Marketing Integration in an International Software Innovation Process

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Graz, 28.06.2019

Declaration of Authenticity

I hereby certify that I have written the present thesis independently and without help from any third parties. I have not used any sources other than those which are clearly indicated and have duly provided details of the sources of both direct and indirect quotations.

The present piece of work and parts thereof, have to date not been presented to this or any other examination board in the same or similar form, nor have they been published. The present version is the same as the electronic version submitted.

Graz, on the 28th June 2019 ………………………….

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Summary

Companies have to continuously focus on innovation in order to survive. Especially in the software industry it is important to do so due to rapid technological change and shorter product life cycles. To guarantee the success of an innovation, a structured innovation process is needed. In addition, it is recommended to integrate marketing from the beginning in order to ensure that customer and market orientation are being considered and incorporated throughout the entire innovation process.

The aim of this master thesis is to elaborate a marketing-oriented software innovation process. Therefore, the theoretical part deals with the structure of an innovation process and how marketing can contribute to the different phases of an innovation process. The structure of an innovation process needs to be able to respond to company-specific factors. This is the reason why four process approaches are valid for the software industry. These are the spiral model, the Stage-Gate process, the V-Model, and the waterfall model.

Currently, the marketing department of AVL´s business unit Advanced Simulation Technologies (AST) is solely involved at the end of the innovation process by creating marketing material for the promotion of the software release. To discover how the AST marketing department can support the different phases of an innovation process from the idea generation to the software release, 15 individual explorations with employees from international software companies are carried out. These interviewees also provide insights into their organization's innovation process.

The outcome of these explorations serves as a basis for an internal focus group in which selected AST employees are asked to share their opinion about how the AST marketing department could be integrated in the different phases of the innovation process.

As a next step, a marketing-oriented innovation process must be defined for AST. Therefore, it is discovered which of the four mentioned innovation processes is most likely to integrate marketing from the beginning and to fulfill further process criteria.

As a result, a recommended innovation process as well as marketing tasks for the different phases of the selected process are introduced.

Abstract

Unternehmen müssen sich laufend auf Innovationen konzentrieren, um die Überlebensfähigkeit des Unternehmens sicherzustellen. Vor allem in der Softwareindustrie sind Innovationen aufgrund von rasanten technologischen Veränderungen und kurzen Produktlebenszyklen unumgänglich. Der Erfolg einer Innovation kann mit der Verwendung eines strukturierten Innovationsprozesses garantiert werden. Zusätzlich wird empfohlen, dass Marketing von Beginn an im Innovationsprozess integriert ist. Dadurch wird gewährleistet, dass Kunden- und Marktorientierung während des gesamten Innovationsprozesses sichergestellt werden.

Das Ziel dieser Masterarbeit ist es, einen marketingorientierten Innovationsprozess zu erarbeiten. Deshalb beschäftigt sich der Theorieteil mit dem Aufbau eines Innovationsprozesses und damit, welchen Beitrag Marketing in den unterschiedlichen Phasen leisten kann. Innovationsprozesse müssen die Möglichkeit bieten, ihre Struktur an unternehmensspezifische Faktoren anzupassen. Aus diesem Grund ergeben sich für die Softwareindustrie folgende vier Prozesse: Spiralmodell, Stage-Gate Prozess, V-Modell und Wasserfallmodell.

Die Marketingabteilung des Geschäftsbereiches Advanced Simulation Technologies der AVL List GmbH ist zurzeit nur in der Releasephase des Innovationsprozesses involviert, indem Marketingmaterial für die Bewerbung einer neuen Softwareversion kreiert wird. Um herauszufinden wie die Marketingabteilung von Beginn an in den Prozess involviert werden kann, werden 15 Einzelexplorationen mit Mitarbeitern von internationalen Softwareunternehmen durchgeführt. Diese Interviewpartner geben auch Einblicke in den Innovationsprozess des jeweiligen Softwareunternehmens.

Die Ergebnisse dieser Interviews dienen als Basis für eine AST interne Fokusgruppe, in welcher ausgewählte Mitarbeiter gebeten werden darüber zu diskutieren, wie die Marketingabteilung von Beginn an in den Innovationsprozess involviert werden kann. In einem nächsten Schritt wird anhand definierter Kriterien untersucht, welcher der vier genannten Innovationsprozesse am besten geeignet ist, Marketing von Beginn an im Prozess zu integrieren.

Als Ergebnis werden ein marketingorientierter Innovationsprozess sowie die unterschiedlichen Aufgaben der Marketingabteilung in den unterschiedlichen Phasen dieses Prozesses vorgestellt.

Table of Contents

List of Figures

List of Tables

List of Abbreviations

AI	Artificial Intelligence
AST	Advanced Simulation Technologies
AVL	Anstalt für Verbrennungskraftmaschinen List
CRM	Customer Relationship Management
IT	Information Technology
ITS	Engine Instrumentation and Test Systems
KPI	Key Performance Indicator
NVH	Noise, Vibration, Harshness
OEM	Original Equipment Manufacturer
PTE	Development of Powertrain Systems
PESTEL	Political, Economic, Socio-cultural, Environmental, and Legal
QFD	Quality Function Deployment
R&D	Research & Development
ROI	Return on Investment
USP	Unique Selling Proposition

1. Introduction

Before elaborating the thesis topic, chapter 1 deals with the initial situation and challenge. Thereafter, the resulting company objectives and thesis objective are presented. Lastly, the core topics as well as the connections of these topics are summarized in a frame of reference.

1.1.   Initial Situation

The globalization of markets leads to the fact that companies must continuously focus on innovation in order to develop and launch new products and services. The launch of a product or service has the advantage for companies to protect margins and stay competitive (cf. Schilling 2013, p. 1).

Especially in the software industry it is important to do so. Rapid technological change and ever-shorter product life cycles demand an adapted time-to-market approach (cf. DAMCO n.d., p. 2). Furthermore, the software industry is characterized by strong internationalization. This means that software can be developed globally as well as distributed via the internet. This is the reason why software providers face worldwide competition (cf. Buxmann/Diefenbach/Hess 2011, p. 3). To stay competitive, it is crucial for software companies to adapt their products and services to customers' needs and market requirements on a more frequent basis as the product life cycle for software has become as short as 4 to 12 months (cf. Schilling 2013, p. 2).

For the software adaptation, customers need to be integrated in the software innovation process. Customers thus get some insights in the software creation process and evaluate the perceived quality. If companies do not have a clear process for developing software, customers associate this with poor software quality. This is one reason why software companies fail to achieve economic goals (cf. Walsh/Deseniss/Kilian 2009, p. 425, 443). In order to achieve targets, companies need to focus on customer as well as market orientation throughout the whole software innovation process. It must be taken into account that market orientation can be only achieved with customer-oriented employees. Therefore, it is the task of marketing to raise awareness for customer orientation within the organization throughout the software innovation process (cf. Gleitsmann 2007, p. 2).

1.2.   Challenges

The business unit Advanced Simulation Technologies (AST) rolls out two software releases worldwide per year. The first release is planned for spring, the second one for autumn. These two software releases are prevalently delayed for weeks or sometimes even months. One reason for the delay is that no structured market analysis is carried out at the beginning of the process.

So far, marketing is only involved at the end of the software innovation process by creating marketing material which is sent to the sales department and market. The content for these marketing materials is provided by the product management and the software development. This procedure is illustrated in figure 1.
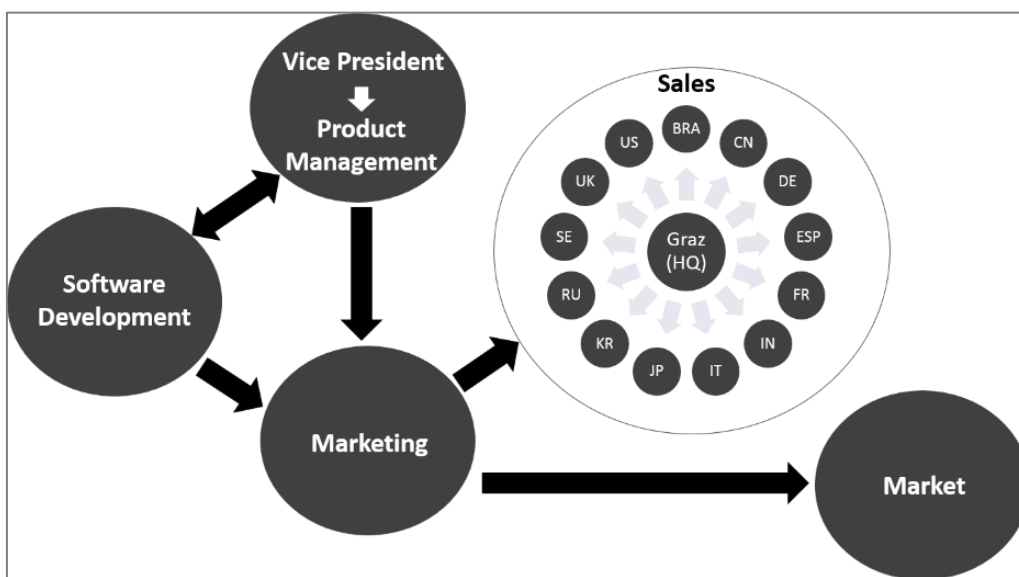
Figure 1: Current Role of the AST Marketing Department regarding the Release Process (own presentation)

An involvement right from the start would also mean for the marketing department that external communication could be planned at a much earlier stage of the process. Right now, marketing cannot provide the material on time due to an unclear release date. As a consequence, the software release is delayed for another two to three weeks.

To ensure that future software versions are released on time, the task is to integrate marketing at the beginning of a structured software innovation process and consequently shorten the time-to-market efficiently.

1.3. Objectives

1.3.1. Company Objectives

The goal of AST is to shorten the software development process by an early integration of marketing from 7 / 8 months to 6 months.

The goal of the AST marketing department is to identify ASTs strengths, weaknesses, opportunities, and threats with the support of an implemented market analysis tool by the end of the first quarter of 2020.

1.3.2. Thesis Objective

The main objective of this master thesis is to elaborate a marketing-oriented software innovation process.

1.3.3. Limitations of the Thesis

It is not part of the master thesis to perform the software innovation process for a new software version.

1.4.   Frame of Reference

Introduction

Initial Situation
- Software market: rapid growth
- Ongoing development necessary to stay competitive
- Shorter product life cycles – 4 to 12 months for software

Challenge
- Delay of software releases
- Unstructured software innovation process, lack of market knowledge and orientation
- No early involvement of marketing

Objectives and Limitations of the Thesis

Theoretical Part

Software Definition and Characteristics

Software Innovation Process Buildup
- Identification
- Selection
- Preparation
- Software Release
- Reflection

Innovation and Marketing
- Strategic Situation Analysis
- Marketing Input for the Idea Generation
- Evaluation and Selection of Ideas
- Preparation of the Business Case
- Communication of the Software Release
- Control of Success

Introduction of Software Innovation Process
- Innovation Processes in Comparison   • Process Criteria

Practical Part

Presentation of AVL List GmbH / Advanced Simulation Technologies

Qualitative Market Research
- Benchmark with International Software Companies   • Focus Group with AST Employees

Selection of a Software Innovation Process

Elaboration of a Marketing-Oriented Software Innovation Process

Figure 2: Frame of Reference (own presentation)

2. Software

The software market is one of the most growing industries. Due to fast changing markets as well as customer demands, software providers have to attach importance on developing innovative and attractive software products (cf. Kim 2017, p. 1). Time has become a scarce resource in management as well as business operations. This is the reason why software providers should focus on an accelerated time-to-market. Furthermore, customer insights need to be implemented in the innovation process in order to reduce market failure (cf. Schulz/Steinhoff/Jepsen 2017, p. 349f.). This chapter first defines the term software. Next, the characteristics of software are explained.

2.1.   Software Definition

The beginning of the software industry goes back to the early fifties of the twentieth century. At that time, software was bundled and sold together with hardware. This means that software was integrated in the hardware. For this approach, software developers used the term program code. The term software was first used in the United States of America in 1959 (cf. Buxmann/Diefenbach/Hess 2011, p. 4).

Nowadays, the European Information Technology Observatory defines software as a *"set of instructions that cause a computer to perform one or more tasks"* (EITO 2012/13, p. 13). A set of instructions is called a program. If the set is complex and large, the term system is used. Computers are not able to work without those instructions, hence software and hardware (the computer) need to be combined in order to do computerized work (cf. EITO 2012/13, p. 13). Software is embedded in various systems, for example, entertainment, industrial processes, medical, military, telecommunications etc. This is the reason why software has an impact on daily life in many fields (cf. Agarwal/Tayal/Gupta 2010, p. 4).

According to the literature, three types of software can be differentiated: system software (e.g. operating system), programming software (e.g. database system), and application software (e.g. program designed for end user). Moreover, software is distinguished by its degree of standardization. In this context, a distinction is made between customized software and standard software. Customized software is individually developed for a certain customer, whereas standard software is created for a mass market (cf. Buxmann/Diefenbach/Hess 2011, p. 5).

As already mentioned, the software market is characterized by fast pace which leads to rapid obsolescence of software. This means that the software product life cycle has become as short as 4 to 12 months. Therefore, software developers need to continuously improve the software according to customer as well as market requirements in order to stay competitive (cf. Schilling 2013, p. 2). However, the software development becomes more complex due to ongoing development. In addition, the increase in complexity is the reason why software developers have difficulties to maintain an overview of the development process (cf. Hoisl 2019, p. 30). The complexity is even increased by the fact that software can be developed globally and distributed via the internet. This is the reason why software providers face worldwide competition (cf. Buxmann/Diefenbach/Hess 2011, p. 3).

2.2. Characteristics of Software

Software represents the result of human thinking. This means that software is developed based on knowledge rather than physical artifacts (cf. Maglyas et al. 2017, p. 25). Therefore, software falls into the category of services. Scientists try to explore the differences between products and services since the 1980s (cf. Meffert/Bruhn 2012, p. 2f.). The result is that software is characterized by intangibility, the integration of customers in the software innovation process, malleability, and having marginal costs of zero (cf. Hoisl 2019, p. 20, 38; Meffert/Bruhn 2012, p. 36). These characteristics are described in more detail in the following sections.

2.2.1. Intangibility

Due to its intangibility, software cannot be seen or touched. In addition, the intangibility of software leads to the fact that it cannot be stored as well as transported. From a customer perspective, this means that software is invisible, thus makes it impossible for a user to see what he or she is buying in advance. Consequently, the purchase of software is classified as particularly high risk due to the fact that customers need to trust in promises of the software provider (cf. Haller 2017, p. 8). To minimize the purchase risk, software providers need to communicate software capabilities but also software usage (cf. Hoisl 2019, p. 40). Furthermore, software providers have to prove experiences in the development of software and build trust with customers (cf. Walsh/Deseniss/Kilian 2009, p. 426).

The intangibility is the reason why software cannot be sold like a good. Instead, software providers sell licenses. Therefore, companies need to define in which ways

software shall be provided to customers. One possibility is to license software as a whole. Another possibility is to solely provide individual performance features to a customer. In addition, companies can define how many users can work with the software. Furthermore, a company is able to specify the period of use for customers (cf. Bürkner 2003, p. 27).

To sell software nationally but also internationally, the right operation mode must be chosen. The choice of foreign operation mode is considered strategically important because it has an impact on the company's activities but also its options (cf. Morschett/Schramm-Klein/Zentes 2015, p. 323). Software is considered to be a service export or invisible export due to the fact that it is acquired in return for payment, whereby the contractor and purchaser are from different countries (cf. Büter 2010, p. 67). In contrast to the export of goods, software is not subject to tariff barriers. However, software faces cultural and language barriers, legislation of the target country, and national regulations. In general, the export process steps are the same for goods and services. There are solely differences in the necessity of documents but also export permissions (cf. Höfferer/Lenger/Sternad 2013, p. 195).

2.2.2. Customer Integration

To guarantee the survivability of the company, the goal of a software provider is to develop software according to customer expectations (cf. Haller 2017, p. 31). This requires a high degree of customer orientation which includes direct customer contact and research on customer requirements. Therefore, customers need to be integrated in the software innovation process (Meffert/Bruhn 2012, p. 2, 37). Due to the customer integration, customers gain insights in the software creation process and evaluate the perceived quality. This is the reason why companies need to have a clear process for developing software. Otherwise, customers associate poor process performance with poor software quality (cf. Walsh/Deseniss/Kilian 2009, p. 443).

