Kanban board is created, for example, on a whiteboard in one of the offices by using a virtual tool (Pereira et al., 2022; Ries, 2011). Four columns are entered, corresponding to the development stages of the project (Ries, 2011):

- backlog (i.e., beginning of the implementation of a function)
- in progress (in active development)
- built (i.e., function technically complete)
- validated (i.e., function considered valuable by customer, per A/B testing or customer discussions or similar)

According to Kanban rules, only a certain number of tasks can be in one stage at the same time. These tasks are written on (virtual) sticky notes and run through the individual columns from left to right as tickets. If the columns are full, no further tickets are included. Only when a requirement has been validated can the corresponding ticket be removed from the Kanban board (Ries, 2011). The following figure illustrates an example of a Kanban board in which no more than three tickets per column may be present at the same time.

Figure 11: Kanban Board



Source: Sabine Pur (2023), based on Ries (2011).

Here, work begins on A, B, and C. D and E are currently under development. F, G, and H are fully developed. I is already validated. It is essential for Kanban that the individual tasks only move to the next column if there is space there. For example, in the second column, there is currently only one free space and development can only be started at A, B, or C. This means that A, B, and C can only be developed. A, B, and C can, therefore, only be processed if D and E have been completed in the development. However, F, G, and H must be validated beforehand. This takes some practice at first but it is a rewarding way to involve all team members in the validation process. Then, they will measure productivity by validated learning processes and not by the production of new features (Ries, 2011).

Bingo cards

In lean startup, “bingo cards” are also used for project management, for example, in internal transformation processes. They are divided into four columns that show the course of adaptation to the innovation in four time horizons, and three rows, which address different levels, from project team level to business unit level, to corporate level. It requires two of these maps. In one, key questions are stored for each field, and in the other, corresponding key metrics. To ensure that the success of the innovation can be assessed, columns or rows cannot be skipped (Ries, 2017).

SUMMARY

In the beginning, a startup usually has too few data to be meaningful with traditional accounting methods. These methods are designed for established companies with known products and markets but are unsuitable for startups that innovate under high uncertainty and where learning is in the foreground as they create a viable, scalable business model.

Accounting at startups needs its own framework with adapted, actionable metrics and milestones in the learning process so the development of highly innovative projects can be measured and controlled. Innovation accounting provides the framework for these activities. It creates a uniform vocabulary and supports the observation of developments and reporting in financial language. Depending on the area of application, innovative accounting can be designed with varying degrees of complexity. There are numerous tools and techniques that support its use. This type of accounting can be used throughout the company and makes startups comparable, which is important for continuous investments. Thus, it can contribute significantly to being competitive through continuous innovation.

UNIT 5

THE LEARN PRINCIPLES

STUDY GOALS

On completion of this unit, you will be able to ...

- understand how and when a change of course (pivot) occurs and why it is necessary for building a viable and scalable business model.
- explain how the three growth engines work and can be used effectively for sustainable growth.
- learn how structures look and can be built for an organization that can handle rapid and even unexpected change – called an adaptive organization.

5. THE LEARN PRINCIPLES

Introduction

In product and company development, startups go through the build–measure–learn feedback loop in increasingly shorter cycles. In the process, they learn from the experiments with customers at each iteration and keep adapting their product. This requires a good mix of perseverance and flexibility from the founders (Ries, 2011). In the process, the team constantly asks themselves questions, like, “Has our product and company evolved according to the desired vision, and should we stay the course or is a radical course correction needed?” However, founders must be careful when asking such questions to not fall victim to the “sunk cost fallacy,” in which they stick to their product or course only because they have already invested so much money and time. It’s often hard to break with something you once committed to doing, in part because you might be afraid of losing face and being exposed. But what has already been invested is not decisive; it is the outlook for the future. “Confirmation bias,” to name another example, also prevents objective decisions, because one subconsciously confirms what corresponds to one’s own assumptions and ideas and eliminates that which does not correspond. A targeted search for contradictions, also called “murder your darlings,” can counteract this (Dobelli, 2020).

So, the founders not only have to glean customer feedback via experiments to successively develop their product; they also need to learn when and how to make a tough strategic decision to change course, how to achieve sustainable growth, and how to build an organization that has long-term innovation power. You will learn how they can go about this in the next sections.

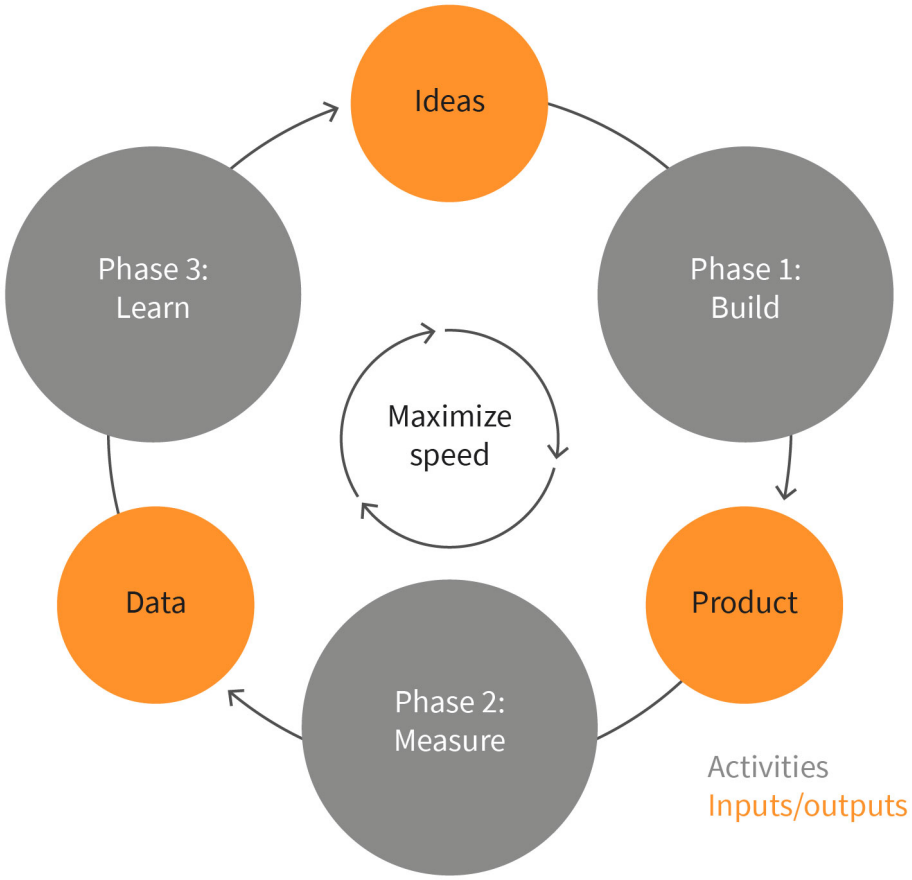
5.1 Pivot (or Persevere)

On completion of this section, you will be able to understand how and when a change of course (pivot) occurs and why it is necessary for building a viable and scalable business model.

Iterative Learning, Acceleration, and Lack of Growth

The goal of a startup is to transform an idea into a viable and scalable business model. To do this, it uses the build–measure–learn feedback loop, which can be seen in the following figure (Ries, 2011; 2017). In this unit, our focus is on “learn” in the build–measure–learn feedback loop, but you will also encounter the other phases and corresponding inputs/outputs at the respective points in context.

Figure 12: The Build–Measure–Learn Feedback Loop



Source: Sabine Pur (2023), based on Ries (2011).

In use of the build–measure–learn feedback loop, the startup formulates its ideas as leap-of-faith assumptions (idea) and builds from this a simple (early) version of the planned product, also called a minimum viable product (MVP; phase 1, build; Ries, 2011, 2017). This MVP (product) is tested in experiments with real customers to measure their feedback (phase 2, measure) and compare the previously defined leap-of-faith assumptions with data analysis and statistical methods (Bortolini et al., 2018). By using actionable metrics and innovation accounting (data), learning can take place from the results of the experiments to make adjustments to the leap-of-faith assumptions and MVPs (phase 3, learn; Ries, 2011; 2017). This continues until, after various iterations, a scalable business model is found that implements the entrepreneurial vision (Ries, 2011).

The success factor for startups is to go through the loop in shorter and shorter cycles. Incidentally, cost savings because the startup suddenly runs out of money lead to a slowdown of the build–measure–learn loop. Acceleration is possible because more and more relevant information is learned about customers and markets, which leads to valuable insights about the strategy. Thanks to faster iterations, fine-tuning, and signing of first deals with paying customers, growth can be achieved. This can work very well and the startup develops according to the assumptions and ideas and grows as planned. That

allows the startup to continue pursuing its planned strategy with minor changes, for example, in the product features. In lean startup, this is known as “persevere.” However, this growth might not be enough to build a scalable business model. The originally planned and desired results may not materialize and the assumptions about the growth model may not be confirmed. If success doesn’t materialize, it’s clear that a radical change is needed to save the startup and the founders’ vision. But the startup may also find itself in a situation between “being on track” and having “no prospect of positive results.” The dilemma, here, is that they are too successful to want to give up, but not successful enough to be able to scale with the current course (Ries, 2011; 2017). Often, founders are afraid to make a tough decision because they don’t want to disappoint themselves, their employees, friends, and they have already invested a lot of money in the current business model. But for a successful business, it is necessary to make hard decisions to grow (Ries, 2011).