2.2.3. Malleability

In contrast to physical products, software is characterized by being flexible. There are fewer restrictions on developing software which allow software developers to set creativity free (cf. Agarwal/Tayal/Gupta 2010, p. 12). Due to its malleability, there is a large number of possibilities for developing software. These possibilities can make it difficult for software developers to focus on customer needs. To avoid this,

it is crucial for software developers to define the right customer benefits, put software as quickly as possible onto the market, and manage available resources. Another consequence of malleability is the uncertainty regarding future function areas of the software. Customers often enter long-term contractual commitments with software providers. These contracts make it difficult for customers to move to the competition because changing a software provider requires effort and involves high costs. To make customers feel secure in the purchase, software providers have to communicate the vision of the software. This means that software producers have to clearly state in which direction software is being developed (cf. Hoisl 2019, p. 38f., 46f.).

2.2.4.   Marginal Costs of Zero

Software can be copied any number of times without entailing any loss of quality (cf. Buxmann/Diefenbach/Hess 2011, p. 3). Thereby, marginal costs are nearly zero. The software is made available for installation on the customer's IT (Information Technology) infrastructure. This approach is seen as the classical way to deliver software and is termed as on-premise delivery model. The customer is responsible for the operation of the software and needs to provide a server, storage, as well as a data network for an appropriate use of the software. The reproduction of software costs the developer close to nothing. The software producer might only have to consider costs for storage media which can be delivered to customers (cf. Hoisl 2019, p. 21f.).

3. Software Innovation Process Buildup

Companies have to continuously focus on innovations in order to guarantee the company's survivability (cf. Schilling 2013, p. 1; Śledzik 2013, p. 90). Innovation *"is a process of industrial mutation, that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one"* (Śledzik 2013, p. 90). This means that the generation of innovations allows a company to stay competitive and achieve economic targets (cf. Śledzik 2013, p. 90).

Innovations can be differentiated in terms of scale. Hence, the literature categorizes innovations into incremental innovation, radical innovation, and breakthrough innovation. An incremental innovation provides small improvements to an existing product design while a radical innovation provides major enhancements to the product. A breakthrough innovation, on the other hand, is characterized by providing a complete different value to customers (cf. Charan 2015, p. 270). Moreover, two approaches exist for developing as well as implementing innovations. These are technology push and market pull. Technology push innovations are driven by the company's R&D (Research & Development) department and are launched without considering if the product will satisfy customers' needs. Market pull innovations, on the other hand, are based on market needs (cf. Disselkamp 2012, p. 44; Weiber/Pohl 2017, p. 30).

As already mentioned, software needs to be adapted to market requirements and customers' needs on a frequent basis due to rapid technological change and shorter product life cycles (cf. Schilling 2013, p. 2). In the software industry, market leaders are more profitable than other software providers due to the principle "the winner takes it all". This is the reason why software providers need to release software onto the market as soon as possible (cf. Hoisl 2019, p. 33, 45). Therefore, software companies need to follow a structured innovation process in order to stay competitive and consequently shorten the time-to-market (cf. Trommsdorff/Steinhoff 2013, p. 1). Companies make use of an innovation process due to the fact that innovations are organized in a process manner (cf. Vahs/Brem 2013, p. 231). This innovation process covers all activities from the idea generation to the launch of the product (cf. Weiber/Pohl 2017, p. 75). To ensure a software release on time, the tasks for each phase of an innovation process need to be determined in advance in order to define appropriate measures (cf. Horn/Ivens 2015, p. 11).

The scientific literature contains various concepts for the structure of an innovation process. However, all these processes aim at identifying necessary activities in order to increase the software's probability of success (cf. Weiber/Pohl 2017, p. 76).

Figure 3 presents three innovation processes by the authors Volker Trommsdorff and Fee Steinhoff, Klaus Aumayr, and Marcus Disselkamp. These processes demonstrate the structure of an innovation process and are supportive to derive an appropriate process for a software company.
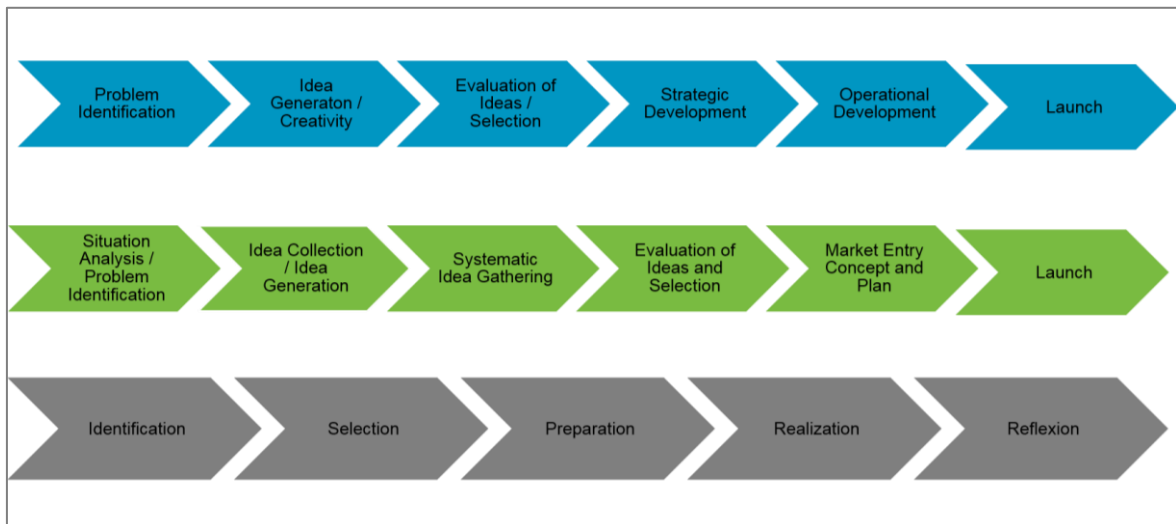
Figure 3: Innovation Processes (based on Trommsdorff/Steinhoff 2013, p. 187; Aumayr 2006, p. 313; Disselkamp 2012, p. 95)

The innovation process by Volker Trommsdorff and Fee Steinhoff begins with the identification of a problem. The authors are convinced that either the market or new technological developments trigger innovation. The aim of the second phase idea generation / creativity is to develop ideas for the new product. To realize the most advantageous idea, phase three makes use of certain instruments to evaluate and select the most promising idea. The phase strategic development focuses on developing the product. Moreover, the target group and positioning of the product need to be defined. The phase operational development ensures that the developed product meets customer needs and differentiates itself from competitors' offers. Finally, the product is introduced into the market (cf. Trommsdorff/Steinhoff 2013, p. 204, 281, 299, 316, 339, 370).

The innovation process by Klaus Aumayr starts with a situation analysis / problem identification of the current situation. The need for product innovations can be identified, for example, through shorter product life cycles or changing customer needs. After analyzing the status quo, ideas for meeting market and customer requirements

are generated. The created ideas are collected in an idea database and are evaluated according to different criteria. For example, market-related criteria but also technical criteria can be taken into account. Before the launch, a company has to develop its market entry concept and plan appropriate measures to guarantee a successful product introduction (cf. Aumayr 2006, p. 315f., 318f., 321).

Marcus Disselkamp's innovation process starts with the identification of new ideas for a product. To create ideas, creativity techniques, controlling instruments, marketing instruments, and organizational techniques can be used. In the second phase, the most promising ideas need to be structured, evaluated and selected. In the preparation phase, a company needs to think about how the chosen idea can be implemented. Afterwards the product is developed. According to Disselkamp's process, the product launch takes place in the so-called realization phase. This phase focuses on the implementation of an idea into a successful innovation. During this important step it becomes clear whether the company was capable to act goal-oriented in the previous phases. After the product launch, the innovation process is evaluated by the project team and lessons learned are drawn in order to improve the next innovation process (cf. Disselkamp 2012, p. 98, 157, 187, 213f., 226).

As already mentioned, competition is high in the software industry. A software provider can solely be successful if the company is able to quickly respond to market changes and meet customers' needs (cf. Schilling 2013, p. 2). Therefore, the company has to analyze its environment before generating ideas for a software. Subsequently, the software provider must check the marketability of generated ideas and chose the most advantageous idea. Afterwards, the software can be developed and the business plan can be prepared (cf. Weiber/Pohl 2017, p. 77f.). After testing the software regarding its functionality, the software can be released (cf. Kriemadis 2018, p. 235). Finally, lessons learned can be drawn to ensure quality improvements for the next innovation process. In conclusion, it can be said that the innovation process for software should consist of the phases identification, selection, preparation, software release, and reflection (cf. Disselkamp 2012, p. 95). These phases are explained in the following sections.

3.1. Identification

In the first phase of an innovation process, a strategic situation analysis is carried out which allows to generate ideas for the company's innovation (cf. Weiber/Pohl 2017, p. 80, 108). Therefore, parties involved need to get an overview of the customer demands as well as market conditions. This means that the team's task is to define the target group of the software, to be aware of competitors and their software, and to discover substitutes as well as market trends (cf. Saavedra 2016, p. 373f.). In addition, parties involved must determine if required resources as well as knowledge to develop software regarding the outcome of the analysis are available (cf. Trommsdorff/Steinhoff 2013, p. 94). Precise knowledge of the market environment and conditions is needed in order to reduce the failure rate and ensure the company's competitiveness. This is the reason why a company has to make use of selected instruments to analyze its environment and, subsequently, generate ideas for its software (cf. Horn/Ivens 2015, p. 11). The following sections provide insights in the strategic situation analysis and methods for the idea generation for an innovation.

3.1.1. Situation Analysis

As already mentioned, software companies cannot afford to react too late to changes as well as trends in the company's environment due to fast changing markets (cf. Deschamps 2017, p. 42). Therefore, a so-called situation analysis needs to be conducted at the beginning of an innovation process. This analysis considers three factors: present issues, future issues, and key trends. A detailed analysis is necessary because these three factors influence the company's internal as well as external environment, and customers. This is the reason why a company needs to know its current and potential customers and know the reasons why customers purchase the firm's software. Moreover, a company has to be aware of its objectives, strategy, performance, and resources. These factors are part of the organization's internal environment. The external environment, on the other hand, consists of competitors and the macro-environment. The analysis of the company's environment enables persons involved to get an overall picture of the organization's current situation. In addition, the findings of the analysis allow the company to create competitive advantage (cf. Ferrell/Hartline 2014, p. 53, 55).

3.1.2. Idea Generation

After analyzing the company's environment, the next step is to gather ideas for the new software (cf. Bruhn/Ahlers 2017, p. 213). This ideation phase includes a problem definition and collection of information and results in structuring these generated ideas (cf. Woodward/Shaffakat 2017, p. 247). Ideas are ideally generated within a cross-functional team. This means that customer service, market research, product marketing as well as R&D are involved in this phase (cf. Bruhn/Ahlers 2017, p. 213). These involved parties shall focus on setting creativity free and create a high number of ideas without concern for utility or uniqueness (cf. Thompson/Schonthal 2017, p. 27). To generate ideas for a new or adapted software, this team can make use of internal sources, external sources, and creativity techniques. In addition, so-called lead users might help a company to generate ideas. These ideas are stored in an idea database (cf. Trommsdorff/Steinhoff 2013, p. 283f., 287; Hoffmann 2012, p. 58; Vahs/Brem 2013, p. 269). These mentioned innovation sources are described below.

Internal Sources

Employees' ideas and knowledge are an important source for the development of ideas. Therefore, the company's R&D department is responsible to create ideas in order to further develop its software. But also employees from other business functions shall be involved in the idea generation phase due to the fact that ideas are originated in the minds of all employees (cf. Trommsdorff/Steinhoff 2013, p. 283). In addition, companies can collect feedback from sales representatives and make use of, for example, statistics of sales as well as customers in order to develop new product ideas (cf. Pepels 2012, p. 19).

External Sources

Besides internal sources, companies have the possibility to draw ideas from external sources. In this case, companies have to be aware that these data are also available for competitors. Ideas can be gathered, for example, through cooperations, databases, fairs, research institutes, publications of patent offices, and the use of journals (cf. Trommsdorff/Steinhoff 2013, p. 284).

Lead Users

Ideas do not solely need to be created by the company itself. Instead, companies can make use of so-called lead users (cf. Kröper/Bilgram/Wehlig 2017, p. 405). Lead users are seen as opinion leaders in their industry which belong to the first adopters of a new product. Due to their leading technological role, lead users influence the purchase behavior of companies in their industry (cf. Viardot 2017, p. 279). Moreover, lead users are respected within the industry because of superior competence as well as market-related knowledge. They recognize and face needs before their competitors and hence benefit first from finding innovative solutions. In addition, lead users are aware of the importance of innovations and, subsequently, are able to improve their own products (cf. Stevens 2010, p. 4).

To generate ideas for the company's innovation with lead users, a four-step process is used (cf. Lehnen 2017, p. 26). Figure 4 demonstrates these four phases.
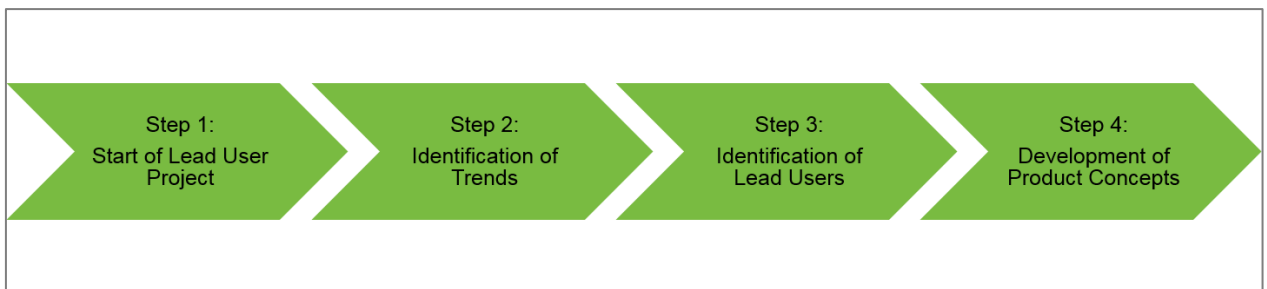
Figure 4: Lead User Workshop (based on Lehnen 2017, p. 26)

Step 1 consists of putting together an interdisciplinary team within the company and defining the target market. Step 2 focuses on the identification of customer needs as well as trends. To detect trends within the industry, the interdisciplinary team can make use of the internet, literature sources, and databases. In step 3, the team identifies lead users according to certain criteria. These criteria can be, for example, basis of trust, capability, communication skills, innovativeness, innovation culture, market leader, reputation, sales potential, and trendsetter (cf. Vahs/Brem 2013, p. 270). In step 4, chosen lead users develop innovative product concepts in cooperation with the interdisciplinary team. These created ideas are ultimately presented to the company's top management (cf. Lehnen 2017, p. 27).

Creativity Techniques

Creativity is the human's ability to develop products or ideas which are new in whole or in essential parts. In order to create ideas for innovations, companies can also make use of creativity techniques. These techniques increase the probability of useful ideas (cf. Weiber/Pohl 2017, p. 110f.). Following creativity techniques can be used for the idea generation phase:

- Brainstorming
- Brain-writing
- Morphology
- Synectics (cf. Aumayr 2006, p. 317)

Brainstorming is used in educational, commercial, industrial, and political fields to generate new ideas within a group. The task of this group is to solve a certain problem. Each group member expresses ideas and shares those ideas with the rest of the group. This procedure leads again to the development of new ideas (cf. Al-khatib 2012, p. 29f.). The advantages of this method are that numerous ideas are generated and participants are inspiring each other. However, the time-consuming post-production of ideas can be seen as a disadvantage (cf. Vahs/Brehm 2013, p. 282).

Brain-writing is similar to brainstorming. But instead of developing ideas together, each group member writes down ideas on a piece of paper individually. During this time, group members do not speak with each other and do only focus on their thoughts (cf. Thompson/Schonthal 2017, p. 24). This 6-3-5 brain-writing method is used in advertising, design, marketing, product development, and writing. This creativity technique involves six participants who have five minutes to generate three ideas. After five minutes, the piece of paper is passed on to the next group member which is encouraged to build on the ideas generated by other team members (cf. Litcanu et al. 2015, p. 387). Benefits are that all participants become actively involved. Moreover, time effort and expenses are rather low. However, it should be considered that incomprehensible wording of ideas and limited communication might lead to a misinterpretation of ideas (cf. Vahs/Brehm 2013, p. 283).

The creativity technique morphology is, for example, used for engineering design, organizational development and creative writing. The morphological approach focuses on structuring as well as analyzing multi-dimensional, non-quantifiable, problem complexes (cf. Álvarez/Ritchey 2015, p. 1). First, a team determines parameters

and problem aspects. In the next step, possible modes for each defined parameter as well as problem aspects have to be established. Finally, the chosen parameters are placed against each other in a table. The task of the team is to evaluate the results in order to find the most promising ideas (cf. Sholeh/Ghasemi/Shabazi 2018, p. 185). This creativity technique allows to break a problem up into smaller problems and identify numerous alternative solutions. However, high effort and expert knowledge are needed to carry out this creativity technique (cf. Vahs/Brehm 2013, p. 289).