Time to Pivot

In the learning phase of the build–measure–learn feedback loop, the experiment results are discussed and a decision is made about the development of the project. If these results show that the desired results cannot be achieved despite a much of fine-tuning, the current course should not be continued and a correction should be made (Ries, 2011). Course correction, called a “pivot,” is not about general changes or product optimization (Ries, 2011; 2017). It is “a change in strategy without a change in vision” (Ries, 2017, p. 108). The corporate vision remains the same, but the strategy to achieve it will be changed (Ries, 2017). It is, therefore, a strategy hypothesis that needs to be tested with an MVP. It involves testing new and fundamental hypotheses about the product, business model, or growth engine (Fitria & Fathurachman, 2022; Ries, 2011; 2017). However, since it is not a one-time action, it is necessary throughout the lifetime of a company to repeatedly align the business model for new growth opportunities (Ries, 2011). Established companies have difficulty with this and often miss it because they usually serve a fixed, mainstream customer base and meet their needs with incremental or sustaining product improvements (Christensen, 2016;Christensen & Raynor, 2017).

This is also clear from the 2019 “Future made in Germany” study, according to which, DAX30 companies invest 96 percent of their innovation budgets in internal innovations (incremental innovations through classic research and development) and four percent in external ones (drivers of disruptive innovations through mergers and acquisitions, corporate venture capital, and acceleration), with the latter having a stronger impact on company growth. The international comparison is striking here. Compared with the DAX30 companies, peers from the USA invested twice as much (nine percent) and those from China twelve times as much (50 percent) in external innovations (Hilpert et al., 2022).

Before they reach the mass market in a better developed way, newly emerging, highly innovative products first target customers that incumbents do not serve, e.g., in the lower market segment with less purchasing power or in other markets. Only when the disruptive innovation reaches the mass market and customers migrate from them to the new players do they take notice. It is very difficult to counteract at this late stage (Christensen, 2016;Christensen & Raynor, 2017). However, reacting too late is not the only problem. Innovations can be launched too early when the market is not yet ready for them. This is

what happened, for example, to carmaker General Motors with its first electric car, EV1, which went into mass production in the late 1990s but was withdrawn from the market just a few years and one billion USD later. It should be noted here that not every industry is subject to disruptive innovation to the same degree. This is due to, among other things, the respective barriers to entry, such as economies of scale, switching costs, and regulation in each industry. So, companies have various options for proactively responding to disruptive innovations depending on their circumstances, like their capabilities (Birkinshaw, 2022). They can, for example, develop them in their own company within appropriate structures, through mergers and acquisitions, etc. It all depends on the chosen corporate strategy (Birkinshaw, 2022).

Many companies are characterized by the high quality of their products. Their customers are not used to being offered an unfinished, partially developed product, which would do more harm than good to the company's reputation if they launched it under the familiar brand. Therefore, such companies often resort to establishing innovations of this type under a separate brand (Ries, 2011). A well-known example of not mastering disruptive innovation can be found in the photography industry. Kodak was the world market leader for over 100 years. It was 18th on the Fortune 500 list in 1990, but had to file for bankruptcy in 2012 (Grätsch & Knebel, 2017). The company itself was the inventor of the digital camera in 1975, first launched in 1986, but it underestimated the traction of digital photography and misjudged the corresponding management. Brandtner (2012) analyzed the case of the company to the effect that it would have been advisable to not rely on the branding of the company but to establish its own brand for this purpose as early as the 1990s. One company that has successfully mastered change and pivots to the right time is Hilti. In the 2000s, the company shifted its business model from selling high-quality tools to providing tool fleet management services. During the transition phase to its new business model, the company faced various hurdles, such as convincing the sales staff of the new concept, designing the information technology (IT) systems accordingly, and so on. A decisive success factor for the change of the business model was "a very strong alignment of the executive team at Hilti and staying the course despite internal resistance over a long time period" (Etiemble, 2020, para. 7).

The Business Model Canvas by Osterwalder and Pigneur (2010) is often used as a conceptual tool to design and analyze business models. It maps the complete business model of a company with its strategic core elements in the form of nine building blocks and the value proposition as the central focus (Blank, 2013; Osterwalder & Pigneur, 2010; Ries, 2017). Various authors specify in this context that a pivot means a significant change in at least one of these building blocks, which would be, for example, the case of a customer segment change (Blank & Dorf, 2020; Bortolini et al., 2018; Flechas Chaparro & Vasconcelos Gomes, 2021). When designing and analyzing a business model, Croll and Yoskovitz (2013) propose a flipbook approach that contains the different aspects of a business (acquisition channel, selling tactic, revenue model, product type, and delivery model) and a separate page for each manifestation of these aspects (e.g., different delivery models). Each page change, e.g., from digital delivery to physical delivery, represents a pivot (Croll & Yoskovitz, 2013).

Reasons That Delay a Pivot Decision

Even if it seems obvious that sooner or later every company has to pivot to be successful in the long-term and scale its business model, there are also always reasons that delay these decisions. Ries (2011; 2017) identifies three widely used ones:

1. Use of vanity metrics: Using gross metrics (e.g., total revenues, total number of customers) instead of innovation accounting with actionable metrics (e.g., revenue per customer, activation rate) tempts people to draw the wrong conclusions from the data. These metrics make it difficult or impossible to recognize the need for a pivot, because the focus here is usually on gross metrics that do not provide the insights that are essential for development. It is extremely difficult to implement a course correction in this context (Ries, 2011; 2017).
2. Unclear hypotheses: If the hypotheses on which experiments and learning are based are unclearly formulated, then the results of the experiments are also unclear or ambiguous. Thus, it is also not clear when a pivot is necessary, just when the startup is, somehow, successful (Ries, 2011).
3. Fear of failure: Admitting failure can drive the mood and morale down. Yet the founders' greatest fear is usually not that their vision will prove to be a failure; they fear much more that the vision will be seen as a failure without ever having had a real chance to prove otherwise (Ries, 2011).

Basis for Strategic Decisions – The Innovation Accounting and Milestones in the Learning Process

Vanity metrics with gross metrics do not provide decision support for the iterative development of the highly innovative products, nor for regular pivots. For this, actionable metrics are always used that quantitatively map the leap-of-faith assumptions (Ries, 2011; 2017). There could be much measurement (e.g., for later use), but it is recommended that one limit oneself to the essential factors that are crucial for success, the key performance indicators (Croll & Yoskovitz, 2013; Ries, 2011; 2017). Especially for startups in their early phases Croll and Yoskovitz (2013) suggest to focus on one essential metric that is meaningful in the current situation, also called "one metric that matters," to conduct the respective experiments more effectively and be able to target them to learn from them quickly. Otherwise, one might lose focus and sight of the big picture. This "one metric that matters" changes over time, depending on the current focus of the company's development. For example, if the focus is currently on customer acquisition, then an ideal metric might be one that relates to the analysis of the respective marketing channels or the conversion rate. Then, if one is interested in retaining returning customers, the **churn rate** could be looked at more closely and experiments could be conducted with this in mind (e.g., reactions to price changes). Later, when the company is larger and equipped with more staff, more experience in analytics etc., more metrics can be focused and managed accordingly (Croll & Yoskovitz, 2013). For a decision, the quantitative forecasts defined at the beginning of the project are compared with current developments. The milestones in the learning process provide warning signals for a course correction. If the actionable metrics in innovation accounting show that sales are declining despite various fine-tuning efforts, or if the metrics are improving but not well enough to build viable business mod-

Churn rate
The churn rate describes the ratio of customers who no longer use a company's product or service to the company's total customers, based on a specific period of time, e.g., one month or one quarter.

els with the current strategy in the foreseeable future, it is an indicator for a pivot. It should be noted that, with all course corrections, a new innovation accounting cycle also begins (Ries, 2011).

However, there is a risk of relying solely on data and operating in a purely data-driven manner. The risk lies in that computers and tools can only identify optimization potential within their defined frameworks. Human intellect, conversely, enables a view of the bigger picture and beyond, which opens entirely new possibilities. If, for example, you were to tell a computer program to construct an ideal arrangement for a vehicle with three tires, it would probably result in a top-optimized tricycle. But it would not be formulated with the thought that with four tires, perhaps a much better vehicle could be built, with which more customers could be addressed. The solution, then, is to work in a data-informed way, which is in line with the basic idea of lean startup to realize one's corporate vision on a grand scale through validated learning (Croll & Yoskovitz, 2013).

Regular Strategy Meetings for Efficient Decisions

It is a logical consequence that a startup innovating under extreme uncertainty will, at some point, find itself in the situation of deciding whether it can maintain its strategy or whether it needs to change it. Regular strategy meetings can significantly simplify the decision-making process and make it more efficient (Ries, 2011; 2017). There are a few points to keep in mind:

- regular meetings: When regular discussions and decisions about the ongoing project take place, a pivot decision should not be emotionally charged when it comes unexpectedly and the pet project is canceled or some stakeholders feel guilty for not giving it their all (Ries, 2011; 2017).
- presence of all involved: A pivot is an extensive change. Therefore, it is necessary that all people involved from product development and the management team attend the strategy meetings. Often, it is also a good idea to bring additional external consultants for an objective view (Ries, 2011).
- continuous reporting: At the strategy meeting, product development reports on the results of all its optimization attempts since the start of the project compared with the expected results. The leadership team reports on discussions with existing and potential customers (Ries, 2011).

Often, however, not everything is immediately thrown overboard and restarted completely from scratch. What has been learned and developed so far is often only embedded in a new context (Ries, 2011).

Various Methods of Pivots

There are several ways to make a pivot and test a fundamental new hypothesis regarding customers, markets, and growth engines (Ries, 2011). Ries (2011) presents a catalog of pivots in his book, as discussed in the following paragraphs.

“Zoom-in pivot”

In this type of pivot, a single original product feature that was part of the overall product becomes the new product (Ries, 2011, p. 173). For example, the company Flickr originally started with an online multiplayer role-playing game called “Game Neverending.” The game proved to be unsuccessful. However, it did include a photo-sharing feature that allowed players to share photos during the game and save them to a website. This was the most popular feature among the players and the company decided to turn it into a complete product, successfully known today as Flickr (Bajwa, 2020).