Synectics allows a team to analyze a problem in more detail and generate new ideas together. The systematic process makes use of three forms of metaphors. The first metaphor compares two objects, ideas, or concepts. The second metaphor is a personal analogy towards objects to which the team members feel connected. The third metaphor involves descriptions which are contradictory to the involved idea in the first two stages. As a result, a team gets new viewpoints about explored ideas throughout the whole process (cf. Balkir/Topkaya 2017, p. 330). Due to the formation of analogies, participants are able to think outside the box. Nevertheless, it must be taken into account that a high amount of time is taken up due to the complex procedure (cf. Vahs/Brehm 2013, p. 286).

Idea Database

The generated ideas can be saved in an idea database. Each employee should have access to the idea database to deposit own ideas. The databases' pool of ideas is screened and evaluated by product managers at regular intervals. Furthermore, product managers are responsible to provide feedback to employees' ideas. This approach ensures that employees remain motivated and continue generating ideas (cf. Gorschek et al. 2010, p. 39). The idea database can also be used to store all ideas whose implementation has not yet been possible due to a lack of resources. The administration of ideas guarantees that these product ideas are not lost for the future (cf. Hoffmann 2012, p. 49).

3.2. Selection

A software company can only succeed if created ideas support the strategy of the business and have a financial impact (cf. Gorschek et al. 2010, p. 39). Moreover, the company's competitiveness can be guaranteed with the right ideas (cf. Zizlavsky 2015, p. 1). In the selection phase of an innovation process, companies have to explore which ideas best fit to the organization's core competences and which ideas seem to be affordable. This is the reason why generated ideas have to be screened regarding their feasibility and viability (cf. Thompson/Schonthal 2017, p. 26). The idea selection enables a company to resolve inputs into an innovation concept and hence plan necessary measures for the software development (cf. Tidd/Bessant 2009, p. 80). The following sections present methods to evaluate the viability of generated ideas.

3.2.1. Viability Analysis

The purpose of a viability analysis is to find an idea which is most feasible to solve the company's problem. The task of parties involved is to explore which idea fits the industry, market, organization, and team. Therefore, it has to be examined whether the idea is consistent with the long term strategy of the company. Moreover, rapid technological developments and changing customer requirements need to be considered when evaluating created ideas. In addition, market as well as economic characteristics decide upon the viability of an idea. Here, the size of the market niche or segment, the size of the market share but also the company's expertise in the market need to be taken into consideration. To sum up, the viability analysis considers following factors to assess the viability of generated ideas: economics, competitive advantage, harvest issues, industry and market, management team, personal criteria, and strategic differentiation. Not all of these factors will have equal importance for the company. This is the reason why every company has to decide upon appropriate factors on its own to conduct a viability analysis (cf. Elearn 2007, p. 85 – 87).

One method to screen ideas is the so-called Quality Function Deployment (QFD). This method *"is a customer-driven quality management and product development system for achieving higher customer satisfaction"* (Shen/Tan/Xie 2001, p. 65). QFD enables a company to translate customer needs into design as well as process parameters and, consequently, develop a product which meets customer requirements

(cf. Garcia et al. 2007, p. 24). The QFD makes use of four phases, these are voice of customer, product design, process design, and production planning (cf. Vahs/Brem 2013, p. 306).

In the phase voice of customer, customer requirements are determined and translated into technical features. The second phase product design focuses on designing the software according to customer requirements. During the process design phase, necessary requirements and parameters are determined for the production process. In the last phase of the process, work plans are established in order to being able to develop the product (cf. Vahs/Brem 2013, p. 306). Figure 5 shows the structure of the QFD method perceived by customers and developers, and related questions.
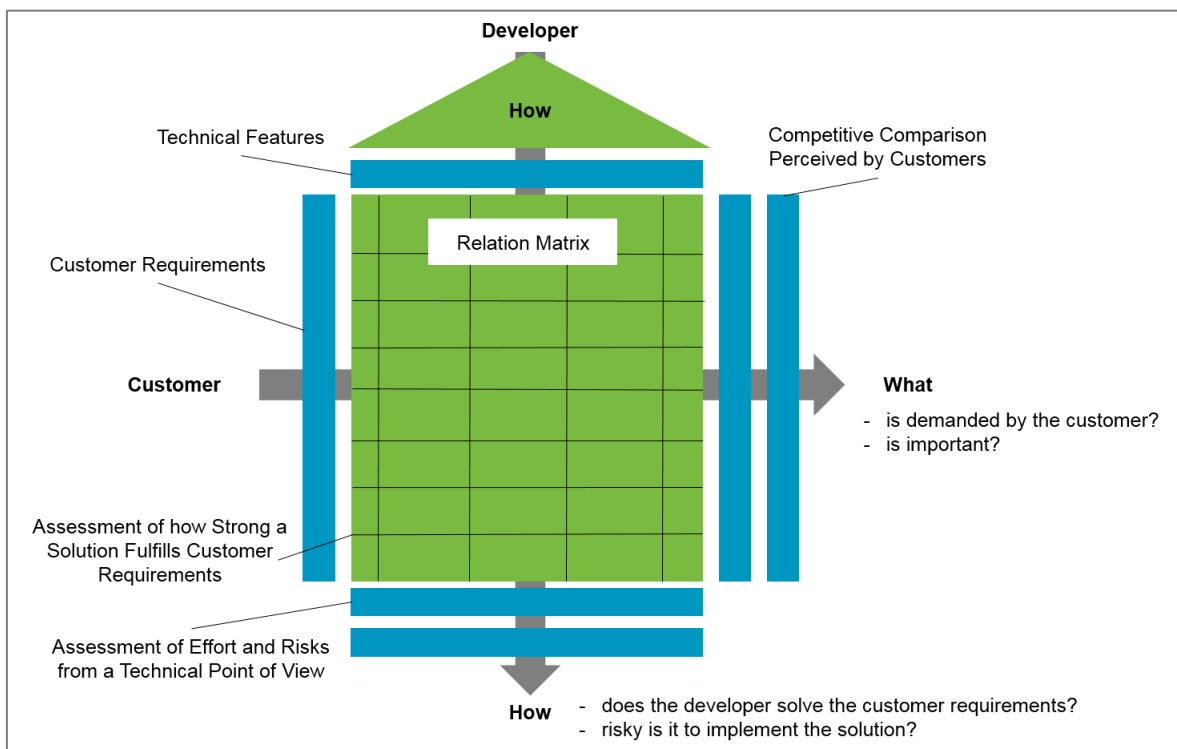
Figure 5: Structure of Quality Function Deployment (based on Vahs/Brem 2013, p. 309)

The QFD is a useful method to screen created ideas according to their viability because it allows a company to focus on customer requirements. Furthermore, QFD prioritizes resources, and takes into consideration information about competitors. In addition, future development redundancies are eliminated which leads to a reduction of implementation time. Another benefit is that the method encourages teamwork and provides documentation (cf. Bossert 1991, p. 6).

3.2.2.   Concept Test

Ideas which passed the viability test successfully have to be put to a concept test. This concept test allows to discover which ideas are able to meet the customers' needs. Furthermore, comprehensibility as well as credibility of the product concept are examined, and the perception of utility but also the purchase preference are determined. These concept test can be based on image displays, product models, etc. and explained verbally or in writing (cf. Weiber/Pohl 2017, p.118).

The conjoint analysis is one method to perform a concept test (cf. Weiber/Pohl 2017, p.118). In accordance with this method, customer preferences for existing or potential attributes of a product are determined (cf. Kahn 2006, p. 72). The conjoint analysis *"quantitatively calculates a metric of desirability (utility) for each attribute of a given product based on customer feedback"* (Kahn 2006, p. 72f.). Therefore, a set of attributes needs to be defined. This set enables the creation of product offerings based on the combination of attributes. The product offerings are evaluated by customers. As a result, desirability scores of individual attributes and relative importance for each single set of attributes are calculated (cf. Kahn 2006, p. 73).

3.3.   Preparation

After evaluating the most promising idea, a software company needs to take the steps required to implement ideas. At the beginning of the implementation phase, a high degree of uncertainty exists regarding competitor behavior, details of technological feasibility, and market demand. This is the reason why persons involved have to trust in a series of best guesses. Over time, the uncertainty is replaced with knowledge and employees get a better image of the end result (cf. Tidd/Bessant 2009, p. 81). The following sections provide an overview on tasks which need to be considered during the preparation phase before a software can be released.

3.3.1.   Definition of Objectives

Before the idea implementation, goals must be defined for specific outputs. The definition of objectives makes it possible to determine resources and facilitate the selection of appropriate communication activities as well as instruments (cf. Pfeffermann 2017, p. 120f.). The company's aim regarding a software release should be to achieve sustained business success by offering products which fit the software provider's strategy and meet customer needs (cf. Vahs/Brem 2013, p. 354f.). Examples for possible launch goals include the establishment of a new product name,

brand, and position but also the raising of awareness for the new product. Another objective could be to cross-sell a new product to an existing customer group (cf. Chapman 2018).

For the formulation of aims it is necessary to focus on effectiveness (do the right thing) and efficiency (do the things right). Effectiveness means that companies need to define strategic goals but also process as well as product goals. In addition, organizations must understand success factors as well as potentials and be aware of customer requirements. Efficiency, on the other hand, focuses on reaching objectives economically. Therefore, the success of an innovation process can be measured by three dimensions, these are:

- Quality
- Time
- Costs (cf. Schmelzer/Sesselmann 2010, p. 3)

The quality dimension measures if process activities are executed according to plan. The time dimension ensures that activities are completed on schedule while the costs dimension measures the process output (cf. Kepczynski et al. 2019, p. 443).

3.3.2. Definition of Measures

A company has to choose a strategic position which is solely claimed by the organization. To define a strategic position, the company needs to give answers to the following questions:

- Who are the customers?
- What software is offered to customers?
- How is software offered to customers efficiently? (cf. Garzia 2011, p. 10f.)

This insight allows a company to plan its marketing actions for the software release. In this context, it is defined, for example, at which fairs the new software is introduced, what the advertisement for the software shall look like, and what sales channels will be used (cf. Tyrväinen/Selin 2011, p. 4). Moreover, a company must ensure that customer support and sales employees complete a training to ensure precise knowledge about the new software and giving the right information to customers (cf. Schawel/Billing 2018, p. 196).

3.3.3.   Resource Allocation

To get an overview of financial, material, and personnel resources, a resource plan is prepared. This plan allows to predict expected project costs (cf. Vahs/Brem 2013, p. 384). Moreover, the needed resources should be combined with milestones in order to facilitate the tracking of the project's status. This combination forms the basis for the success control (cf. Disselkamp 2012, p. 197).

But the creation of a resource plan is not enough. To ensure a timely software release, a company must consider that employees need to have the right skills but also enough capacity. It must be taken into consideration that the success of a company results from the creativity of employees. This means that a company has to give employees sufficient space to create ideas on their own and that it allows them to put ideas into practice (cf. Woodward/Shaffakat 2017, p. 246).

3.3.4.   Time Plan

As already mentioned, the software market is a fast-paced industry (cf. DAMCO n.d., p. 2). This is the reason why the right timing is seen as a crucial success factor. The following three categories of timing strategies can be distinguished:

- First movers
- Early followers
- Late entrants (cf. Schilling 2013, p. 89)

First movers (or so-called pioneers) are the first ones selling a new product or service (cf. Schilling 2013, p. 89). If the pioneer is able to satisfy customer needs and demand is high, the first mover is generating significant revenue as well as profit. However, the success of the pioneer signals to competitors within the industry that money can be earned by imitating the pioneer. But there are various countermeasures how to make it more difficult for competitors to capture the first mover. First, being the first provider allows to exploit network effects but also positive feedback loops. Second, brand loyalty can be established. Third, cost advantages can be achieved by ramping up sales volumes ahead of rivals. Fourth, switching costs can be created for the pioneer's customers which makes the market entry more difficult for rivals. Finally, knowledge about customer needs, product technology etc. can be accumulated by the pioneer and consequently leads to a knowledge advantage (cf. Hill/Gareth 2010, p. 225 – 227). This timing strategy is recommended for software

providers due to high competitive pressure and shorter time-to-market (cf. Schulz/Steinhoff/Jepsen 2017, p. 350).

Early followers (or so-called early leaders) are early to market but not first (cf. Schilling 2013, p. 89). They appear on the market after pioneers but it is not assured that their product is a technical improvement for customers. However, early follower benefit from having more information about the market which leads to a reduced market uncertainty. Moreover, early leaders can take advantage of the pioneer's advance performance regarding technical as well as market development which allows an early follower to still establish the product for a long duration on the market (cf. Tomczak/Reinecke/Kuss 2018, p. 84f.).

Late entrants enter the market during or after the product begins to penetrate the mass market (cf. Schilling 2013, p. 89). Pioneers are able to raise entry barriers for late entrants due to patents or other protections. Furthermore, it might be difficult for late entrants to gain market share due to high switching costs. However, late entrants can learn from the pioneer's mistakes and hence be still able to improve the product design as well as marketing strategy. In addition, late entrants have good market information which increases certainty about their product's success (cf. Pride/Ferrell 2016, p. 39).

Table 1 provides an overview of when the timing strategies pioneer or late entry are preferable for a company.

Question	Answer	Recommendation
How long will this product category continue to exist on the market?	Long	Late Entry
	Short	Pioneer
How high are the anticipated switching costs in this market?	High	Pioneer
	Low	Late Entry
How great is the importance of the brand in purchasing decision?	High	Pioneer
	Low	Late Entry
How high are the costs of informing the market about the new product?	High	Late Entry
	Low	Pioneer
Is there a network effect on this market?	Yes	Pioneer
	No	Late Entry

Table 1: Key Considerations for Choosing a Timing Strategy (Tomczak/Reinecke/Kuss 2018, p. 86)

Besides the selection of the timing strategy, companies have to also think about the internationalization of its software. Due to modern communication instruments, economic cooperation between countries worldwide, and infrastructure, companies have access to various target groups, resources, and value added possibilities. Internationalization allows a company to benefit from diversification which means that the firm, for example, reduces its dependency on the domestic market. Consequently, the firm is able to reduce costs as well as risks (cf. Vahs/Brem 2013, p. 429f.). To go international, the parties involved must therefore ask themselves whether the company shall enter all markets at the same time or over a certain period of time. Backhaus differentiates between the waterfall and sprinkler strategies for going international. With the waterfall strategy the circle of international markets is gradually expanded. This means that a company first sells its product in the domestic market. Afterwards, the software is sold to countries which are similar to the domestic market. Finally, the company will offer its software to countries which differ from the domestic market. With the sprinkler strategy software is available in numerous foreign countries at the same time which allows a company to generate high sales volumes in a short period of time. This strategy is beneficial for software providers due to short product life cycles in the software industry (cf. Tomczak/Reinecke/Kuss 2018, p. 85f.).

3.3.5. Budget and Financing

As already mentioned, companies have to focus on innovations to stay competitive. This leads to a change in cost management. To vary cost perceptions and facilitate decisions regarding costs, target costing is seen as an appropriate strategic management accounting method (cf. Potkány et al. 2017, p. 130). Target costing allows to adapt products to cost but also quality requirements of customers during the product planning phase. Moreover, this method enables a company to reduce product life cycle costs from the product design phase to the after-sales service (cf. Ghafeer/Rahman/Mazahrih 2014, p. 250). To calculate the target cost, the selling price is subtracted from the target profit (cf. Jiang/Ørts Hansen 2016, p. 11). Figure 6 demonstrates the general structure of the method target costing including the product development.
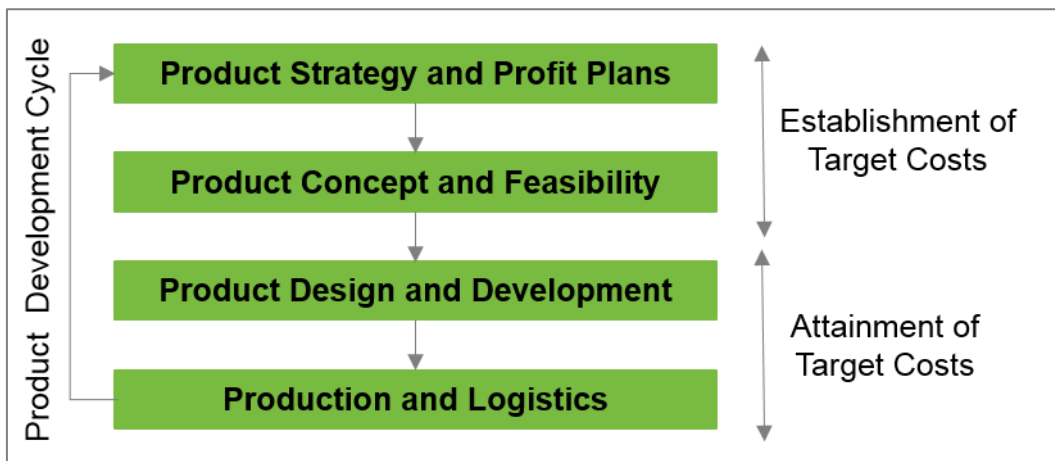
Figure 6: Target Costing (based on Jiang/Ørts Hansen 2016, p. 11)

As illustrated in figure 6, the establishment of target costs occurs during the phases product strategy and profit plans, while target costs are attained during the product design and development, and production and logistics phases. The first two phases of this process concentrate on the planning process. At the beginning of this process, a company must collect data about customer requirements and the willingness to pay in order to define the product's or service's features. Afterwards, the company is able to establish the selling price and set the target profit margin. To establish a selling price, the price of existing products but also competitors' prices serve as a basis. In addition, a company can make use of other factors to establish the selling price. Examples are the company's current competitive positioning as well as its long term market penetration target. These factors allow to reflect the company's as well as competitors' strategies but also customer demand. The attaining phase focuses on activities of cost reduction. This phase includes six major steps. First, the target cost is defined. The second step is to estimate the initial cost which is based on the current cost factors. The third task consists of calculating the cost gap between target cost and current cost. In order to close the calculated cost gap, step four focuses on designing the product or service. When the target cost is attained a company is able to release the cost-effective design. Finally, the company can undertake improvements on cost reduction (cf. Jiang/Ørts Hansen 2016, p. 11f.).

3.3.6. Protecting Software

A company must determine whether or how to protect its innovations. In general, companies can protect intellectual properties with patents, trademarks, and copyrights. Each of these three possibilities have different purposes. Patents protect inventions. Words or symbols are protected by trademarks, and original artistic but also literary work is protected by copyright (cf. Schilling 2013, p. 181f.).

To protect software, certain things must be taken into consideration (cf. European IPR Helpdesk 2018). *"Copyright will protect only the computer program in the form written by a programmer i.e. its source code. Neither the functionality of a computer program, nor the programming language nor the format of data files used in a computer program in order to exploit certain of its functions constitute a form of expression of that program, and thus these are not protected by copyright"* (European IPR Helpdesk 2018). Software can only be protected if it relates to a computer program as such. The European Patent Office only accepts software patents if the software is a so-called computer-implemented invention. The protection for such inventions is solely granted if they involve the use of a computer as well as a computer network or other programmable apparatus. In addition, these inventions must consist of at least one feature. Moreover, this computer-implemented inventions must have a technical character. If a software fulfills these criteria a company can try to obtain national, regional or international protection (cf. European IPR Helpdesk 2018).

3.3.7. Software Development

The task of a software company is to develop innovative software. Competitive advantage can be achieved through certain development, design, and testing skills of employees (cf. Lewis 2008, p. 395). In addition, the company's structure and size can have an impact on the software development. For small companies, a close cooperation with the management is possible while large companies face the challenge that numerous people are involved in the software development. This is the reason why the design for software development is emphasized more and more by scholars. The right design allows companies to efficiently develop software and save costs. Scholars recommend to use agile methods, such as Kanban or Scrum, for the software development (cf. Dobrigkeit/de Paula/Uflacker 2019, p. 199f., 219). Agile methods are described as *"an outgrowth of rapid prototyping and rapid development experience as well as the resurgence of a philosophy that programming is a*

craft rather than an industrial process" (Abbas/Gravell/Wills 2008, p. 95). This approach supports companies to reduce the development time, increase flexibility as well as the quality of the software. For the software development, Scrum is the most commonly used agile method. This approach is used for projects or situations which are difficult to plan beforehand. By using Scrum, the project team is working in so-called sprints. This means that work is planned in small cycles of one to four weeks (cf. Dobrigkeit/de Paula/Uflacker 2019, p. 200f., 205). *"Each sprint consists of a planning, working, and reflecting on the work done and the deliverables created"* (Dobrigkeit/de Paula/Uflacker 2019, p. 205).

The Scrum approach differentiates between the roles product owner, the Scrum master, and the development team. The product owner's task is to collect user's and stakeholder's requirements and transfer this input into small, understandable pieces. A Scrum master is seen as a coach whose tasks are to support the product owner but also the development team and ensure that everybody adheres to the Scrum rules. The development team works on the planned items and is responsible for the implementation of defined requirements (cf. Dobrigkeit/de Paula/Uflacker 2019, p. 207).

3.3.8.   Testing

After the development phase, software has to be tested in order to ensure the fulfillment of requirements (cf. Kriemadis 2018, p. 235). Due to fast changes in computer technology, increase in software complexity and user expectations, it has become more and more challenging for software providers to deliver high-quality software. Another challenge for software companies is to guarantee consistent reliability of software. Errors in software can result in considerable costs and damage the reputation of the provider. To ensure that customers receive a good-quality software, bugs must be fixed and customer requirements must be met. Apart from the aspects reliability and the fulfillment of customer demands, a software has to fulfill following criteria:

- Correctness
- Efficiency
- Integrity
- Usability
- Maintainability

- Testability

- Flexibility

- Portability

- Reusability

- Interoperability (cf. Basu 2015, p. 1 – 3)

To test software, a common way is to break the testing process into various levels. The first level of testing is a so-called unit, component, or subsystem test in which parts of the created system are tested. This test shall eliminate bugs before different parts are integrated. During the second level of testing, software developers test collections of interoperating components, subsystems, or units. In the third level of testing, the whole system is tested. Finally, a so-called acceptance or pilot test is conducted. If no problems occur, the software is ready to be released (cf. Black 2007, p. 21).

3.4. Software Release

The software release is often the most decisive phase of a new or adapted software. This phase reflects the company's ability to turn ideas into a financial successful software (cf. Bruhn/Ahlers 2017, p. 217). With the software release, the product life cycle of the software starts. At that time, potential customers get in touch with the software for the first time. This is the reason why the company had to already plan appropriate measures during the innovation process (cf. Aumayr 2006, p. 322).

3.5. Reflection

At the end of an innovation process, the whole process needs to be reviewed and improvement potentials have to be determined for the next innovation process. But many companies do not take up lessons learned due to the fear of criticism. Moreover, people do not feel comfortable to deal with mistakes and problems. However, lessons learned from success and failures need to be captured in order to improve the quality of the next innovation process. In this context, the company can evaluate its technological competence but also its capability regarding the product innovation management (cf. Tidd/Bessant 2009, p. 86).

At the end of the process but also during the process, innovation controlling plays a decisive role. The task of innovation controlling is to provide necessary business management information at the right time to the right people. The controlling pro-

vides strategically but also operationally important controlling information. On a strategic level, controlling focuses on providing relevant information about the company and its environment to the management. On the operational level, controlling concentrates on achieving milestones as well as coordinating financial, material, and personnel resources. The performance measurement allows to control activities and evaluate the performance of employees. Finally, controlling enables to document as well as visualize the value of activities for decision-makers (cf. Vahs/Brem 2013, p. 354 – 356). Table 2 provides an overview of the success measurement of innovations during the innovation process.

Process Step	Success Criteria	Measurement Dimensions	Responsible for Success Measurement
Idea Generation	• Protocols • Drafts	• Number of Ideas	• Technical Experts
R&D	• Software Design • Prototypes	• Technical Progress • Increase in Productivity	• Technical Experts
Invention	• Patents • Publications	• Number	• Engineers
Marketing, Software Development	• Feasible Process • Marketable Software	• Description of Improvements	• Engineers • Marketing
Software Release	• Cost Savings • Profits • Sales	• Amount of Money • Key Performance Indicators	• Controller • Marketing

Table 2: Success Measurement of Innovations (based on Trommsdorff/Steinhoff 2013, p. 67)

4. Innovation and Marketing

Innovation and marketing are key for the durable success in the competitive process due to the fact that the company's profits can be realized or rather maximized. The focus on innovation and marketing allows a company to survive in global competition as marketing is responsible to analyze the market requirements and provide this information within the company. This market observation throughout the innovation process allows to increase the success probability of an innovation (cf. Weiber/Pohl 2017, p. 1, 77). This is confirmed by a study of Kleinschmidt et al. According to this study, the success rate of products is twice as high due to carrying out sufficient marketing activities (cf. Stummer/Günther/Köck 2006, p. 87f.).

The task of marketing is not only to observe the market. Instead, marketing needs to also provide effective communication within the organization throughout the innovation process. A common understanding of required tasks is guaranteed through effective communication. Moreover, defined outcomes can be achieved which subsequently ensures the company's survivability. This internal communication measures must be provided by marketing in every phase of the innovation process – from the idea generation to the software release (cf. Woodward/Shaffakat 2017, p. 245). In addition, marketing is also responsible for external communication as marketing is defined *"as a function and process of the organization, which creates, communicates and delivers value to customers and maintains customer relationships by means profitable to the firm and interest groups"* (Tyrväinen/Selin 2011, p. 3).

To sum up, the marketing of innovation deals with the usage of tools from strategic innovation marketing but also with the commercialization of innovations (cf. Pfeffermann 2017, p. 305). Therefore, chapter 4 provides an overview of the different marketing tasks in each phase of the innovation process – from the strategic situation analysis to the reflection of the process. A brief overview is demonstrated in table 3 in advance.

Identification	Selection	Preparation	Software Release	Reflection
• Strategic Situation Analysis • Creativity Techniques • Collaboration with Lead Users • Expert Interviews • Scenario Technology	• Idea Viability Analysis • Concept Testing	• Definition of Objectives • Segmentation Analysis • Planning of Measures • Resources Assignment • Controlling of the Development Project • Market Testing	• Internal Communication • External Communication	• Controlling of Market Success

Table 3: Marketing Integration in the Innovation Process (based on Trommsdorff/Steinhoff 2013, p. 41; Disselkamp 2012, p. 95)

4.1. Innovation Impulse: Strategic Situation Analysis

The software industry is characterized by dynamic innovation due to fast developments and changes. Consequently, companies are faced with an increase in complexity and dynamics in their macro and micro environment. This means that companies are challenged by an increasing amount of external information which might even exceed the company's abilities to process information about its environment. However, a company has to keep an overview of the environment in order to gather ideas as well as develop new software or adapt its software to changes in the market. Through the ability to react to environmental changes or timely demands, the company can guarantee its survivability (cf. Hülsmann et al. 2017, p. 77f., 80). Moreover, the analysis of the company's environments reduces uncertainties and risks and is relevant for the software's success (cf. Stummer/Günther/Köck 2006, p. 87).

Marketing is responsible to understand what kind of software is demanded. Therefore, marketing managers have to screen the company's environment and to be able to interpret the gathered information. In addition, marketing's task is to analyze potential threats as well as opportunities and combine these findings with environmental changes to get an understanding of the company's current situation (cf. Pride/Ferrell 2016, p. 63).

A company operating in a domestic environment is solely concerned about competitive as well as technological factors in order to guarantee market success. An international company, on the other hand, does not only face new competitors but also new competitive dynamics (cf. Ansoff et al. 2019, p. 311). This is the reason why marketing managers of international companies are challenged because they need

to gather information of international markets. Moreover, it must be considered that the collection of valuable information is hampered by fast pace in the software industry. However, marketing managers are responsible for the adequacy, quality, and timeliness of data. Therefore, a strategic situation analysis needs to be supported by the right resources and follow a systematic and well-organized approach. In addition, the collection of market data must be seen as an ongoing process. This market data can be gathered through the use of commercial data sources, internal sources, government sources, periodicals and books but also, for example, through focus groups, and surveys (cf. Ferrell/Hartline 2014, p. 56, 76, 80).

Figure 7 demonstrates an overview of which factors need to be considered for a strategic situation analysis. It is shown that the performance of a strategic situation analysis involves the exploration of the company's macro and micro environment in order to identify present but also future strengths, weaknesses, opportunities, and threats (cf. Fleisher/Bensoussan 2015, p. 107).
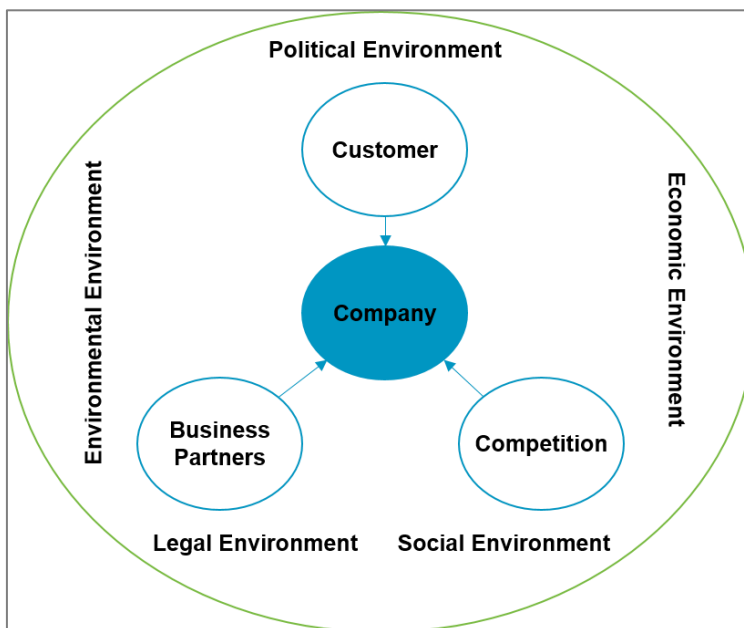
Figure 7: Situation Analysis (based on Weiber/Pohl 2017, p. 27)

The prediction of future demands is difficult. However, marketing can make use of certain analysis tools in order to reduce the risks and react to the organization's dynamic environment (cf. Pride/Ferrell 2016, p. 62). Therefore, the following sections introduce tools to analyze the company's macro and micro environment.

4.1.1. International Macro Environment Analysis

First, the company's macro environment is analyzed. This can be done with a so-called PESTEL analysis (cf. Warren 2008, p. 373). This analysis focuses on political, economic, socio-cultural, technological, environmental, and legal factors (cf. Pride/Ferrell 2016, p. 247). These factors are explained below.

Political Factors

The political contexts of a foreign country need to be understood by a company due to the fact that government decides what is beneficial for its society and do not tolerate activities that cause harm (cf. McManners 2014, p. 62). In addition, companies have to be aware that recent elections can change the political landscape within domestic but also international markets (cf. Ferrell/Hartline 2014, p. 67). Political factors include, for example, political stability, changes in government constitutions, the government's support to the industry and organizations, and changes in political but also national policies. Moreover, it has to be taken into consideration that governments may forbid foreign business activities. To avoid the loss of business, a company can arrange agreements and contracts with national governments (cf. Perera 2017, p. 8f.).

Economic Factors

Economic factors support a company to assess the economic conditions of a foreign country as these factors have an impact on the sales opportunities of the company's software (cf. Quack 1995, p. 49; Ferrell/Hartline 2014, p. 67). Influencing factors are the interest rate, inflation, and exchange rate but also budget deficit (cf. Hitt/Ireland/Hoskisson 2012, p. 19).

Socio-cultural Factors

A company has to consider cultural aspects, religions, traditions, and norms when doing international business because these factors influence the buying behavior of customers. In addition, these factors have an impact on how a company promotes its products in a foreign country. If a company is able to adapt to cultural values, a

better performance, higher productivity and growth targets can be achieved (cf. Perera 2017, p. 12; Trigwell-Jones 2016, p. 464).

Technological Factors

The technological environment is defined by the availability of scientific institutions but also specific technologies, and technological progress (e.g. patent application). This differs from industry to industry (cf. Meffert/Burmann/Kirchgeorg 2012, p. 65). Companies need to be capable to adapt its software to the speed of change in the environment (cf. Trigwell-Jones 2016, p. 464). Technological factors are distinguished between developments in IT and technology specific developments to an industry (cf. Cadle/Paul/Turner 2010, p. 4).

Environmental Factors

Environmental factors deal with so-called "green" issues. This means that changes in the natural environment need to be considered (cf. Cadle/Paul/Turner 2010, p. 4). Regarding the software industry, environmental factors focus on the increasing complexity of software. Companies face the challenge that software needs to be continually adopted to the fast changing customer requirements. Consequently, many companies release numerous versions of software because it is unlikely that all features can be delivered in solely one release. This allows a company to provide more reliable software on the market (cf. Zhu/Pham 2017, p. 72).