“Zoom-out pivot”

In this case, the previous product is developed as a feature of a broader product (Ries, 2011). This is the case, for example, with Instagram, which has evolved from a photo-sharing platform to a social media platform with video content, shopping, and messaging (Clark, 2021; Fitria & Fathurachman, 2022).

“Customer segment pivot”

This pivot is made when it turns out that the product solves the problems of a certain customer group, but not the customer group that was originally intended as the target group. In the context of early adopters, this pivot becomes clear. This customer group likes undeveloped MVPs and demands them accordingly. But the early adopter market is eventually tapped out. However, the target group in the mainstream market that the product was originally intended to address is more demanding and has different requirements for the product. So, a real problem is solved, but for a different customer group than planned (Ries, 2011, p. 173).

“Customer need pivot”

It often turns out that the problems the startup is trying to solve are not as important to the customers as assumed. However, the close contact and learned knowledge about them makes it possible to solve other problems, either by doing a bit more than just repositioning the existing product or by creating a completely new product for them. In this case, the customer is clear, but the problem is different than previously thought (Ries, 2011). An example of this is Potbelly Sandwich Shop, a sandwich chain that started as an antique store offering sandwiches to increase customer traffic. This part of the business was so successful that the company turned to this, a completely different business from the original one (Fitria & Fathurachman, 2022; Ries, 2011, p. 173).

“Platform pivot”

In this pivot, a single application is converted into a platform or vice versa. This is often the case when startups actually want to create a platform, but initially sell a **killer application** for their later platform. Over time, this platform is also used by third parties to sell similar products on it (Ries, 2011, p. 174). The company appMobi (formerly Flycast) made

this pivot when it first designed a mobile application for iPhone, Android, and Blackberry, but then developed tools to help others develop cross-platform mobile applications (Bajwa, 2020; FlyCast, 2010).

Killer application
A killer application is an application that helps an existing, but largely unknown or unused, technological solution to achieve a breakthrough.

"Business architecture pivot"

This pivot is based on Geoffrey Moore's assumption that companies usually align themselves with one of two business architectures: Either it sells low volumes at high margins, as is often the case in the business-to-business sector, or it sells high volumes at low margins, as is usually the case in the business-to-customer sector. In this pivot, the company changes its business architecture, as Google, for example, did with its search app when it moved from high margins and low volumes to the mass market (Ries, 2011, p. 174).

"Value capture pivot"

With this pivot, the company changes the way it creates value. In addition to the changes to the product, such a pivot often also has massive effects on the entire company and the marketing strategies as a result (Ries, 2011, p. 175).

"Engine of growth pivot"

Later in this unit, you will learn about the three engines of growth: sticky, viral, and paid. In this pivot, a company changes its growth strategy and chooses a different growth engine that allows it to grow quickly and profitably. Often, this pivot is also accompanied by a change in value creation (Ries, 2011, p. 175).

"Channel pivot"

The selected sales or distribution channels usually determine, among other things, the price of the product and the competitive structures. If a company changes its sales or distribution channels to be able to sell its products more efficiently, this is known as a channel pivot (Ries, 2011, p. 175). This was the case, for example, when newspaper publishers switched from formerly complex traditional distribution structures to online distribution over the internet (Ries, 2011, 2017). Or, when the company Site59 was unsuccessful with its idea of selling last-minute vacation packages directly to end customers, it then handled its sales via vacation portals and airlines (Bajwa, 2020).

"Technology pivot"

Such a pivot is often seen in established companies when they achieve the same solution to a problem with a different technology. These tend to be incremental innovations in which customer segments, customer problems, sales structures, and value creation models remain untouched. Existing customers are, thus, from their perspective, served further and possibly better (Ries, 2011, p. 176).

Other types of pivots can be found in the literature and in practice. For example, in addition to product-oriented pivots, market zoom-in, market zoom-out, or the pivot to a side projects may prove to be more successful than the main project (Bajwa, 2020). In addition,

different types of pivots are often performed at different product development times (Bajwa et al., 2016; Bajwa, 2020). In order to structure the process of pivoting, the Business Model Canvas by Osterwalder and Pigneur (2010) can be used to support the analysis of the business model and the search for a suitable pivot (Flinchbaugh, 2018).

Pivot and persevere decisions serve to grow the business (Ries, 2011). You will learn how to drive growth in the next section.

5.2 Engine of Growth

On completion of this section, you will be able to explain how the three growth engines work and how they can be used effectively for sustainable growth.

Short-Term Versus Sustainable Growth

Initial success and evaluation via classic approaches with gross and vanity metrics often fail to reveal that companies "bumble along in the land of the living dead" (Ries, 2011, p. 114) and no significant growth is possible with the chosen strategy. Marketing campaigns and other actions can achieve short-term growth, but sustainable growth requires growth engines (Ries, 2011, 2017). Based on the rule "new customers come from the actions of past customers" (Ries, 2011, p. 207), there are four sources of how the behavior of past customers can enable sustainable growth (Ries, 2011):

1. "Word of mouth" (Ries, 2011, p. 208): Enthusiastic customers motivate others to use or buy products. This often takes place in the private environment (Ries, 2011; 2017).
2. "As a side effect of product usage" (Ries, 2011, p. 208): Through the public perception of trends, as in the automotive or fashion industry, or in the use of viral products, such as Facebook or PayPal, potential new customers automatically interact with the product through the simple use of the product by current customers (Ries, 2011; 2017).
3. "Through funded advertising" (Ries, 2011, p. 208): Companies invest part of all of the revenue they generate with their existing customers in advertising activities to acquire new customers (Ries, 2011).
4. "Through repeat purchase or use" (Ries, 2011, p. 208): In addition to products that are designed for one-time use, such as wedding planning or home construction, there are products that are designed for repeated use, either in the sense of subscription models, as with streaming providers or magazines, or for regular one-time purchases, such as with food or batteries (Ries, 2011).

These sources drive different growth engines. In simple terms, it can be stated that the faster the respective growth engine turns, the faster the company grows (Ries, 2011).

Three Engines of Growth

Lean startup distinguishes between three different growth engines, each of which can be managed using a specific set of actionable metrics and driven in feedback loops (Croll & Yoskovitz, 2013; Ries, 2011; 2017):

“The sticky engine of growth” (Ries, 2011, p. 209)

According to Croll and Yoskovitz (2013), “the sticky engine focuses on getting users to return and to keep using your product” (p. 47). Thus, the goal of this growth engine is a high customer retention rate (Moogk, 2012; Ries, 2011). To drive this engine, products are improved for existing customers in order to retain them as long as possible and increase customer loyalty to the company and its products (Ries, 2011). The company specifically monitors the customer churn or turnover rate, i.e., whether customers stop using the product at some point or cancel their contract in the case of subscription models, for example. For the company to grow, the rate of new customer acquisition through word-of-mouth must be higher than the churn rate (Buturac et al., 2020; Ries, 2011; 2017). The growth rate depends on the average growth rate of the company, i.e., the natural growth rate minus the churn rate (Moogk, 2012; Ries, 2011). The higher the average growth rate, the faster the growth (Ries, 2011). This growth engine is often seen in mobile operators or software giants, such as Microsoft. This is because high customer retention rates are usually accompanied by the lock-in effect, which is characterized by high **switching costs** (Ries, 2011). Word-of-mouth also plays into this growth engine when enthusiastic customers motivate others to buy or use (Ries, 2017).

Switching costs
Switching costs are the costs or disadvantages that arise for a customer because of switching to another provider. They can be of a financial or non-financial nature (e.g., time expenditure) and make switching more difficult.

“The viral engine of growth” (Ries, 2011, p. 212)

In this growth engine, the company’s customers account for most growth activities. However, this is not done by word-of-mouth but as an automatic side effect of using the product (Ries, 2011; 2017). This does not work for all products but is the case, for example, with social networks or even Tupperware (Moogk, 2012; Ries, 2011). The viral growth engine is driven by a quantifiable feedback loop, the viral loop. Here, the speed of growth depends on the viral coefficient, which expresses the number of new customers an existing customer brings (Buturac et al., 2020; Ries, 2011). The higher this coefficient is, the faster the engine turns and the faster the product spreads. For example, if it is 0.1, this means that, on average, every tenth customer brings in a new customer. If it is 1, then, on average, each customer brings one more. It quickly becomes clear that exponential growth occurs with a viral coefficient greater than 1 (Ries, 2011).

So, the goal with this growth engine is to increase the viral coefficient. Often, these products are not priced so that any costs for users do not hinder distribution. Revenue is then generated, for example, via advertising revenue with the product or on the platform of the social network. If the products are priced, as is the case with Tupperware, for example, then the pricing is not the growth driver, but only an indicator of the value of the product (Ries, 2011).

“The paid engine of growth” (Ries, 2011, 215)

In this growth engine, the revenue generated with existing customers flows back into advertising activities to acquire new customers (Ries, 2011; 2017). To drive this engine, either customer sales must be increased or acquisition costs, i.e., the costs of acquiring new customers, must be reduced (Ries, 2011). Two key performance indicators are relevant here. One is the customer lifetime value (also known as contribution margin), which represents the amount a customer pays for a product over the course of his or her cus-

tomer lifetime (discounted to the point in time under consideration). The other key figure is the cost of acquiring new customers, known as cost per acquisition. The difference between customer lifetime value and cost per acquisition is called marginal revenue. It represents the **revolutions per minute** of this growth engine (Buturac et al., 2020; Moogk, 2012; Ries, 2011). If it is positive, growth takes place; if it is negative, growth slows down (Moogk, 2012; Ries, 2011). Short-term activities to increase growth are ineffective here because they only work in the short-term and do not lead to a sustainable increase (Ries, 2011).