Legal Factors

Companies need to be aware of laws that affect the organization (cf. Cadle/Paul/Turner 2010, p. 4). But knowing the laws from the home country is not sufficient. Instead, a company must also know the laws from the host country. The laws of the host country can have an influence on how a company conducts its business because changes in global trade agreements or laws have an impact on international marketing opportunities. Furthermore, these laws can have an impact on how a company develops as well as uses technology, finances its operations, manages its workforce, and markets its software (cf. Griffin/Pustay 2014, p. 79 – 84; Ferrell/Hartline 2014, p. 67).

The factors mentioned above (political, economic, socio-cultural, technological, environmental, and legal) differ from country to country. Therefore, a company must define how information shall be collected about various foreign countries. Moreover, an appropriate strategy for managing innovation across boarders must be defined. The literature differentiates between four strategies, these are the center-for-global strategy, local-for-local strategy, locally leveraged strategy, and globally linked strategy. With the center-for-global strategy innovation activities are carried out at a centralized hub. A local-for-local strategy is chosen when each subsidiary carries out its own R&D activities and product needs differ from market to market. With the locally leveraged strategy each subsidiary conducts R&D activities on its own but innovations are leveraged across the company. A globally linked strategy follows the principle of decentralizing innovation activities but coordinates these activities centrally for the global needs of a company (cf. Schilling 2013, p. 220 - 222).

4.1.2. International Micro Environment Analysis

After carrying out a macro environment analysis, the micro environment of a company has to be examined. Porter's five forces is seen as an example for analyzing the micro environment. This technique focuses on observing the company's industry (cf. Cadle/Paul/Turner 2010, p. 6f.). Moreover, companies need to also focus on customer needs and carry out a customer analysis (cf. Hisrich/Kearney 2014, p. 95). Porter's five forces as well as the customer analysis are described below.

Porter's Five Forces

The five forces framework enables a company to gain insights into the industry's average price as well as costs. Each force has a relationship to the industry profitability. The more powerful a force is, the less attractive the industry becomes to its incumbents due to price pressure and / or higher costs. Figure 8 illustrates the five forces which are explored by an organization to determine the structure of its industry (cf. Magretta 2012, p. 37 - 40). Afterwards, each force is described below.
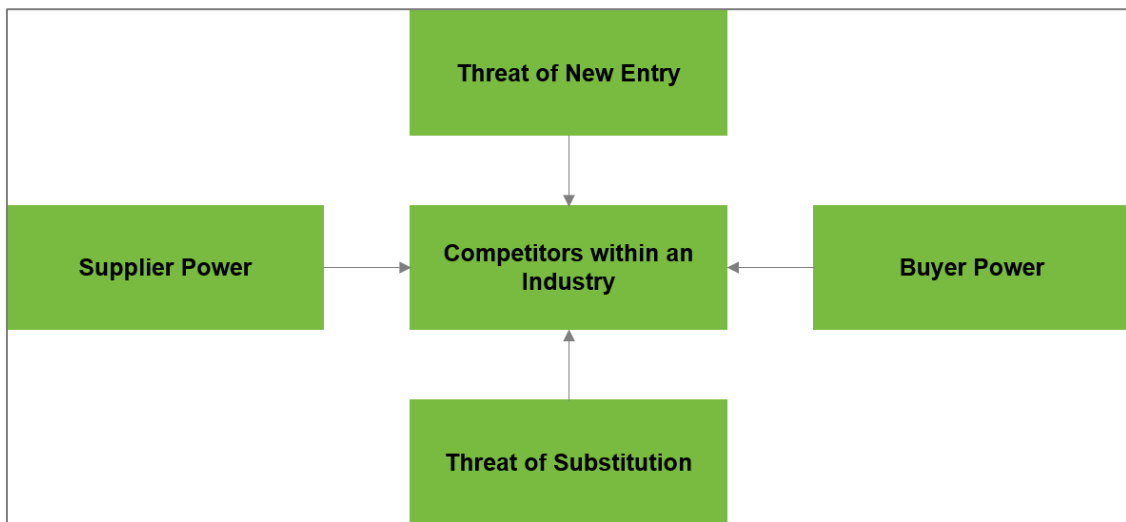
Figure 8: Porter's Five Forces (based on Cadle/Paul/Turner 2010, p. 6)

Threat of New Entry

This force focuses on observing the existence of entry barriers for new entrants and the likeliness for new companies to access the market (cf. Cadle/Paul/Turner 2010, p. 7). Newcomers have an influence on prices which means that incumbents would need to, for example, spend more money in order to satisfy their customers. This is the reason why entry barriers have to be high for new entrants (cf. Magretta 2012, p. 47).

Buyer Power

Powerful customers have an influence of the software's price and might demand more value in the software. In these two cases, powerful buyers are able to lower the industry's profitability and capture more value for themselves (cf. Magretta 2012, p. 41f.). In addition, companies need to evaluate the number of choices from among customers can chose and how easy customers can switch to another software provider (cf. Cadle/Paul/Turner 2010, p. 7).

Threat of Substitution

Companies need to be aware of available substitute products on the market. In this case, the organization has to compare its position with the provider of the substitutes (cf. Cadle/Paul/Turner 2010, p. 7).

<u>Supplier Power</u>

Organizations have to determine the amount of available suppliers and discover if the company can chose its suppliers on its own (cf. Cadle/Paul/Turner 2010, p. 7). Powerful suppliers could exploit the situation and charge higher prices or negotiate more favorable conditions (cf. Magretta 2012, p. 43).

<u>Competitors within an Industry</u>

A company has to evaluate its competitive position within the industry and be aware of the level of competition for the software (cf. Cadle/Paul/Turner 2010, p. 7). Therefore, competitors have to be continuously monitored. The observation of competitors allows a company to learn from them and enhance their ideas (cf. Disselkamp 2012, p. 126).

Regarding the company's competitors, an organization must be aware of several considerations. One of the major challenges is to identify the company's competitors and analyze their growth, size, strategies, and target markets. After detecting these facts, the competitors' strengths as well as weaknesses have to be analyzed. In addition, the competitors' capabilities but also vulnerabilities regarding their marketing program have to be determined. At the same time, it must be considered how competitors' will react to environmental changes. Lastly, a company must take into consideration that competitors might change in the future. This is the reason why a company has to ask itself how new competitors are likely to be (cf. Ferrell/Hartline 2014, p. 66 – 68).

Section 4.1.1. presents four strategies about how to collect data of foreign countries. As already mentioned, an international company can chose between four strategies, these are center-for-global, local-for-local, locally leveraged, and globally linked (cf. Schilling 2013, p. 220 - 222).

Customer Analysis

Customer focus should be seen as the key element for innovation efforts. A company is solely able to reach a competitive advantage in its target market by understanding the market and customer needs (cf. Hisrich/Kearney 2014, p. 95). This is

the reason why marketing managers have to understand the buyer behavior but also product usage characteristics. To gather this information, marketing can make use of the so-called 5W Model. This method concentrates on answering following questions: who, what, when, where, and why (cf. Ferrell/Hartline 2014, p. 60). These five questions are explained below.

Who questions answer following questions:

- Who are the current as well as potential customers?
- Who purchases the software?
- Who is influencing the purchase decision? (cf. Ferrell/Hartline 2014, p. 61; Hisrich/Kearney 2014, p. 96)

What questions focus on answering following questions:

- What are customers doing with the software?
- In what quantities is software purchased?
- What are customers doing with the software after the purchase? (cf. Ferrell/Hartline 2014, p. 61)

When questions respond to questions below:

- When is software purchased by customers?
- To what extent is the software purchase affected by marketing activities? (cf. Ferrell/Hartline 2014, p. 61)

The where question deals with the following topic:

- Where do customers purchase the software? (cf. Ferrell/Hartline 2014, p. 61)

Lastly, following why and how questions must be taken into consideration:

- Why do customers chose the company's software?
- What are basic software features provided by the company and its competitors?
- Are customers' needs expected to change in the near future? How?

- How can the relationship with customers be improved? (cf. Ferrell/Hartline 2014, p. 61)

4.1.3.   Evaluation of Potentials

The potential analysis is used for the strategic business planning. The tool enables a company to analyze the availability of resources. Its focus is on identifying as well as evaluating the company's internal potentials. The company's overall potential lies in financial, human, organizational, physical, and technological resources. The potential analysis is, therefore, applied to find ways to expand the company's business. This is the reason why this tool is relevant for conducting an internal viability study and discover if required abilities for developing new software or adapt its existing software are available within the organization. In this context, marketing determines the market as well as sales potential, and market size (cf. Holzmüller/Böhm 2007, p. 297). The *"market potential is the total amount of a product that customers will purchase within a specified period at a specific level of industry-wide marketing activity"* whereas the *"sales potential is the maximum percentage share of a market that an individual firm within an industry can expect to capture for a specific product"* (Pride/Ferrell 2016, p. 176). Market as well as sales estimates deliver relevant data for strategic decisions regarding the new software or existing software (cf. Holzmüller/Böhm 2007, p. 298).

4.1.4.   SWOT Analysis

After analyzing the company's external as well as internal environment, the collected data must be organized and structured. Therefore, the findings of the analysis are merged in a SWOT analysis and assessed regarding their strengths, weaknesses, opportunities and threats (cf. Ferrell/Hartline 2014, p. 85). Figure 9 illustrates how findings are merged in a SWOT analysis.
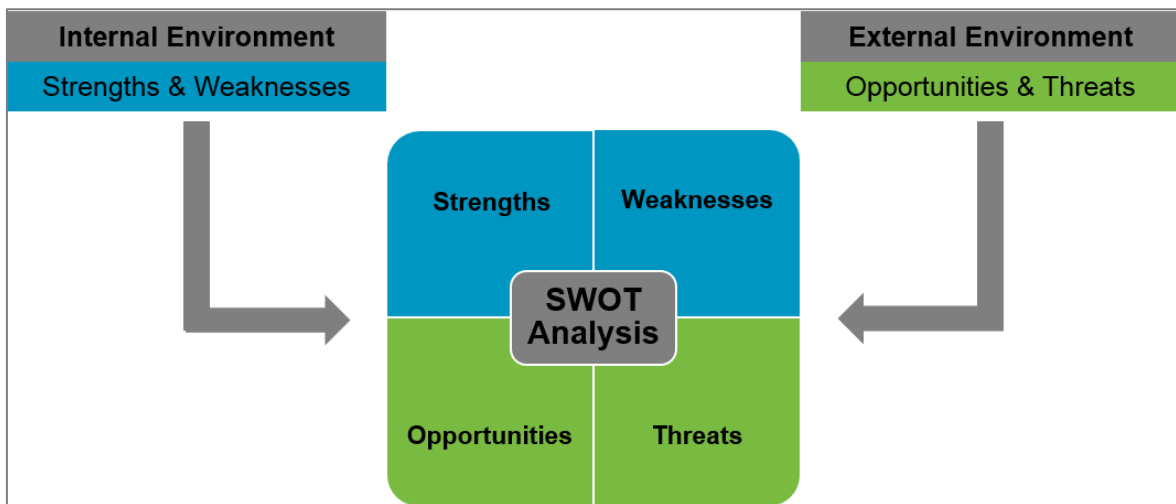
Figure 9: SWOT Analysis (based on Warren 2008, p. 99; Trommsdorff/Steinhoff 2013, p. 210)

Strengths and weaknesses are focusing on the company's resources as well as capabilities whereas opportunities and threats concentrate on the external environment. The external environment includes the macro and micro environment of the company. Knowledge about the status quo enables the software provider to draw conclusions about what the company is able to perform (cf. Warren 2008, p. 99). By investing strategically in key areas, such as customer support, employee training, and R&D, a company is able to convert weaknesses into strengths. Whereas threats can be converted into opportunities if the right resources are available (cf. Ferrell/Hartline 2014, p. 96). In addition, this analysis method allows a company to consider as well as understand forces and trends of the industry (cf. Fleisher/Bensoussan 2015, p. 107).

In conclusion of section 4.1., a company must be able to detect changes in the environment and be capable to keep pace with the environment. The sooner a company detects changes, the greater is the company's scope of action. Therefore, it is necessary to identify these changes earlier than competitors and to monitor the market continuously (cf. Trommsdorff/Steinhoff 2013, p. 206). If a company fails to adjust to these changes, the organization risks to lose its competitive position as well as to become unprofitable (cf. Ansoff et al. 2019, p. 123).

4.2.   Marketing Input for the Idea Generation

Section 4.2. provides an overview of how marketing can provide input to the generation of ideas for new software or existing software.

The generation of ideas is one of the major challenges during the innovation process because there is no method which guarantees the success of an idea. However, to

increase the probability of success, marketing managers have to possess technical know-how in order to create usable ideas. In addition, marketing must be capable of recognizing future problems and unmet needs. To determine latent as well as future needs, marketing can make use of certain instruments. These include the use of creativity techniques, collaboration with lead users, expert interviews (e.g. by using the Delphi method), and scenario technology (cf. Weiber/Pohl 2017, p. 108f.).

Possible creativity techniques (brainstorming, brain-writing, morphology, and synectics) as well as the collaboration with lead users are described in section 3.1.2. The methods expert interviews and scenario technology are described below.

Expert interviews are *"used to develop insights on a specific topic"* (Planing 2014, p. 94). Therefore, marketing can obtain advice and support of experts by using, for example, the so-called Delphi method (cf. Weiber/Pohl 2017, p. 109). This qualitative research methodology brings together experts who use a structured approach to work on a given issue. The aim of this approach is to attain a consensus (cf. Brady 2015, p. 1). This consensus is achieved after several iterations. According to Cyphert and Gant, Brooks, Ludwig, and Custer, Scarcella, and Stewart three rounds are sufficient in order to gather information and reach a consensus. The first round starts with an open-ended questionnaire (cf. Hsu/Sandford 2007, p. 2). This means that open or semi-open questions are asked. After collecting the experts' answers, questions become more structured. In the second round, participants provide feedback on all answers from the first round. Finally, the collected responses from round one and two enable the interviewer to develop a final questionnaire in order to find a final consensus. If no consensus is found in round three, additional rounds take place until the experts agree on a result (cf. Brady 2015, p. 3).

With the scenario technology, different future scenarios are established in order to minimize surprises and encourage managers to think in different ways. These scenarios are useful because they allow people to forget about the present. Instead, the scenarios enable participants to open up the future whereby different future scenarios can be created by involved participants. The planning of scenarios supports companies to understand future uncertainties and their impact on the company's business. Furthermore, this approach enables companies to get an overview of changes in the software provider's environment and hence makes it easier to adapt to changes (cf. Mietzner/Reger 2005, p. 223f.).

4.3.   Evaluation and Selection

As the goal of the idea generation phase is to create a wide range of ideas, numerous ideas are gathered through the use of the methods mentioned in sections 3.1.2. and 4.2. (cf. Weiber/Pohl 2017, p. 114). The generated ideas are screened in the selection phase of an innovation process. In this phase, the task is to find the most promising ideas and hence to reduce the risk of failure (cf. Bruhn/Ahlers 2017, p. 214).

The risk of failure can be reduced by exploring if created ideas fit the company's strategy and *"build upon established areas of technical and marketing competence"* (Tidd/Bessant 2009, p. 80). The idea screening should be done by management employees from different departments including controlling, marketing, and R&D. The task of these employees is to rank ideas according to their feasibility as well as viability (cf. Vahs/Brem 2013, p. 229). After preselecting ideas, chosen ideas are presented to the top management which is responsible for taking a final decision on which ideas shall be implemented (cf. Stummer/Günther/Köck 2006, p. 67). The procedure of evaluating and selecting the most feasible as well as viable ideas is explained in the next two sections.

4.3.1.   Assessment, Evaluation, Prioritization and Selection of Ideas

As already mentioned, it is necessary to check if generated ideas are realistic for the company (cf. Weiber/Pohl 2017, p. 115). This is the reason why ideas are evaluated according to their technical feasibility, expected success on the market and their strategic fit with the company's strategy. To consider different viewpoints, various assessment criteria have to be defined for the screening of ideas. For example, following criteria can be chosen for the evaluation of ideas:

- Economic factors (e.g. cash flow, ROI (return on investment), sales etc.)
- Marketing related factors (e.g. competitive situation, market growth, market volume etc.)
- Technological factors (e.g. integration capability in the company's range of products, synergy effects etc.)
- Temporal factors (e.g. durability of the innovation process and product life cycle etc.) (cf. Vahs/Brem 2013, p. 312, 316)

To evaluate ideas according to chosen assessment criteria, weighting criteria are used. These weighting criteria consider, for example, the idea's impact on employees as well as the company's cost situation, and implementation effort (cf. Vahs/Brem 2013, p. 317).