Revolutions per minute
The term revolutions per minute (rpm) represents a frequency unit that is used to measure the rotational speed of motors or hard disks, for example.

For example, if it costs $100 to place an ad and 50 customers are acquired, then the cost per acquisition ($100/50 customers) is $2. For a positive marginal return, the customer lifetime value must, therefore, be higher than $2 (Ries, 2011). This is very brief, as other costs are also included in the cost per acquisition (Ries, 2011).

Growth and the Product/Market Fit

When a startup solves a real customer problem with its business idea, the "problem/solution fit" is given. The idea was iteratively developed into a product (or MVP) that is in demand by early adopters (Still, 2017; Karia et al., 2022). Now, every company longs to find a large customer segment willing to pay and they literally snatch the product out of its hands. This state is called "product/market fit". If you are uncertain whether you have found it, you have not yet reached it. The growth engines provide a clear picture of this. Since they are based on metrics, it is also possible to evaluate how close the company is to the product/market fit (Ries, 2011, 2017).

If, for example, the viral coefficient for the viral growth engine develops to 0.9 during the fine adjustments, then it can be assumed that the startup is close to breakthrough. In combination with innovation accounting, growth engines also provide guidance for product and business development activities (Moogk, 2012; Ries, 2011). For example, a startup with a viral growth engine focuses on actionable metrics related to customer behavior. Metrics related to new customer acquisition through promotional activities, which are powerful in the case of a paid growth engine, are not as relevant in the case of a viral one. So, to find the right path to product/market fit, the growth engine is readjusted after each run of the build–measure–learn loop using innovation accounting. However, each customer segment is exhausted at some point and the growth engine loses momentum (Ries, 2011).

The simultaneous use of several growth engines in one business area is possible, but difficult to implement. The expertise required for such a documentation, evaluation, and control of the respective effects is usually lacking, which makes targeted action much more difficult. Therefore, startups, in particular, are recommended to focus on one growth engine (Buturac et al., 2020; Croll & Yoskovitz, 2013; Ries, 2011). In their leap-of-faith assumptions, they have usually described a growth engine that could work for their venture. If this is not the case, this can often be found out in customer discussions or similar. Only when one growth engine has been used successfully should you think about switching to another. Incidentally, it is not absolutely necessary to adapt the growth engine when changing customer segments, for example, if the existing growth engine pays off when the change is made (Ries, 2011). However, depending on the company, product, and

industry, different growth engines can make sense at different times or in certain company growth phases, and can be selected and managed accordingly. For example, the sticky engine of growth can be used first to build an initial stable customer base, then to grow on that basis with the viral engine of growth, and then drive further growth with the paid engine of growth (Croll & Yoskovitz, 2013). This should all be checked with the help of the innovation accounting and the respective metrics of the growth engines (Ries, 2011).

Strategic Partnerships as Additional Drivers

In practice, it has been shown that the conclusion of strategic partnerships is also important for the expansion of distribution networks, for the creation of network effects, complementary products, and licensing and, thus, for sustainable growth. This involves finding initial customers, understanding them, serving their market segment, and then gradually growing into other segments with strategic partners (Sarasvathy, 2022).

To open new growth areas, however, a company must be able to deal with rapid and unexpected change. You will learn in the next section how such an organization can look and be built.

5.3 An Adaptive Organization

Throughout this section, you will be able to learn how structures look and can be built for an organization that can handle rapid and even unexpected change – called an "adaptive organization." You will first experience what is meant by adaptive organization, what can hinder growth, and then what is needed for fast learning and adaptive growth.

Concept of Adaptive Organization and Problems of a Growing Organization

To achieve sustainable growth, an organization that can cope with changing conditions must prevail. In lean startup, this construct is called an "adaptive organization," "one that automatically adjusts its processes and performance to current conditions." (Ries, 2011, p. 227).

However, there are various circumstances that hinder business growth. Ries (2011) names three that are frequently encountered in practice, but there are also many others:

1. Too much bureaucracy: Companies tend to want to be prepared for all eventualities and to act increasingly professionally. This usually leads to more bureaucracy, slows processes, and increasingly hinders product launches as well as the necessary fast turning of the build–measure–learn loop and growth engines (Ries, 2011).
2. Friendster effect: This term refers to a serious technical glitch that occurs just when customer acceptance has reached its peak (Ries, 2011).
3. Vague planning and lack of a basis for decision-making: If planning is inadequate, it is almost impossible to clearly prioritize potential problems. As a result, there is no solid basis for decision-making and the decisions made by managers seem arbitrary, which lowers employee morale and increases insecurity. Managers usually take compro-

mise-driven decisions, which sets off a vicious spiral. In the process, the employees involved tend more and more to make extreme demands so that the compromise ultimately chosen is as close as possible to them and their actual objectives. Over time, the demands become more and more polarized and the decisions become increasingly inefficient and unproductive (Ries, 2011).

Small Batch Sizes Accelerate Validated Learning

Batch size is a key feature of the lean startup method. It indicates how many workpieces are transferred from one workstation to the next. Even though large batch sizes promise a supposedly faster finished work result, errors and discrepancies are often noticed very late and the effort to correct them is relatively high. With a batch size of 100 sheets of metal, for example, a defect in the "punching" step might only noticed in the "welding" step, after they have already been punched. With a batch size of one, conversely, the error can be noticed immediately after the first sheet has been punched. Small batch sizes, thus, allow quality problems to be identified more quickly. They accelerate validated learning and allow the build–measure–learn loop to run faster. This approach, also called one or single-piece flow (originating from lean manufacturing), contrasts with achievable economies of scale as they occur in mass production. For startups, however, the aim is to obtain rapid customer feedback by reducing batch sizes and pass through the build–measure–learn loop faster than the competition (Ries, 2011).

Quality Versus Speed

The startup runs through the build–measure–learn feedback loop faster and faster before the resources available to it are used up. It constantly improves the product and, for example, adds new features or removes irrelevant ones for the customer. In doing so, however, it also runs the risk of incompatibilities, of volatile errors occurring, and, thus, of quality being lost. Speed maximization should be treated with caution. It is, therefore, important to find the ideal working speed for the startup. Speed regulators can be used for this purpose. Coming from the **Toyota Production System**, lean startup uses the "Andon-Cord." Here, work is interrupted immediately if a problem is noticed that cannot be solved at once. If work were continued instead of being interrupted, it could result in serious consequences, such as rework and customer complaints, and the flow of work would be noticeably slowed down (Ries, 2011).

Toyota Production System
The Toyota Production System is a production concept that originated at Toyota. It is based, among other things, on the principles of continuous improvement and is considered the basis for what is now known as lean production.

The topic of speed also plays a role in error prevention. At first, preventive activities mean a slowdown, but as soon as they pay off and quality increases, the startup automatically gains speed again (Ries, 2011).

Identification and Elimination of Problems: The 5-Why Method

Problems of all kinds endanger the success of a company. It is, therefore, important to eliminate them as quickly as possible and, ideally, prevent them from occurring in the first place. In doing so, one should not be satisfied with superficial solutions, since the actual problem is not remedied. The root cause should always be sought (Ries, 2011). To be able to identify the original trigger for a problem across departments and across the company, the "5-Why" method, which originates from the Toyota Production System, can be used. In

this method, the problem is analyzed successively by asking successive “why” questions, with each question forming the basis for the next question and, thus, enabling the cause-effect path to be traced (Rahmana et al., 2021; Ries, 2011). Even though the method is called the 5-Why method, more or fewer questions than five questions may be needed to find the cause of the problem (Hamoumi et al., 2021).

When the method is used, it often becomes apparent through repeated questioning that an ostensibly technical problem turns out to be a human error that can be remedied through appropriate training measures and work instructions. This method helps build an adaptive organization because, depending on the scope of the problem, it is possible to invest proportionally in preventive measures. Thus, this method represents a natural speed regulator because a large investment in fixing major problems leads to a reduction in the number of problems, which, in turn, increases the speed of the workflow. However, this does not only apply to technical problems. Startups can also use this method when they want to learn from failures, such as why business results did not meet expectations or why customer behavior changed unexpectedly. In combination with small batch sizes, it provides a solid basis for responding to problems without making large investments and without time-consuming, uncoordinated tinkering with solutions (Ries, 2011).

Introduction and Implementation of the 5-Why Method

The introduction of the 5-Why method is often viewed critically because an investment in prevention usually ties up resources that are then no longer available for product development, even if the method ultimately saves the company time and money. Therefore, it is essential that everyone involved in the 5-Why method believes in it for it to be successful. All managers must stand behind it at each of the “why” levels and, if necessary, act as referees should disagreements or recriminations arise. To avoid blame, all those affected should always be present during the analysis. It is absolutely essential that the environment is characterized by mutual trust and offers employees opportunities for discussion (Ries, 2011).

The 5-Why method should start with addressing small problems so the team can learn the method without everything being immediatley at stake and the analysis ending in recriminations. Only when initial experience with the method has been gained should larger problems be tackled step by step. The problems must always be clearly formulated and specific so that the 5-Why method can be used successfully. For example, if there are problems with customer payments, a subset of payments should be looked at first, such as credit card payments. Then other subgroups or other problems related to customer payments can be successively analyzed. The sessions in which the method is applied should always be kept as short as possible and include simple solutions. It is also advisable to appoint a moderator to lead the sessions, decide on preventive measures and assign tasks accordingly. They need the necessary decision-making authority for this and are responsible for the results (Ries, 2011).