For the idea screening, companies can make use of qualitative and quantitative methods. Examples for qualitative methods are checklists, pair-wise comparison, and verbal evaluation. Quantitative methods include the benefit analysis and the calculation of economic efficiency (cf. Stummer/Günther/Köck 2006, p. 67).

The benefit analysis is a method which combines qualitative and quantitative assessment methods (cf. Vahs/Brem 2013, p. 321). This method allows a team to define necessary criteria in order to evaluate alternatives. The criteria can, for example, consider the topics marketing mix, competition and market, and the company's abilities. After selecting necessary criteria, the weighting factor for each criterion must be defined. Afterwards, the task is to identify the relevance of each criterion for the ranking of the alternatives. As a result, the most advantageous alternative is detected (cf. Kühnapfel 2014, p. 5 - 10). For a better understanding of the procedure, table 4 illustrates the structure of a benefit analysis.

Criteria	Weighting Factor	Alternative 1		Alternative 2		Alternative x^n	
	g	$x1$	$x1 \cdot g$	$x2$	$x2 \cdot g$	x^n	$x^n \cdot g$
Criterion 1	0,2	4	0,8	2	0,4	1	0,2
Criterion 2	0,5	4	2	2	1	3	1,5
Criterion x^n	0,3	3	0,9	3	0,9	2	0,6
Σ	1		**3,7**		**2,3**		**2,3**

most advantageous alternative

Table 4: Example of the Structure of a Benefit Analysis (based on Vahs/Brem 2013, p. 330)

4.3.2. Concept Testing

Ideas which passed the selection process can afterwards be tested in more detail via a concept test. In section 3.2.2. it is explained that the most promising ideas are determined through a conjoint analysis. This analysis enables marketing to determine, for example, the sales potential, perception of utility, and purchasing intention of the software. The concept testing allows a company to find the most promising ideas and start its development phase (cf. Weiber/Pohl 2017, p. 118f.).

4.4.   Preparation of the Business Case

After defining the most promising ideas, marketing is able to start with the business planning whereas software engineers can start with the software development. The preparation of the business case includes the definition of objectives, segmentation analysis, planning of measures, resources assignment, controlling of the development project, and market testing (cf. Weiber/Pohl 2017, p. 119; Trommsdorff/Steinhoff 2013, p. 41, 316). These marketing activities are explained below.

4.4.1.   Definition of Objectives

Before formulating marketing goals, it has to be considered that a goal needs to fulfill certain criteria: A goal needs to be attainable, to have a certain degree of continuity, to assign responsibilities, and to define a time period during which the goal shall be reached. The right formulation is necessary as these goals shall define the desired output at the end of the innovation process (cf. Ferrell/Hartline 2014, p. 108 – 111).

Marketing's desired output of an innovation process is to achieve a competitive market advantage by offering marketable software. Therefore, the achievement of competitive advantage needs to be also reflected in a monetary gain. To reach a monetary gain, a company has two possibilities to maximize its profits. First, sales can be increased through effectiveness advantages. Second, costs can be reduced through efficiency advantages (cf. Weiber/Pohl 2017, p. 31; Trommsdorff/Steinhoff 2013, p. 67).

International companies follow the same goals as domestic domestic companies. Following goals are, for instance, defined:

- Growth in size / volume (e.g. to sustain growth and avoid stagnation, increase the volume as well as size of the company)
- Improvement in profitability (e.g. to sustain growth and avoid stagnation, increase the volume as well as size of the company)
- Balance of the company's strategic portfolio (e.g. ensure a continued profitability / growth, guarantee the company's invulnerability to discontinuities) (cf. Ansoff et al. 2019, p. 314f.)

4.4.2. Segmentation Analysis

At the end of the selection phase in the innovation process, the most advantageous ideas were chosen. After this step, target customers need to be identified with the so-called segmentation analysis. Knowing the target customers enables marketing to choose the right instruments for the marketing mix. Therefore, the segmentation analysis takes the relative market and the market potential of the total market into consideration. These insights make it possible to discover appropriate segments. These segments need to be accessible, actionable, measurable, and substantial (cf. Trommsdorff/Steinhoff 2013, p. 316, 318, 320). Four categories are distinguished for the market segmentation, these are behavioral segmentation, demographic segmentation, geographic segmentation, and psychographic segmentation (cf. Ferrell/Hartline 2014, p. 136). These four categories are explained below.

Behavioral segments distinguish the market according to consumers' behavior or product usage. This category of segmentation is closely associated with the customers' needs. Demographic segments divide customers, for example, according to their education, gender, and income (cf. Ferrell/Hartline 2014, p. 136f.). With the geographic segmentation, the market is distinguished by geographical units. These units can be cities, nations, regions, and states (cf. Claessens 2016). Psychographic segmentation deals with, for example, attitudes, interests, lifestyles, and motives. B2B markets are segmented according to the factors demography (e.g. industry, location), socioeconomics (e.g. company size, market position, sales), psychographics (e.g. attitudes, involvement, motives, objectives), and behavior (e.g. price behavior, suppliers) (cf. Trommsdorff/Steinhoff 2013, p. 321f.).

4.4.3. Planning of Measures

The communication measures for the software release depend on the type of software that is offered by a company (cf. Tyrväinen/Selin 2011, p. 4). Therefore, the following paragraphs present different measures for each type.

Usually, embedded software is solely developed for one company. This is why software is individually implemented and deployed. In professional service business a company must be able to build trust to customers because the software does not exist yet. In this kind of business, the number of customers is small but transaction costs as well as revenue are high. Therefore, software companies have to concentrate on customer relationship management. Internet-generation organizations that

offer low-priced software, on the other side, have to focus on strong brand marketing and marketing alliances. For this standardized and packaged software products, marketing costs constitute a major part of the budget (cf. Tyrväinen/Selin 2011, p. 4).

In general, marketing for software services includes *"relationship management, seminars, fairs and other form related to personal communication, software product business relies more on advertising and direct sales while both use Internet as a marketing channel"* (Tyrväinen/Selin 2011, p. 4). Typical sales channels for software are personal selling, representatives and value-added-resellers. International software companies are cooperating closely with customers hence the organizations make use of representatives (cf. Tyrväinen/Selin 2011, p. 4).

4.4.4. Resources Assignment

Marketing has to discover the current but also the anticipated level of organizational resources which are available for marketing purposes. Therefore, marketing has to review financial and human resources but also resources which improve the customers' experience. Furthermore, marketing has to find out if these resources are likely to be available in the near future (cf. Ferrell/Hartline 2014, p. 59).

4.4.5. Market Testing

After the software engineers developed the software, it is possible to carry out a market test. The aim of this test is to find out if the software will be able to assert its position in the market (cf. Weiber/Pohl 2017, p. 164). Therefore, software is tested by the software developers regarding its functionality (cf. Agarwal/Tayal 2009, p. 30). Furthermore, there are two possibilities to collaborate with demanders from a marketing point of view. First, the provider can make its software available to customers before the purchase. This has the advantage that the company receives accurate feedback about its software and is hence able to optimize it. Through this optimization, the market success can be increased. Second, customers can be taken as a reference after the purchase. For the selection of appropriate customers, companies can make use of lead users because these type of customers are able to articulate their demand well (cf. Weiber/Pohl 2017, p. 164f.).

4.5.   Software Release

After testing the software according to its functionality, the software can be provided to customers. To release a software successfully, the internal as well as external innovation communication serves an important role. Innovation communication is defined as a systematically planned communication with the aim to create an understanding as well as trust for the innovation. In addition, the innovation communication enables a company to issue the release of a new software and raise awareness for the software provider (cf. Vahs/Brem 2013, p. 393 - 395). Moreover, marketing can strengthen the organizational culture but also its position within the organization with chosen communication tools. This type of communication has to be conducted throughout the whole innovation process (cf. Ferrell/Hartline 2014, p. 60). Internal as well as external communication measures are described below.

4.5.1.   Internal Communication

Internal communication allows to improve the relationship between marketing and R&D but also other company functions (cf. Mohr/Sengupta/Slater 2010, p. 125). This is the reason why internal communication focuses on sharing technological as well as market-related knowledge within the organization. To keep employees up to date, marketing can make use of various communication tools. Following measures can be implemented by marketing:

- Employees can be informed personally at a workshop or an employee event.
- An internal newsletter can be created for employees.
- Information can be spread electronically via e-mails, use of intranet, and during videoconferences (cf. Vahs/Brem 2013, p. 400).

According to Zerfaß and Ernst, the most important internal communication tools are internal newsletters, the intranet, team meetings, product demonstrations, employee meetings, and trainings (cf. Vahs/Brem 2013, p. 401). The use of these communication instruments ensures that all employees understand the organizational issues and are able to comply with them (cf. Mohr/Sengupta/Slater 2010, p. 126).

4.5.2.   External Communication

As already mentioned, software is intangible which leads to the fact customers do not know if the software keeps its promises (cf. Haller 2017, p. 8). This is the reason why marketing has to be able to articulate the vision of the software and hence

minimize the customers' purchase risk. Therefore, marketing has to provide a relative advantage for customers and communicate the software's benefits. These benefits must be observable for everyone. Furthermore, customers must be convinced that the software is easy to use (cf. Mohr/Sengupta/Slater 2010, p. 236f.). On the actual release date, the software code should be made available for the target group and necessary information has to be provided by the release announcement but also social media postings (cf. Proffitt 2015).

Regarding the release announcement, a company has to find an appropriate timing for the release. For sending out the release announcement, Tuesday is seen as the most appropriate week day whereas Fridays or holidays are seen as inappropriate (cf. Proffitt 2015). If possible, major software releases should be coordinated with, for example, relevant fairs or other events (cf. Stummer/Günther/Köck 2006, p. 97).

A company can also make use of pre-announcements which allow to stimulate the development but also marketing. If customers depend on the software providers' product, a pre-announcement is useful to inform customers about features of the new software in advance. However, the software provider must take into account that also competitors will find out about the company's new software and will react to it. Moreover, the organization's reputation can be damaged if the software provider is not able to release the software on time or is not able to offer the promised features (cf. Mohr/Sengupta/Slater 2010, p. 421).

4.6. Reflection

As already mentioned in section 4.4.1., the desired output of an innovation process is to achieve a competitive market advantage (cf. Weiber/Pohl 2017, p. 31). Following four success criteria can be reviewed by marketing. First, marketing can check the market success of the software. This criterion is measured by the customer satisfaction, the achievement of market share but also sales figures, and the number of customers. Second, marketing can control if financial performance goals were achieved. This criterion includes the controlling of profit targets and the return on investment. In addition, it can be checked if the break-even point was reached. Third, marketing can measure the overall performance. This includes the achievement of quality goals, development costs, speed-to-market, and release in time (cf. Trommsdorff/Steinhoff 2013, p. 68). Lastly, learning outcomes and the reduction of errors can be evaluation criteria for the success of an innovation (cf. Weiber/Pohl 2017, p. 243).

5. Introduction of Software Innovation Processes

Innovations are organized in a process manner. As described in chapter 3, an innovation process includes all necessary steps from the idea generation to the product launch. In the literature, various approaches subdivide the innovation process into phases or steps. This subdivision allows to keep an overview of the entire innovation process and to make different tasks visible. Critics have the opinion that such innovation processes solely exist on paper and are not lived by employees. The reason for this is that there are difficulties to find the optimal mix regarding general validity and level of detail. Moreover, the structure of an innovation process needs to be able to respond to company-specific factors (cf. Vahs/Brem 2013, p. 231). Therefore, chapter 5 introduces four innovation processes for software. Afterwards, criteria for evaluating and selecting the right innovation process are mentioned.

5.1. Innovation Processes for Software in Comparison

This section gives an overview of possible innovation processes for software. These processes do not solely focus on the software development itself but also include activities from the idea generation to the software release (cf. Kneuper 2018, p. 97). These four processes are called spiral model, Stage-Gate process, V-Model, and waterfall model (cf. Schuh/Müller/Rauhut 2012, p. 166, 170, 173, 175).

5.1.1. Spiral Model

The spiral model, originally developed by Boehm, provides software developers a framework which is used for designing a software innovation process (cf. Agarwal/Tayal/Gupta 2010, p. 44). This innovation process distinguishes itself from other processes by being a risk-driven approach instead of focusing on documentation or the code (cf. Boehm n.d., p. 1). Risks are seen as *"potentially adverse circumstances that may impair the development process and the quality of the product"* (Agarwal/Tayal/Gupta 2010, p. 44). Therefore, the spiral model supports software providers with identifying, addressing as well as eliminating software risk items before they can become a threat for the company or lead to high software rework. The spiral model is used when complex systems with a numerous amount of features should be developed from scratch (cf. Agarwal/Tayal 2009, p. 34). Figure 10 demonstrates the design of the spiral model.

Figure 10: Spiral Model (Boehm n.d., p. 7)

Figure 10 illustrates that the spiral model is divided into four quadrants and cycles. Accumulated costs are represented by the size of the spiral while the process progress is reflected by the angular dimension. In the first quadrant the task is to identify objectives as well as to consider alternative solutions. In the second quadrant these alternative solutions are evaluated in detail with regard to the company's defined objectives (cf. Agarwal/Tayal/Gupta 2010, p. 44f.). During the evaluation of alternatives, uncertainties and sources of risk are identified (cf. Boehm n.d., p. 7). If risks occur, the third quadrant deals with the strategy development which should resolve the risks as well as uncertainties. In this phase, activities, such as benchmarking, prototyping and simulation, are conducted in order to eliminate risks. In the fourth quadrant the objectives and actions for the next cycle have to be defined in order to being able to build a complete system (cf. Agarwal/Tayal 2009, p. 35).

The spiral model allows the persons involved to review each cycle before passing on to the next cycle. During this review, the current situation is determined and required resources are planned for the next cycle. In addition, those reviews allow to get the right user interface, meet performance requirements, and deliver the required results in time and budget. The main goal of the review is to ensure that all employees involved are committed to the approach for the next cycle (cf. Boehm n.d., p. 9, 17).

5.1.2. Stage-Gate Process

The Stage-Gate process was created in the 1980s in order to facilitate new-product projects with its systematic as well as disciplined structure. Based on an in-depth study of successful product launches, this process has proven to have a positive impact on the product introduction process from the idea generation to product launch (cf. Cooper 2017, p. 48). At the beginning, the Stage-Gate process was only used for the development of new software products. However, this process proved to be also appropriate for manufacturers of physical products (cf. Cooper/Sommer 2016, p. 1). The process is often implemented by companies because it is cross-functional which means that employees from all company departments are involved in the innovation process right from the beginning (cf. Cooper 2016, p. 22). In addition, this approach enables a process team to go through a product innovation process step by step and decide after each stage if the project shall be continued or stopped (cf. Cooper 2011, p. 19). The process flow is demonstrated in figure 11.
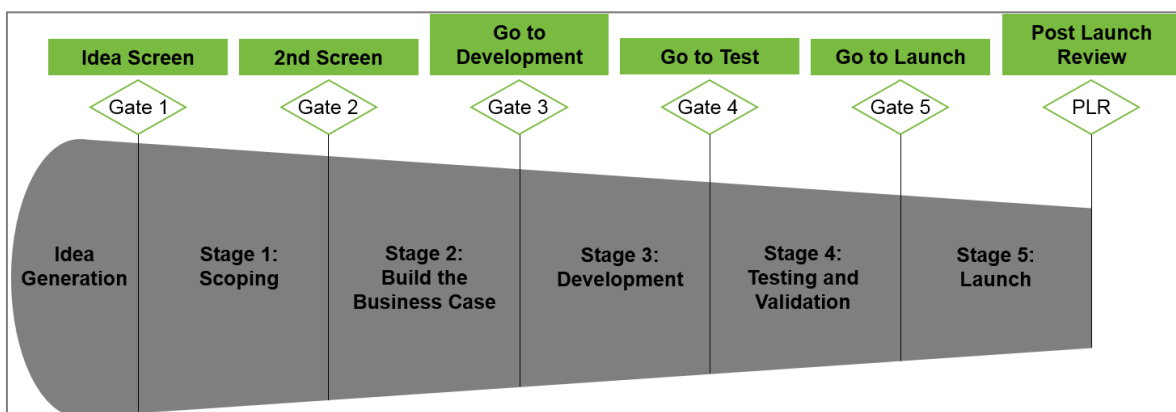
Figure 11: Stage-Gate Process (based on Cooper 2017, p. 49)

As shown in figure 11, the Stage-Gate process consists of six stages (cf. Cooper 2016, p. 2). These stages and the purpose of gates are described in the following paragraphs.

Idea Generation

At the beginning of the Stage-Gate process, a small core team of technical as well as marketing employees undertakes an investigation of business opportunities. These findings allow the core team to generate ideas for the new product (cf. Cooper/Edgett 2006, p. 4).

Scoping

In this stage a quick investigation is done by the project team. The task is to conduct desk research in order to define the scope of the project (cf. Edgett 2015, p. 4).

Build the Business Case

The detailed investigation of customers, the market, and technical demands enables a company to build a business case. This case consists of the definition of the product as well as of the project, the project justification, and the development plan (cf. Edgett 2015, p. 4).

Development

The new product is designed and developed. In this stage, the company implements the development plan, builds a prototype and tests the product in-house as well as with chosen customers. In addition, the marketing department plans the measures for the launch of the product (cf. Cooper/Edgett 2006, p. 4).

Testing and Validation

In this stage the developed product and marketing operations are tested (cf. Edgett 2015, p. 4).

Launch

In the last stage, the product is commercialized. The marketing launch plan is implemented and the post launch activities are carried out. Moreover, a company has

to monitor and adjust its product in order to ensure that defined goals can be achieved (cf. Cooper/Edgett 2006, p. 4).

Gates

After each stage, a decision has to be made about the further course of action (cf. Cooper 2011, p. 19). Here, it needs to be considered if the company should continue investing in the project or stop it. These gates can be seen as quality-control checkpoints which support a company to focus on the execution quality, evaluate business rationale, stick to the project plan, and align resources. For each gate, the project team has to do different tasks. In gate 1 the generated ideas are screened while gate 3 is a business rational driven decision gate. In this gate the project team has to decide whether the development of the product can be started or if the process needs to be rethought. However, the gates have a similar structure (cf. Edgett 2015, p. 4f.). The Stage-Gate process *"incorporates six proven criteria:*

- *Strategic fit*
- *Product and competitive advantage*
- *Market attractiveness*
- *Technical feasibility*
- *Synergies / core competencies*
- *Financial reward / risk"* (Edgett 2015, p. 5)

Through the use of these six criteria, the company stays on track. Moreover, the company ensures that the right project is implemented (cf. Cooper/Sommer 2016, p. 2). This allows a company, for example, to accelerate the time-to-market, decrease new product failure, and improve the cross-functional engagement within the organization (cf. Edgett 2015, p. 3).

5.1.3. V-Model

The V-Model was originally developed by the German government and is a software process which concentrates on the entire software life cycle (cf. Kneuper 2018, p. 99). This model can be seen as an extension of the waterfall model (see section 5.1.4.). But instead of following a linear approach, the process steps of the V-Model are bent upwards the coding phase and hence form a V-shape (cf. Singh Dhami 2016, p. 241). The horizontal axis demonstrates the time or project completeness

while the vertical axis represents the level of abstraction (cf. Shanker Yadav 2012, p. 1). Figure 12 shows the procedure of the V-Model.
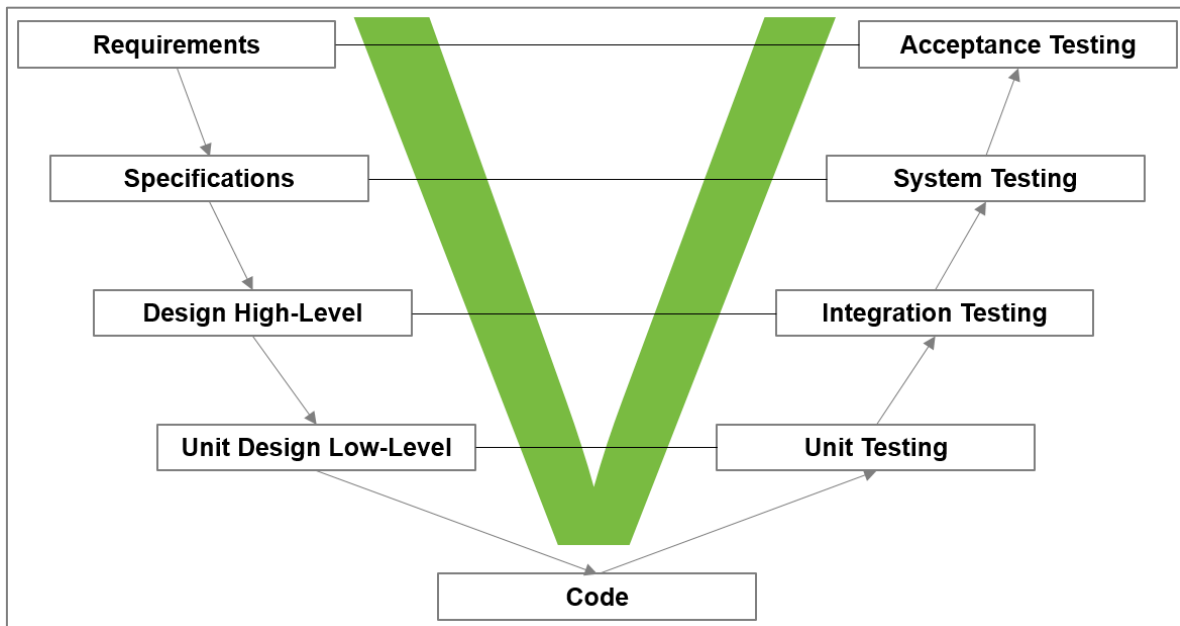
Figure 12: V-Model (based on Schuh/Müller/Rauhut 2012, p. 173; Balaji/Sundararajan Murugaiyan 2012, p. 28)

As shown in figure 12, testing is a crucial element in the V-Model. Accordingly, testing is of great importance after each development phase (cf. Singh Dhami 2016, p. 241).

At the beginning of the process, requirements have to be defined (cf. Schuh/Müller/Rauhut 2012, p. 174). This means that the feature set but also customer needs are analyzed (cf. Powell-Morse 2016). Based on these requirements, software developers are able to prepare system test cases. The phase design high-level enables software developers to build the software architecture and prepare cases for the integration testing (cf. Balaji/Sundararajan Murugaiyan 2012, p. 28; Powell-Morse 2016). After the development of components, the integration test is conducted. This test can be seen as the most important test during the process because it is validated if all components are compatible with each other (cf. Shanker Yadav 2012, p. 2). The phase unit design low-level includes detailed specifications for the implementation of the functional, coded business logic. Finally, the actual coding is done and potential bugs as well as issues are fixed (cf. Powell-Morse 2016).

The advantages of the V-Model are the specification of requirements and the conduction of a risk analysis at the beginning of the process. Moreover, the management of the V-Model is simple due to the rigidity of the model. However, the model

is not recommended if requirements are often changed due to the rigidity of the V-model (cf. Singh Dhami 2016, p. 242).

5.1.4.   Waterfall Model

The waterfall model consists of non-overlapping phases which are needed to develop software (cf. Laplante 2003, p. 24). This model is useful for a software provider when tasks depend on the results of completed tasks of prior stages (cf. Ihrig 2013, p. 41). Each phase consists of two elements. The first element concentrates on carrying out the work while the second element verifies as well as validates the work done (cf. Cadle/Yeates 2008, p. 69). As shown in figure 13, the waterfall model consists of the stages system requirements, software requirements, analysis, design, coding, testing, and delivering and maintenance (cf. Schuh/Müller/Rauhut 2012, p. 170).
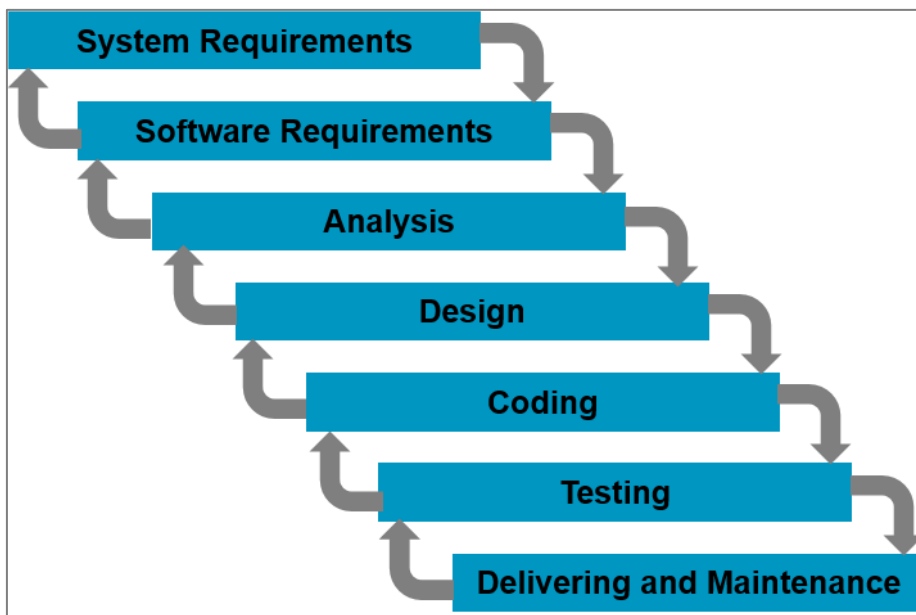
Figure 13: Waterfall Model (based on Schuh/Müller/Rauhut 2012, p. 170)

At the beginning, costs and benefits of the proposed software application need to be evaluated. Therefore, the problem has to be analyzed and understood in order to identify alternative solutions as well as the costs and benefits for users of these alternatives. In the next steps, the ease of use, functionality, performance, portability etc. are identified. As a result of this analysis, a software provider should be able to state the problem, determine technical and economic viability, define alternative solutions as well as expected benefits, and create a time plan with required resources and costs (cf. Agarwal/Tayal 2009, p. 28f.). In the design phase, software developers transform the defined requirements of prior stages into a suitable structure in

order to implement them in a programming language. After that, software developers are able to write the code for programs (cf. Agarwal/Tayal/Gupta 2010, p. 38f.). In the next phase, it needs to be tested if the developed software fulfills the set requirements. First, a so-called alpha testing is conducted by the software developers. Second, a so-called beta testing is performed by chosen customers with support of the software developers. Finally, an acceptance testing is performed by customers themselves. If the software works, it can be installed by customers. The delivery of software can be done in two stages. In the first stage, the developed software is distributed to chosen customers before the official release date. This has the advantage that customer feedback can be collected in order to make changes if required. In the second stage, the software is distributed to all customers. After the release, remaining errors in the system need to be corrected and the software needs to be adapted to changes in the environment (cf. Agarwal/Tayal 2009, p. 30f.).

The advantages of this waterfall model are that it follows a linear as well as systematic approach. In addition, the implementation of this model is simple and proper documentation is provided to software developers. But it must be taken into consideration that no risk analysis is conducted, a working version of the system is only available at the end of the project, and a project team can solely go back one phase if problems occur (cf. Agarwal/Tayal/Gupta 2010, p. 41).

5.2.   Characteristics of a Software Innovation Process

It is not enough to solely implement any innovation process. Instead, it must be ensured that the process meets certain characteristics to guarantee success (cf. Edgett 2015, p. 1). Therefore, the following sections explain which criteria should be met by an innovation process.

5.2.1.   *Clear Go / No Go Decision Points*

Clear go and no go decision points are crucial for the success of an innovation process. Therefore, companies should make use of so-called quality gates. Quality gates are carried out at specific stages within a process and evaluate the quality as well as completeness of agreed results. These quality gates enable companies to monitor the quality as well as progress of the innovation process on a continuous basis, assign roles within the process, and integrate the top management in the process (cf. Seidenschwarz 2008, p. 45f.).

To implement quality gates within the innovation process, selection points throughout the process must be defined in which parties involved come together and review the project status. The project is reviewed against defined decision criteria which allow to make fact based decisions. The decisions are made by those employees which own the resources and are hence able to make the allocation decisions required in order to being able to continue the project. Moreover, these quality gates allow to make timely decisions and realize early enough if a project should be approved or killed (cf. Edgett 2015, p. 2).

5.2.2.   Employee Commitment

In order to have the commitment for innovation of all employees, certain points must be taken into account. These aspects are mentioned below (cf. Mast 2017, p. 177).

An innovation process needs to be appealing to all involved parties from the beginning. Therefore, it is necessary that participating employees are invited at the beginning to draw up a common agenda. This meeting makes it possible for employees to talk about their insights. By participating right from the start, employees feel perceived as well as understood. The integration of involved employees enables a company to discuss different views within the team and results in a common understanding of the problem that needs to be solved. This assures that all concerned employees are on the same page and work on the same goal (cf. de Bruijn/ten Heuvelhof/in 't Veld 2010, p. 123f.).

Employees are not willing to innovate if the need for innovation is unclear. Therefore, it must be clear for employees why innovations are necessary for an organization. Furthermore, it must be considered that people do not like changes. To encourage employees to think outside the box, it must be conveyed that not only the company itself but also employees benefit from the innovation. Moreover, employees want to see where the company is going and evaluate if innovations are aligned to corporate values. Additionally, employees value openness, honesty, and reliability which means that leaders should speak openly about the progress of the innovation. This behavior avoids producing feelings of being captured and motivates employees to contribute to the innovation process and share their information in small ways instead of limiting information exchange to solely meetings (cf. Mast 2017, p. 177, 180; Mohr/Sengupta/Slater 2010, p. 119).

5.2.3. Consideration of Subprocesses

A process refers to structured activities conducted by employees in order to produce a product or service for customers in a defined period of time (cf. Haller 2017, p. 119). To introduce the output of a process in an efficient manner, it is advisable to divide the process into subprocesses. The consideration of subprocesses enables a company to identify deviations at an early stage and makes it possible to react to those deviations (cf. Gaitanides 2012, p. 57).

5.2.4. Cross-Functionality

Companies often fail during an innovation process due to a functional disconnect. This means that business functions do not collaborate with each other and do not share insights to other business functions. Consequently, it is impossible to build on each other's ideas which can also lead to internal infighting on ideas. The key oversight on this is, that each business function is involved in the innovation process and consequently, responsible for the company's success. To overcome failures, a stable partnership between the engineering, marketing, R&D function as well as other business sites of the company needs to be build. This partnership allows a company to ensure that all business functions work towards the same goals. In addition, the collection of market data as well as definition of customer requirements is facilitated due to the fact that internal power struggles are put to an end (cf. Deschamps 2017, p. 59f.). This is possible because employees recognize that the knowledge of marketing, R&D and other business functions is necessary to make strategic decisions (cf. Mohr/Sengupta/Slater 2010, p. 118). Improved communication within the business functions is also the reason why the speed-to-market can be accelerated (cf. Charan 2015, p. 272).

To ensure that cross-functional teams are able to work together, project leaders need to be capable of managing complex projects under tight deadlines. Moreover, teams needs to have the cross-functional skills to make sure that they can be successful (cf. Edgett 2015, p. 3).

5.2.5. Customer Driven Focus

A customer driven innovation process is the key for the company's success as well as profitability. Therefore, the aim of a company is to develop a product which solves the problems of customers and also provides high customer value. To achieve this

aim, a customer driven focus must be built into the entire innovation process. This means that customers are already integrated in the process right at the start by generating ideas for a new product. Furthermore, customers should be integrated in each subsequent phase of the innovation process. To collect customers' opinions and proposals for improvement, companies can integrate customers, for example, during the concept screening and testing but also prototype testing. This approach ensures that the product complies with customer requirements (cf. Edgett 2015, p. 2).

The customer integration in the innovation process is also referred to as inside-out process or open innovation. This means that companies make use of external knowledge for the internal innovation process because this knowledge is key to the company's success (cf. Kowalski et al. 2016, p. 733f.).

5.2.6.   Top Management Involvement

To ensure that employees are willing to contribute to the innovation process, the top management needs to be committed to the product innovation. In addition, the task of the top management is to provide strong as well as visible support. If leaders do not show interest in the product, success rates will decrease. Therefore, top management has to set as well as to communicate the innovation strategy, to allocate the funds needed, and to motivate teams to get necessary tasks done (cf. Edgett 2015, p. 3). Moreover, top management is responsible to promote communication as well as cooperation among the company's functions (cf. Mohr/Sengupta/Slater 2010, p. 118).

5.2.7.   Upfront Activities

The success or failure of software can be determined before the software development by conducting upfront activities. These upfront activities define the software's attributes, features and benefits. These activities need to be built into the innovation process in order to reduce the time-to-market. This can be achieved through the analysis of customers, competitors, and the market (cf. Edgett 2015, p. 2).

5.3. Selection of an Appropriate Software Innovation Process

This section provides an overview of how an appropriate software innovation process is chosen for an organization. The following paragraphs present the necessary criteria.

As already mentioned in the introduction of chapter 4, the implementation of strategic marketing tools throughout the innovation process have an influence on the innovation's success probability (cf. Weiber/Pohl 2017, p. 1, 77). However, the success of an innovation also depends on the collaboration between the different functions within an organization as open communication increases the time-to-market. This is the reason why an innovation process must allow to integrate various functions of the organization (cf. Deschamps 2017, p. 59; Charan 2015, p. 272).