There is a simpler version of the 5-Why method that is useful for beginners to train their minds for the method and get to the bottom of problems. There are rules that train fault tolerance and allow proportional investment in prevention:

1. “Be tolerant of all mistakes the first time” (Ries, 2011, p. 236): Here, it is a matter of dealing sensitively and tolerantly with errors caused by employees for the first time, so that a foundation of trust can prevail in the company. In most cases, the errors are not directly attributable to the employees themselves. In most cases, work instructions, for example, are incomplete, misleading, or otherwise inadequate (Ries, 2011).
2. “Never allow the same mistake to be made twice” (Ries, 2011, p. 236): To ensure that the errors remain unique and do not happen again, measures must be taken to prevent their repetition. This rule motivates and helps the company invest proportionally in error prevention (Ries, 2011).

Structures for Long-Term Innovation Capability

Certain structures are necessary for a company to innovate in the long-term; startups usually have them by nature. In established companies, the internal startups need the support of the management for this (Ries, 2011; 2017). Ries (2011) names three essential structural attributes:

1. “Scarce but secure resources” (p. 254): Only little capital is required for fast learning with low error tolerance.
2. “Independent development authority” (p. 254): The ideally cross-functional innovation team must be allowed to independently develop the business model. Lengthy approval processes slow down the build–measure–learn loop and impair learning successes, independent thinking, and behavior.
3. “A personal stake in the outcome” (p. 255): In established companies, personal interest in the result is often stimulated by shareholdings or by a financial or non-financial bonus system (such as status gains or name recognition for successful projects). It is important here that the incentive system is communicated clearly, objectively, and transparently within the company.

Companies must, therefore, provide their innovation teams with an appropriate framework.

Establishment of a Growth Board and an Innovation Sandbox

For sustainable growth and long-term innovative strength, highly innovative projects must be managed. In an established company, this task can be performed by a growth board, which acts similarly to a venture capital fund. It consists of a permanent team that uses innovation accounting techniques to regularly evaluate the project progress of internal startups and make financial decisions (Ries, 2017).

Ideally, the internal startups are housed in an “innovation sandbox.” In this, the autonomous teams are not restricted in their working methods, but their impact is limited. If possible, cross-functional teams should be formed, each with a team leader who are allowed to develop and market independently and without additional approval steps. Project progress is reported using actionable metrics and innovation accounting. Sandbox experiments with real customers and small batch sizes enable rapid iterations, measurable suc-

cesses, and ensure validated learning. Once a viable business model is found, it can be integrated into the parent organization (Ries, 2011) or, if more appropriate, transferred into a new company of its own.

One problem that often arises when a new product from the sandbox is integrated into the company's product portfolio concerns how usually, the employees also move to the next phase (e.g., series production) with "their" product. This results in a lack of creative employees for the sandbox. One solution would be to pass on the products like a baton and to leave the employees of the autonomous startups free to decide whether they want to follow their product and continue supporting it or whether they want to remain in the sandbox for new tasks (Ries, 2011).

Over time, the sandbox will expand its scope within the company and, eventually, the company's products will fill the entire sandbox. Then it will be populated with constraints and rules that are essential to mission-critical activities but hinder the way the sandbox works. Eventually, "the former innovators will become guardians of the status quo" (Ries, 2011, p. 268). Then the cycle starts again and it is time for new innovation teams in a new sandbox (Ries, 2011).

SUMMARY

Changes are, of course, indispensable if a company wants to build a sustainable business model and grow, because "successful pivots put us on a path toward growing a sustainable business" (Ries, 2011, p. 150). At the same time, there are always reasons that delay this decision. But by using innovation accounting, the timing quickly and objectively becomes clear. Regular strategy meetings help avoid suppressing or pushing out decisions and crediting the development. They also allow for a routine that supports learning from hard decisions. After all, it is not always necessary to throw everything you have learned overboard right away, because there are many ways to pivot.

For the startup to grow sustainably, it is necessary to find the appropriate growth engine and to analyze and optimize it using the respective metrics. By using the respective metrics, it soon becomes apparent whether it makes sense to pivot to achieve the product/market fit for a scalable business model.

However, to be successful in the long term (even in an established organization) and be able to cope with rapid, unexpected change and react proactively, the startup must learn to build an adaptive organization with appropriate structures, methods, and speed regulators.

UNIT 6

LEAN STARTUP: USE CASES

STUDY GOALS

On completion of this unit, you will be able to ...

- understand the necessity and difficulties of customer interviews and how companies deal with them successfully in practice.
- explain what hurdles there are in establishing two-sided markets and how they can be overcome step-by-step in practice.
- learn from a current practical example how established organizations successfully used the lean startup method to innovate in a customer-centric way and reduce time-to-market.

6. LEAN STARTUP: USE CASES

Introduction

Since its birth in 2008, the use of the lean startup method has enjoyed ever-increasing prevalence in practice and academia (Bortolini et al., 2018; Hampel et al., 2020; Yordanova, 2021). Many large, established companies have also recognized the need to create a special framework for highly innovative and disruptive projects. In this context, this method is often seen as a building block within an innovation method box that can be combined with others.

For the method to be used successfully, it must be integrated into the structures of the respective company and anchored in the thinking of the employees. For example, the business model of a company, the target groups it serves, the industry in which it operates, and the prevailing innovation and competitive pressures – to name just a few influencing factors – all play a significant role.

In the following sections, you can expect various use cases, from Lean Startup Consulting, Caterpillar, and Pivotal Labs, to DuProprio and Bosch, which will help you gain insight into the use of the method in practice.

6.1 Lean Startup Use Case 1: The Problem, Solution, and MVP Interviews

On completion of this section, you will be able to understand the necessity and difficulties of customer interviews and how companies deal with them successfully in practice.

Talking to Customers

Startups still use classic methods for the development of innovative products and scalable business models. However, these offer an approach that is generally designed for incremental product innovations and an environment with known customers and markets and not for innovating under high uncertainty and difficult planning, as is the case with startups (Blank, 2020; Ries, 2011; 2017). This also includes the use of a business plan. It may have its *raison d'être*, because when creating it, founders deal intensively with their business idea, draw a baseline for their expectations, and can, thus, convince investors. But it is based on rigid assumptions that do not allow for any deviation. Not only is deviation essential for startups due to their constant learning and development process (Ries, 2011), but it also suggests a wrong approach. Often, founders start by developing the product before approaching customers with it. In the meantime, they are so convinced of their product that they often cannot take negative customer feedback constructively and do not adapt their product accordingly, or they have invested all resources in a product that finds too few customers (Ritika, 2015).

Lean startup turns the procedure around and, thus, precisely counteracts the problem of developing a product that ultimately solves no customer problem and finds no buyers on the market. Here, customer feedback is obtained even before the product is developed, which greatly increases the chances for the startup to be successful with it – and it is faster and cheaper (Ries, 2011; 2017; Ritika, 2015). According to Ries (2011), "the first step in this process is to confirm that your leap-of-faith questions are based in reality, that the customer has a significant problem worth solving" (p. 88). Blank (2020) points out what needs to be done: "get out of the building and talk to customers" (p. 92), either physically or metaphorically.

However, this is easier said than done. The founders often do not know where their potential customer group is located and which people they should ask. At the same time, the customer problem is often formulated so vaguely that it covers the entire market and not a segment that would allow for development and learning. Also, the fear of negative, harsh criticism toward their "baby" prevents effective learning (Lean Startup Co., 2014). Further, many do not know how to design and conduct the interviews and experiments to gain the insights needed to develop the product (Ritika, 2015). This often involves confirming false assumptions with suggestive questions or making sales pitches at the outset, rather than using clever questioning techniques to uncover the deep-seated customer problem with potential target customers (Fitzpatrick, 2013; Ritika, 2015).

The way to conduct customer interviews and how to formulate non-intrusive questions while still obtaining rich information can be learned. There are a few authors who specifically address this topic, such as Fitzpatrick (2013) in his book *The Mom Test,* Portigal (2013) in *Interviewing Users: How to Uncover Compelling Insights*, and Constable (2014) with *Talking to Humans*. Throughout the rest of this section, you can expect to see a few use cases of how companies approach the topic of customer interviews in the innovation process.

Use Case: Customer Development for the Lean Startup Conference

Erik Ries, the founder of the lean startup method, launched a consulting firm called Lean Startup Consulting to help companies with their innovative ventures (Lean Startup Co., 2022b). They are the leading consulting company that trains businesses, government agencies, and non-profit organizations on innovation, modern management practices, and how to use the lean startup method; moreover, they help founders systematically develop their business vision into a successful enterprise. Lean Startup Consulting offers an online media library and events with topics related to lean startup (Lean Startup Co., 2022a; 2022b). Their mission statement is "equipping teams to systematically vet, shape and de-risk new business ideas" (Lean Startup Co., 2022a, Mission Statement).

To plan their annual lean startup conference, the team uses a customer development approach to design an attractive program for attendees early on. Each January, the core team conducts 45-minute phone calls with past conference attendees, more than 10 months before the next conference, to reflect the content from the last one and find out if they gained the knowledge expected from attending. They also continuously talk to potential customers and new community members about their problems and needs. This brings two benefits. First, it allows them to ensure that their product (conference) is

aligned with the needs of customers (attendees) and continues to evolve. Second, they develop a product that provides the greatest benefit for their customers (Lean Startup Co. Education Program, 2015).

To ensure a continuous learning process and minimize the team's effort, the customer base is broken down into four broad groups. Each team member interviews 1–2 customers per week and records their notes in a shared Google spreadsheet. Particularly exciting insights are also immediately shared with the team via the web-based instant-messaging service for working groups, Slack. Once initial themes for the conference are identified, a full analysis is done across all groups with the goal of identifying content, tools, and services that will be tested. Testing is iterative using content experiments. In the process, more than 50 blog posts, podcasts, and webcasts represent the minimum viable products (MVPs) throughout the conference preparation until November.

This is all used to test customer responses, for example, which content is shared and how often, which leads to how many signups, etc. This brings further adjustment to the MVP. Different ways are also used to validate assumptions, like surveys after a sign-up, interactions on Twitter, etc. Thus, conference program development is a continuous iterative process with ongoing customer feedback (Lean Startup Co. Education Program, 2015).

Use Case: Lean Innovation at Caterpillar

Caterpillar, having earned sales revenue of $51.0 billion in 2021, is the world's leading manufacturer of construction and mining equipment, off-highway diesel and natural gas engines, industrial gas turbines, and diesel-electric locomotives (Caterpillar, 2022a). It employs 107,700 full-time employees and has a global dealer network with 160 independently owned dealers serving 193 countries. The company's history clearly reflects its innovation-driven, customer-oriented approach, which is also anchored in its corporate strategy (Caterpillar, 2022b).

The field of activity in the earthmoving department ranges from road construction to the preparation of construction sites for new buildings and material production and all the equipment used there. In this department, the approaches of lean startup are applied under the name "lean innovation." The company already develops and produces according to various lean principles. Lean startup helps the company ensure at the beginning of the innovation development process that they are solving a real customer problem or need and that they are willing to pay for it (Lean Startup Co. Education Program, 2021).

One very successful example was an application to help salespeople find the right machine for their customers. It was usually a very complex process until a tool was created that, among other things, compiled various parameters of the respective customer location to show the customer options while giving salespeople the opportunity to make changes based on customer feedback. The customer could then take a printed overview of their options to aid their decision. This application significantly improved the interaction between dealers and customers, which is essential for a relationship-based company like Caterpillar (Lean Startup Co. Education Program, 2021). Customer interviews played a key role in this, as, according to Lean Startup Co.Education Program (2021), "we have to talk to

our customers to better understand what's going on out there so that we can put ourselves in our customer's shoes. It's not just a learning activity, but [it] also helps us design better solutions" (para. 3).

For a new successful design of the models of "track type tractors" for customers in Africa, the Middle East, and Asia, the company relied on small interdisciplinary groups that learned on site from the customer about the problems and challenges of daily work. Logistical and language barriers were an additional challenge that had to be overcome, especially during the interviews (Caterpillar, 2022c). After much positive experience, lean startup principles are now being applied in more groups at Caterpillar. Employees show great interest in the method and personal responsibility in using the principles. They no longer rely exclusively on surveys and focus groups, but increasingly combine them with in-depth customer interviews (Lean Startup Co. Education Program, 2021).

Use Case: Customer Feedback at Pivotal Labs

Pivotal Labs, now known as VMware Tanzu Labs, was founded in 1989 and is a successful software development consulting company (VMware Tanzu, 2022). The content presented here refers to an interview when the company was still known as Pivotal Labs (Lean Startup Co., 2014).

Pivotal Labs had noticed that startups often begin by solving a perceived customer problem and that they wanted to turn their vision into a growing business as quickly as possible. In doing so, the startups tried to satisfy an unmet need, capture an untapped market, or solve customer's personal problems. What was essential was that the startups were not looking for a serious customer problem they could solve with an MVP (Lean Startup Co., 2014).

An example of this is a founder who wanted to offer a diaper delivery service in 35 cities but had not yet delivered a single diaper. She had done market research and developed a three-year business plan but had not validated the need for the service. She hadn't talked to parents or built an MVP where she would buy diapers for first-time customers and use her car to deliver them within a specified time window (Lean Startup Co., 2014).

At Pivotal Labs, there are two phases in the development of the product: user interviews and user testing. The interviews are used to identify the potential customers, understand their demographic background, behaviors, needs, goals, and so on. This is usually done in a sprint with a manageable group of people (about 10) until they have all the relevant information about them and an idea of how to add value to these people's lives with their product. From this information, an MVP is developed and tested with the group. The group is closely observed and questioned during testing about the use and handling of the product (e.g., why they got stuck at one point). Based on the customer reactions and interactions, it is then very easy to deduce if the product solves a real customer problem (Lean Startup Co., 2014).

Interviews and tests with real users are tricky because it takes practice and courage to receive open, harsh criticism for your product and implement it constructively. It is also not so easy to receive necessary harsh criticism, because many people are too polite to

give it. To learn to accept criticism, it helps to first receive criticism on a product that is not your own, so that you are not emotionally invested in it. This helps you get used to the procedure.

For a certain routine and an appropriate portfolio of test customers, a regular schedule is useful. This serves to reduce the anxiety of getting enough people to do the interviews and tests and to present unfinished MVPs. Even if you think the MVP is not yet presentable, you should get into the habit of asking for real feedback as soon as possible because you can learn valuable information for further development at every stage, no matter how small it may be (Lean Startup Co., 2014).

6.2 Lean Startup Use Case 2: Lean Analytics for Two-Sided Marketplaces

On completion of this section, you will be able to explain what hurdles exist in establishing two-sided markets and how they can be overcome step-by-step in practice.

The Specifics of Two-Sided Marketplaces

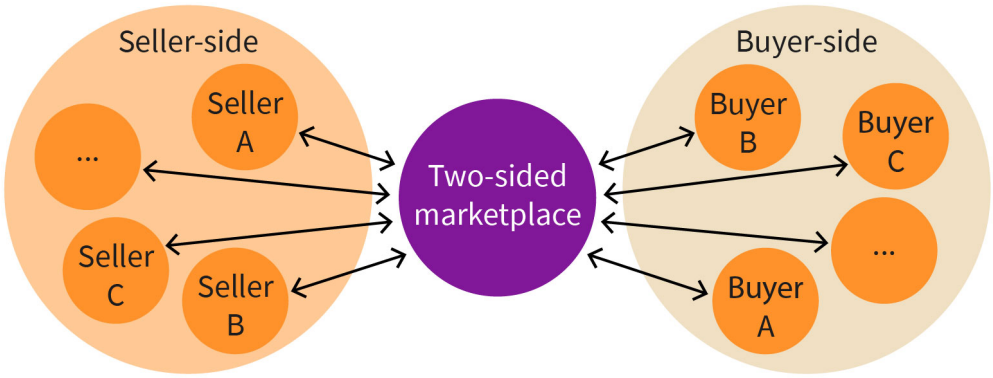
Croll and Yoskovitz (2013) describe various business models for startups, including two-sided marketplaces. They see them as a combination of the business models of e-commerce, because transactions between sellers and buyers take place, and user-generated content, because they depend on the quality and quantity of seller's listings. In this context, the actionable metrics that contribute to the development and growth of two-sided marketplaces are also a combination of the other two models (Croll & Yoskovitz, 2013).

Two-sided marketplaces play an intermediary role by connecting two different, mutually attracting user groups with strong network effects and, often, complementary offerings on both sides, increasing their complexity (Parker & van Alstyne, 2005; Pur et al., 2022). They can only be successful if both sides attract each other. They interact and, consequently, neither side can exist without the other, which is also referred to as the "chicken-and-egg problem" of the platform operator (Croll & Yoskovitz, 2013; Pur et al., 2022; Song et al., 2018). In this context, one side is often treated as a profit center and the other as a loss-maker or as financially neutral (Song et al., 2018). However, a healthy platform can only be effective if both sides receive equal attention (Pur et al., 2022).

Croll and Yoskovitz (2013) define two-sided marketplaces even more narrowly by limiting them to marketplaces where the seller creates and promotes the content and the marketplace operator has a "hands off" approach toward the individual transactions. This is not the case, for example, with a website that only lists broker directories or that creates profiles for its sellers. Moreover, in their view, conflicting interests prevail among buyers and sellers, i.e., buyers want to spend as little as possible, but sellers want to earn as much as possible. On the contrary, for example, dating sites, where both sides pursue the same

interest – finding a partner – are excluded from the definition (Croll & Yoskovitz, 2013). The following figure illustrates the structure of two-sided marketplaces and the interconnection of both sides.

Figure 13: Two-Sided Marketplaces



Source: Sabine Pur (2023).

Case: DuProprio

Now let's look at how lean analytics can look in two-sided marketplaces, using DuProprio as an example.

About DuProprio

Founded in 1997 by Nicolas Bouchard, DuProprio is a broker-free, fixed-fee online real estate assistance service that supports Quebec homeowners with a team of photographers, appraisers, notaries, coaches, etc., to sell their property commission-free (Croll & Yoskovitz, 2013; DuProprio, 2022b). Since its founding, over 344,000 homeowners have sold their properties using the service. The company has over 31,000 properties listed as of 2022 (DuProprio, 2022c) and records over 6 million visits to its site every month as of October 2022 (DuProprio, 2022d). It employs over 500 people and is the most popular real estate website in Quebec (DuProprio, 2022a).

The beginnings with a vision and a static website

The son of a real estate agent, Bouchard helped his father build a website for his real estate business in the early days of the internet. The "for sale by owners" sections in hardware stores gave him the idea to create a real estate website for owners. The first version of their site was static. At the time, possibilities were limited, so he manually searched the classifieds and scoured the area for houses with "for sale by owner" signs and tried to convince sellers to list their properties on the website. In doing so, the only metrics and key performance indicators (**KPIs**) they gathered were the number of signs on the lawns in front of the houses, the ads listed on the website, and a page hit counter. As the internet evolved, Bouchard found sellers and potential customers for his service through other real estate sites (Croll & Yoskovitz, 2013).

KPIs
A key performance indicator is a quantitative metric that expresses progress toward achieving a specific targeted outcome.

From a static to dynamic website and more possibilities in analytics

As his business gained traction, Bouchard switched to a dynamic website in the early 2000s by manually transferring all listings. Then, he allowed sellers to revise their listings themselves via a separate login. Eventually, he added the Webtrends analytics tool, allowing sellers to get more relevant information for their sales, such as how often their listings appeared in search results, how frequently they were clicked, etc. A few years later, a client-login was also implemented, allowing potential buyers to set their own search criteria and receive email notifications when listings matched (Croll & Yoskovitz, 2013). At this point, the company could measure and compare the number of visitors and the number of seller subscriptions. However, what did not yield a reliable metric was that, in this marketplace, the two groups of customers were difficult to delineate. Those who sold a property were also often looking for a new one. Therefore, they decided to work with a rule of thumb in the future: "1,000 visits on a website equals 1 subscription" (Croll & Yoskovitz, 2013, p. 140). They used this rule of thumb as a benchmark for the **conversion rate** and formulated the goal "to generate more conversions per visits" (Croll & Yoskovitz, 2013, p. 140).

Conversion rate
The conversion rate is the ratio between the number of visitors to a website and the number of specific actions they take, for example, the number of visitors who come to a real estate platform versus those who subscribe to it.

Optimizing and detailing analytics

Over time, DuProprio used increasingly sophisticated analytics. In the beginning, they analyzed the conversion rate of visitors coming to their subscription page that listed their different service packages. They watched the conversions and the visitors-to-listings ratio evolve as they adjusted their website. While there was noticeable progress, they were still far from what is known as A/B split testing, which they did later. But, by looking at the visitors-to-listings ratio, they could see if their business was evolving in a healthily. As the marketplace evolved, the company focused on revenue-related metrics, such as the list-to-sold ratio (Croll & Yoskovitz, 2013).

Analysis with Google Analytics

A lot has happened since DuProprio's origins. Using the analysis tool Google Analytics, the company no longer cares so much about the details. Visitor numbers, for example, are constantly increasing but only about five percent of visitors also create an account. As a result, they no longer focus as much on account creation on the buyer side; they look now at new metrics related to search results, **email click-through rate**, and the use of their mobile apps. They also continuously compare their numbers with other relevant real estate agents (Croll & Yoskovitz, 2013).

Email click-through rate
The email click-through rate (CTR) measures how many email recipients who received a particular email clicked on a link within it.

Today's three big goals

Today, the company has three major goals:

1. Convince sellers to list their property with them
2. Convince buyers to subscribe to the notification when a suitable property is listed
3. Mediate the sale of the real estate

The company focuses “on the source of the money” (Croll & Yoskovitz, 2013, p. 141). Here, the number of sales is a key figure. But even more important is the list-to-sold ratio, i.e., the ratio of properties listed versus sold on the marketplace. Even if many properties are listed, the sale is decisive. If no properties are sold, then the marketplace cannot exist (Croll & Yoskovitz, 2013). In their book, Croll and Yoskovitz (2013) go into more detail about the stages startups experience during their development and the relevant metrics in each case.

6.3 Lean Startup Use Case 3: Innovation Framework in Established Companies

On completion of this section, you will have learned from a current practical example how established organizations successfully used the lean startup method to innovate in a customer-centric way and reduce time-to-market.

An Environment for Internal Startups

Established companies usually focus on their existing customers and the associated market to develop their products. However, technological, service-oriented, and other developments are constantly enabling new business models. The opportunities that arise in this context are often seized by startups. At the beginning, a **disruptive innovation** usually serves a niche market and/or the lower segment of the mainstream market. These do not have an attractive target group for the established companies and are not or are hardly served by them. Established companies, also called incumbents, only notice the disruptive innovation when it gains traction and penetrates their mainstream market, leading their customers away. For this reason, it is essential for established companies to deal with the topic of disruptive innovation and their development in their own company (Christensen, 2016;Christensen & Raynor, 2017). At the same time, large companies have completely different requirements for the allocation of resources and the planning of the project portfolio than a small start-up that has only one product. For the long-term competitiveness of a company, ambidexterity is crucial; in other words, the ability to be simultaneously efficient by improving existing products and processes, as well as innovative and flexible by opening up new business areas (Chesbrough & Tucci, 2020). For established companies to identify new business areas and grow continuously with different types of innovations, appropriate structures and clear responsibilities are required (Blank, 2013; Ries, 2011; 2017). Lean startup offers a promising approach with the internal startups in the innovation sandbox and the growth board that manages them (Ries, 2011; 2017). In the following use case, you can see how an established company successfully addresses the topic of innovation with lean startup.

Disruptive innovation
A disruptive innovation includes a completely new set of features (usually better usability, other features, lower price, etc.) and serves customers outside the main market of the established companies. Through product improvement, it enters the main market over time, with the goal of displacing the solutions of the established companies.

Innovation Coaching at Bosch Power Tools

Let’s look at Bosch as an example of how an innovation framework can look in an established company.

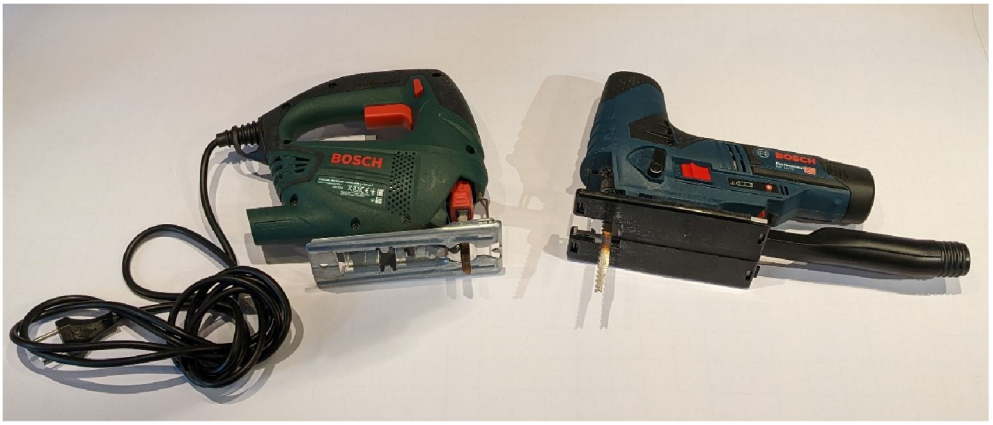
About the Bosch Group and the Power Tools Division

Robert Bosch GmbH was founded in 1886 by Robert Bosch as a workshop for precision mechanics and electrical engineering. Since its beginning, it has been characterized by innovative strength and social commitment (Bosch, 2022b, para. 1). In this regard, the special ownership structure of Robert Bosch GmbH ensures the entrepreneurial independence of the Bosch Group, which enables long-term and innovation-oriented entrepreneurial planning (Bosch, 2022a).

The Bosch Group has grown into a leading international technology and services company, employing some 402,600 associates in more than 60 countries and regions worldwide (Bosch, 2022c) and generating sales of 78.7 billion euros in fiscal year 2021. Its activities are divided into four business sectors: mobility solutions, industrial Ttchnology, consumer goods, and energy and building technology. In addition to the BSH Home Appliances division, the customer goods business sector also includes the power tools division (Bosch, 2022a), which we will explore in more detail in this use case.

Bosch Power Tools develops, manufactures, and sells power tools and power tool accessories for trade and industry as well as do-it-yourself and garden (Bosch Power Tools, 2022a). With sales of 5.8 billion euros in 2021 and growth of 16 percent year-on-year adjusted for exchange rate effects (Bosch Power Tools, 2022b), Bosch Power Tools is the global market leader for power tools and power tool accessories. The immense speed of innovation and the corresponding employee commitment enable Bosch to launch more than 100 new power tools on the market every year (Bosch Tools, 2022). To best serve the different requirements of the target groups, the two lines “Bosch green” and “Bosch blue” are maintained. Bosch blue addresses the professional use of power tools by craftsmen and in industry, while Bosch green is aimed at casual use by do-it-yourselfers (Bosch Professional, 2022). The following picture shows an example and comparison of the jigsaw PST 650 from Bosch green (left) and the jigsaw GST 12V-70 from Bosch blue (right).

Figure 14: Jigsaws From Bosch Green and Bosch Blue



Source: Ludwig Maul (2023). Used with permission.

Our use case describes product development at Bosch Power Tools in the Bosch blue line, in which lean startup is successfully used alongside other methods. Thankfully, Prof. Dr. Ludwig Maul, Innovation Coach at Bosch Power Tools, was available to us as an interview partner.

Starting situation before using the lean startup method: VDI guidelines and sequential product development

The development of power tools requires different specialized knowledge and, thus, interdisciplinary cooperation from the fields of mechanical engineering, electrical engineering, and software development. The processes used for this at Bosch Power Tools had their origins in engineering and were based, among other things, on the **VDI** guidelines for product development and design. Project planning followed the procedure of first formulating ideas internally and then developing them into prototypes before testing them with real users in later phases of product development. This was, therefore, a sequential procedure, as is also used in the classic waterfall model or similar, which does not provide for any early validation steps for a problem/solution fit, which is the target of lean startup.

VDI
The VDI (*Verein Deutscher Ingenieure* – Association of German Engineers) is the largest technical-scientific association in Germany and sees itself as a driving force for innovation in the technology sector. In addition to its nationwide work, it also organizes itself into state and district associations.

Problem: Competitive pressure and increasing complexity require fast time-to-market and early customer integration

Increasing globalization and technical progress has affected the industry in various ways. More and more new companies, or companies from related fields, have been entering the market for electrical equipment for professional use, which has led to continuous competitive pressure in the industry. As a result, customers have an ever-increasing choice of technically comparable products. The developments of the internet have enabled them to survey the market in a largely transparent manner, thus enabling them to make comparisons on their own and enter the product selection process better informed. In addition, product requirements have transformed and have been reprioritized by awareness of ergonomics, health, and usability.

For a company to gain an advantage in this highly competitive and agile market, it was necessary to generate unique selling propositions and optimize time-to-market with short innovation cycles. This has led to an increase in the complexity and diversity of offerings and products throughout the industry. This was made even more difficult when new technologies, such as connectivity, made their way into the craft. At Bosch, it was particularly noticeable with connectivity services and Internet of Things (IoT) products that the increasing complexity can make change costs particularly high in later stages of product development (Lücking, 2019). For Bosch, it became necessary to identify user requirements and market needs in the early phases of product development; but this was not possible with the development methods they were using.

Implementation of the method: Support of the product teams through structural changes and use of customer-centric frameworks

As part of a group-wide strategy for “user centricity,” corresponding operational processes and structures were redesigned and developed. Among other things, an agile way of working with cross-functional teams was introduced throughout the power tools division and a

"user experience design" organizational unit was created. The task of this organizational unit is to advise the product teams – consisting of engineers and employees from marketing and product management – and support them in the early phases of product development with "innovation coaches" and market research and design. Lean startup and **design thinking** are frequently used in this context. They serve as a framework for the implementation of projects and collaboration in workshops with employees from the product teams.

Design thinking
Design thinking is a human-centered, systematic approach to problem-solving and idea generation.

Status quo: Practical use of the lean startup method to identify and serve the needs of craftsmen

The use of lean startup supports Bosch Power Tools in testing and developing ideas with real customers at an early stage. This makes it possible to identify the features that create value from the customer's perspective, focus on them, and, thus, avoid any superfluous effort in later development. By doing so, different customer segments in the craft sector are specifically selected according to their needs. Based on the customer problems identified with them, solution ideas are generated and made tangible for the customers through prototypes. Unlike in software development, these prototypes do not necessarily cover all aspects of a "minimum viable product" but can often depict only individual value propositions. For example, they can make a particular arrangement of components tangible or a new workflow experienceable. Depending on the status of the idea generation and formulation or product development phase, they can also be designed quite differently, for example:

- sketches of the products and visualizations of how they work
- verbal concepts of customer benefits and functionality
- 3D models and renderings of concepts (The following figure shows an example of a 3D printing of a battery interface, where print is the whole black plastic part, except the attached battery. It is an early-stage prototype before a detailed styling and design without electrical features, and for testing haptics and usability of battery handling.)
- rough cardboard or styrofoam models
- first functional samples for testing
- volume and weight models

Figure 15: 3D Printing of Battery Interface

Source: Ludwig Maul (2023). Used with permission.

These prototypes will be tested with customers in a variety of formats to validate different assumptions about customer problems and solution approaches, for example, via the following:

- interview studies at Bosch development sites
- **focus group** studies
- **observation studies** in the laboratory
- observation studies on construction sites

Focus group
A focus group is a moderated group discussion that usually follows a guideline with open-ended questions.

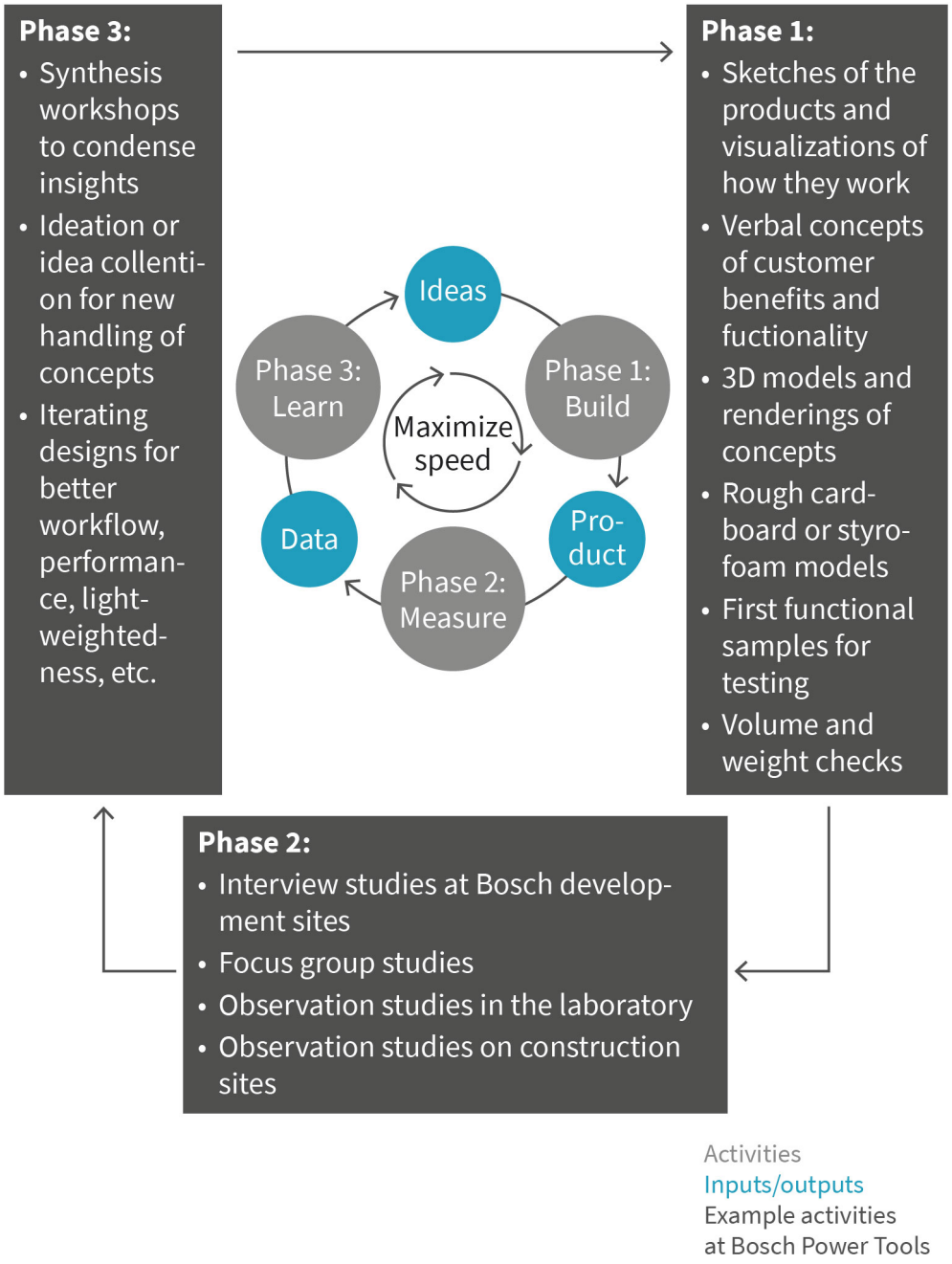
Observation studies
Observation studies take place in "real life situations," often in their original context without interruptions from researchers to gain insights.

These customers or test participants are recruited from specialized market research/user research agencies who search after criteria, such as industry "trade," years of experience, experience with different brands, frequency of working with similar tools, and demographics (e.g., age, country of origin). In doing so, participants will be compensated for their time and, if applicable, travel expenses incurred to participate.

The criteria that are always examined and measured are those that can be experienced with the current maturity level of the prototype. In the case of cardboard models, for example, the arrangement of handles or the workflow with the tool is tested, and not the weight, which is the focus of weight models. The focus of the cardboard models is the subjective perception of the customer. That is, how they experience the weight, for example, which is influenced by handle shape, ergonomics, etc. In addition, advanced prototypes are often contrasted with innovative competitor products. Customers compare the various

test objects and evaluate them according to predefined criteria. After the tests, the user feedback and input are evaluated and analyzed in synthesis workshops. The results from the tests are used to further develop the ideas and concepts, with the product development process being iterative, as is common in lean startup (as you can see in the following figure).

Figure 16: Build–Measure–Learn Feedback Loop at Bosch Power Tools



Source: Sabine Pur (2023), based on Ries (2011).

In this process, the feedback loop of build–measure–learn is run through often and increasingly faster until a value-creating product is developed. After these iterations, the preliminary concept is validated by professional market research using further methods through larger, quantitative samples before a series development starts.

Learnings and outlook: Use of the method fulfilled expectations, now to enable employees and add further methods

The use of lean startup helps Bosch Power Tools integrate the user perspective into product development at an early stage and, thus, develop products that optimally serve customer needs and reduce time-to-market with the least possible use of resources. In the medium term, the product teams, which are currently supported by the innovation coaches, are empowered to apply the methods independently ("enabling" employees), so that the approach is not just lived by a few experts, but can be multiplied and used by many employees throughout the company. It is also planned to successively expand the method toolbox for product development.

SUMMARY

The Lean startup approach is gaining more and more recognition, not only in scientific literature, but also in practice. However, many startups still begin with the solution they want to develop, not with the problem that needs to be solved for the customers. In the meantime, however, many companies, regardless of their business model and associated markets, have understood that successful development of highly innovative products requires the earliest possible customer feedback via MVP (whether that involves interviews, early prototypes, or something else) and the corresponding validated learning with actionable metrics. The knowledge of how questions should be phrased to ensure the necessary learning about real customer problems and needs is not an intrinsic or succinct matter; it can and should be learned.

Analysis of the data that a company can obtain about customer behavior on its website, for example, also plays an essential role here. Here, the approach often differs from the chosen business model, as in the case of two-sided marketplaces.

Many established companies now know how to apply the method in a structured way internally to be sustainably innovative and competitive. Globalization, competitive pressure, unique selling propositions and rapid time-to-market, among other things, force them to rethink, which also results in a change in corporate culture toward entrepreneurial thinking.

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