Competitive advantage can be achieved by open innovation. This means that knowledge about customer requirements as well as the integration of customers in the process facilitate the creation of ideas for software. Therefore, an innovation process has to enable customer integration (cf. Jokubauskienė/Vaitkienė 2017, p. 55).

An innovation process shall be divided into subprocesses and quality but also the completeness of agreed results shall be monitored on a continuous basis. This enables a company to reduce the risk of failure at an early stage (cf. Gaitanides 2012, p. 57; Seidenschwarz 2008, p. 45f.).

A software company must be able to react to fast changing requirements and trends in the industry (cf. Deschamps 2017, p. 42). Therefore, a strategic situation analysis needs to be carried out at the beginning of an innovation process (cf. Pride/Ferrell 2016, p. 63). Afterwards, the results of the analysis are used to create ideas for the software. These ideas cannot solely be developed by the company itself. Instead, ideas can also be gathered externally, for instance, by customers (cf. Taferner 2017, p. 53f.). To guarantee the success of an innovation, the innovation process must contain a selection phase. During this stage the feasibility and viability of ideas are screened (cf. Thompson/Schonthal 2017, p. 26).

After selecting feasible and viable ideas, an innovation process must allow a company to prepare a business case. The business case contains the definition of ob-

jectives, segmentation analysis, planning of measures, resources assignment, controlling of the development project, and market testing (cf. Weiber/Pohl 2017, p. 119; Trommsdorff/Steinhoff 2013, p. 41, 316). Furthermore, an innovation process contains a clear launch phase as the release triggers the beginning of the software's life cycle (cf. Aumayr 2006, p. 322). Finally, an innovation process takes into account a reflection phase (cf. Tidd/Bessant 2009, p. 86).

6. Key Findings of the Theoretical Part

The software market is one of the most growing industries. To stay competitive in this fast-paced industry, companies have to continuously focus on innovations according to customer as well as market requirements (cf. Kim 2017, p. 1; Schilling 2013, p. 1; Śledzik 2013, p. 90).

Innovations are organized in a process manner (cf. Vahs/Brem 2013, p. 231). This is the reason why companies have to follow a structured innovation process. This innovation process covers all activities from the idea generation to the software release (cf. Weiber/Pohl 2017, p. 75). However, the launch of innovations is associated with uncertainties and risks. Therefore, companies have to focus on market orientation throughout the entire innovation process (cf. Stummer/Günther/Köck 2006, p. 87; Gleitsmann 2007, p. 2).

Companies often fail during an innovation process due to a functional disconnect. To ensure the commitment of all employees, each business function has to be involved in this innovation process from the beginning (cf. Deschamps 2017, p. 59f.). In addition, customers should be integrated in the innovation process. This integration guarantees that customers' needs can be met by the company (cf. Edgett 2015, p. 2). Furthermore, the innovation process should be divided into subprocesses. These subprocesses enable a company to identify deviations at an early stage and make it possible to react to those deviations (cf. Gaitanides 2012, p. 57).

To guarantee market orientation throughout the process, marketing has to be integrated from the beginning. In the first phase of the innovation process, marketing carries out a strategic situation analysis to get an overview of the market (cf. Pride/Ferrell 2016, p. 63). The results of this analysis enable a company to generate ideas for the new software (cf. Cooper/Edgett 2006, p. 4). Afterwards, marketing provides tools to evaluate and select the most advantageous idea (cf. Bruhn/Ahlers 2017, p. 214). After defining the most advantageous alternative, the business case is prepared including the internal and external testing of the software before the release. Lastly, it is reflected if a competitive market advantage has been achieved (cf. Weiber/Pohl 2017, p. 31, 119, 164; Trommsdorff/Steinhoff 2013, p. 41).

The main objective of this master thesis is to elaborate a marketing-oriented software innovation process. To ensure marketing orientation throughout the process, the innovation process must fulfill certain criteria.

These criteria are summarized in the flowchart in figure 14. This flowchart serves as a basis to select the right innovation process for AST in the practical part.
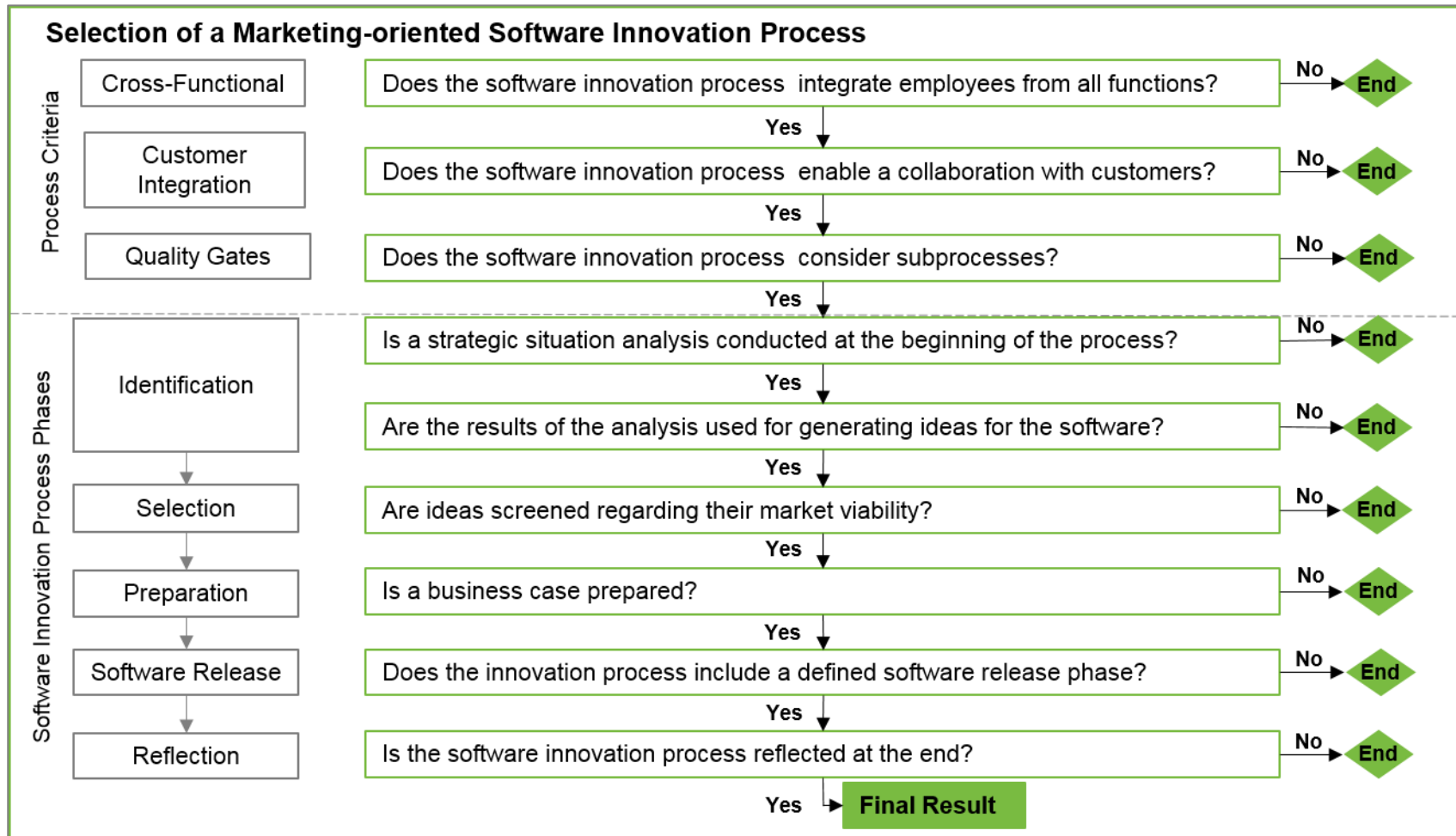
Figure 14: Selection Criteria for the Selection of a Marketing-oriented Software Innovation Process (own presentation)

7. Presentation of AVL List GmbH

AVL List GmbH (Anstalt für Verbrennungskraftmaschinen List) was founded in 1948 and *"is the world's largest independent company for development, simulation, and testing technology of powertrains (hybrid, combustion engines, transmission, electric drive, batteries and software) for passenger cars, trucks, and large engines"* (AVL List GmbH 2018). Headquartered in Graz, the company has 45 affiliates worldwide and employs 9.500 employees worldwide whereof 3.850 are working in Graz. In 2017, the company achieved a turnover of 1.55 billion € (cf. AVL List GmbH 2018).

The company's focus is to provide customers innovative solutions. These solutions allow customers to achieve an affordable emission reduction and master speed and complexity to market. Additionally, AVL List GmbH concentrates on acting as a strategic global partner for customers (cf. AVL List GmbH 2018, p. 6).

The business of AVL List GmbH is divided into three scopes, these are:

- Development of Powertrain Systems (PTE)
- Engine Instrumentation and Test Systems (ITS)
- Advanced Simulation Technologies (cf. AVL List GmbH 2018)

The business area Development of Powertrain Systems develops and improves all kinds of powertrain systems. The products of the scope Engine Instrumentation Systems include instruments and systems required for engine and vehicle testing. The scope Advanced Simulation Technologies provides simulation software which is focusing on the design and optimization of powertrain systems and covers all phases of the development process (cf. AVL List GmbH 2018).

The software innovation process will be developed for AST. This is the reason why the focus will be laid on this business unit in the paragraphs below.

As already mentioned, the business unit AST develops multi-dimensional simulation platforms. Therefore, various simulation tools and solutions are provided to original equipment manufacturers (OEMs). These products help OEMs to reduce time and costs along their product development cycle. This is done by replacing physical prototypes with virtual prototypes using frontloading.

7.1. AST – Software Portfolio

The following eight simulation tools are provided by AST:

- AVL BOOST™
- AVL CRUISE™
- AVL CRUISE™ M
- AVL EXCITE™
- AVL FIRE™
- AVL FIRE™ M
- AVL SPA™
- AVL TABKIN™ (cf. AVL List GmbH 2018)

Moreover, AST offers various simulation solutions. These solutions cover multi-physical component and system simulation requirements and allow engineers to develop clean and energy-saving powertrain concepts. Following 15 simulation solutions are available:

- Aftertreatment
- Combustion and emissions
- Electrifications
- Energy management
- Model based development
- Injection nozzle
- Model based testing
- Noise, vibration, harshness (NVH)
- Powertrain components
- Quenching
- Strength and durability
- Thermal management
- Transmission and driveline
- Turbocharging
- Vehicle system simulation

These mentioned products are sold all around the globe. The business unit AST has its affiliates in China, France, Germany, Japan, Korea, Spain, Sweden, United Kingdom, and the USA. To use the simulation tools as well as solutions, customers can

either choose to buy annual licenses, short-term leases or permanent licenses. An annual license is granted for a period of twelve months and customers are able to download the latest software releases. A short-term lease license is granted for less than twelve months. This license is useful for customers who work on projects and need the license only for the duration of the project. The permanent license is granted for an unlimited period of time but no downloads of the latest software release is possible.

7.2.   Current Status regarding Software Releases at AST

The business unit AST releases two software versions per year. The first one is planned to be released in February while the second one should be released in September. However, these releases are not released on the actual release date. Instead, the release is provided to customers weeks or months after the planned release date. Lack of market knowledge is one of the reason why the release is delayed.

Regarding the innovation process, the AST marketing department is solely involved in the software release phase. This is also illustrated in figure 15. In this software release phase, marketing is responsible for creating the marketing material for the promotion of the release.

Figure 15: Current AST Marketing Integration in the Innovation Process (own presentation)

The entire innovation process is led by the product management and software development. This means that these business functions are responsible for the idea generation of new features for the next software release. This task is supported by customer support. Currently, no structured market analysis is carried out for the collection of ideas. However, specific needs of customers serve as a basis for the creation of new features. In addition, trends and competitor observations are occasionally taken into account.

The generated ideas are stored in Jira which is a software that enables the tracking of issues and projects. The gathered ideas are sorted out by product managers and main project leaders.

After defining the features for the next software release, a development plan is created. The defined features are then developed by using the agile method Scrum. Each quarter, the development process is monitored in a so-called planning workshop. In the next step, developed software is tested internally. This is the first time when marketing is involved in the innovation process. The AST marketing department sends out a pre-release note to AST employees worldwide and informs them that the new software release is ready to be tested. Later on, marketing is integrated in the software release phase. This means that marketing creates an email as well as a landing page which contains the changes in the software. The so-called release announcement is sent out to all existing customers worldwide.

8. Research Design

According to Burns and Bush, *"a research design is defined as a set of advance decisions that makes up the master plan specifying the methods and procedures for collecting and analyzing the needed information"* (Planing 2014, p. 89). The research design can be seen as a guideline to answer the defined research problem (cf. Planing 2014, p. 89).

A result drawn from the theoretical part is, that a structured innovation process is necessary to release software on time. In addition, the deployment of strategic marketing tools ensures market-orientation within the organization. Moreover, internal as well as external marketing communication allows to provide necessary information to customers but also employees.

So far, the AST marketing department is solely responsible for creating the communication material for the software release. However, findings in the theoretical part demonstrate that a marketing-oriented innovation process can reduce the risk of failure as well as ensure a software release on time. Therefore, it has to be determined how marketing-orientation can be assured in AST's innovation process.

8.1. Survey Objective

The main research question of this thesis is to discover how the AST marketing department can support the different phases of an innovation process – from the idea generation to the software release – in order to define a marketing-oriented innovation process. Therefore, following subjects shall be inquired in order to obtain an appropriate response to the research question:

- Gain information about how marketing can contribute to the identification / selection / preparation / software release / reflection phase of the innovation process
- Identify the importance of market analysis (competitors, customers, trends in the industry) and regularity of its implementation
- Find a process that enables flexibility in order to respond to fast-changing requirements in the software industry

8.2. Survey Method

To procure information, a company can make use of primary research or secondary research. A primary research is conducted if no data is available to solve the research question. A secondary research, on the other side, is carried out if the required information exists (cf. Olbrich/Battenfeld/Buhr 2012, p. 67). So far, AST has not collected any data regarding the marketing integration in the innovation process. Therefore, a primary research needs to be carried out.

The primary research distinguishes between the quantitative and qualitative market research. Quantitative market research is characterized by a large sample size and measurable numerical results (cf. Schürmann 2016, p. 84). A qualitative market research is defined as a personal and oral discussion which is guided by a moderator (cf. Kepper 2008, p. 181). In contrast to quantitative market research, qualitative market research deals with the determination of unconscious motives, attitudes, and expectations. In addition, qualitative market research concentrates on recognizing as well as understanding psychological and sociological aspects (cf. Mayerhofer 2009, p. 479). To gather this information, a moderator can make use of an individual exploration or a focus group (cf. Schürmann 2016, p. 84). In a qualitative exploration, solely one person is interviewed by the moderator whereas six to ten persons take part in a focus group and work on a specific topic together (cf. Kuß 2012, p. 137). An individual exploration is carried out if no specific information is available to a topic (cf. Berekoven/Eckert/Ellenrieder 2009, p. 89f.).

As already mentioned, no data collection regarding the marketing integration in the innovation process has been conducted. This is the reason why an individual exploration is chosen. This exploration shall serve as a benchmark and allow AST to discuss the results internally via a focus group in order to find an appropriate procedure for AST.

A focus group is used to exploit a wide range of views in a short time. The focus group consists of six to ten participants who discuss the research question together under the guidance of a moderator. These group discussions are often used for sensitive issues due to the fact that participants create a sense of togetherness. Consequently, participants talk openly about improvement possibilities (cf. Berekoven/Eckert/Ellenrieder 2009, p. 90f.). This is the reason why chosen AST employees shall discuss the findings of the individual exploration via a focus group.

The findings of the individual exploration shall provide an overview of the company's innovation process and how the company's marketing department is contributing to the various phases of the innovation process. This information can be found in section 9.1. The results of the focus group shall provide insights about how the AST marketing department can be integrated in the innovation process. These findings are summarized in section 9.2. Moreover, it is determined within chapter 10 of the thesis which of the four mentioned innovation processes (spiral model, Stage-Gate process, V-model, and waterfall model) fulfill mentioned criteria in figure 14. These criteria are as follows:

- Enablement of cross-functionality
- Customer integration throughout the innovation process
- Availability of quality gates
- Conduction of a strategic situation analysis
- Generation of ideas
- Screening of ideas
- Preparation of a business case
- Defined software release phase
- Reflection of process

The findings of these three parts make it possible to elaborate a marketing-oriented software innovation process for the business AST. This procedure is summarized in figure 16.
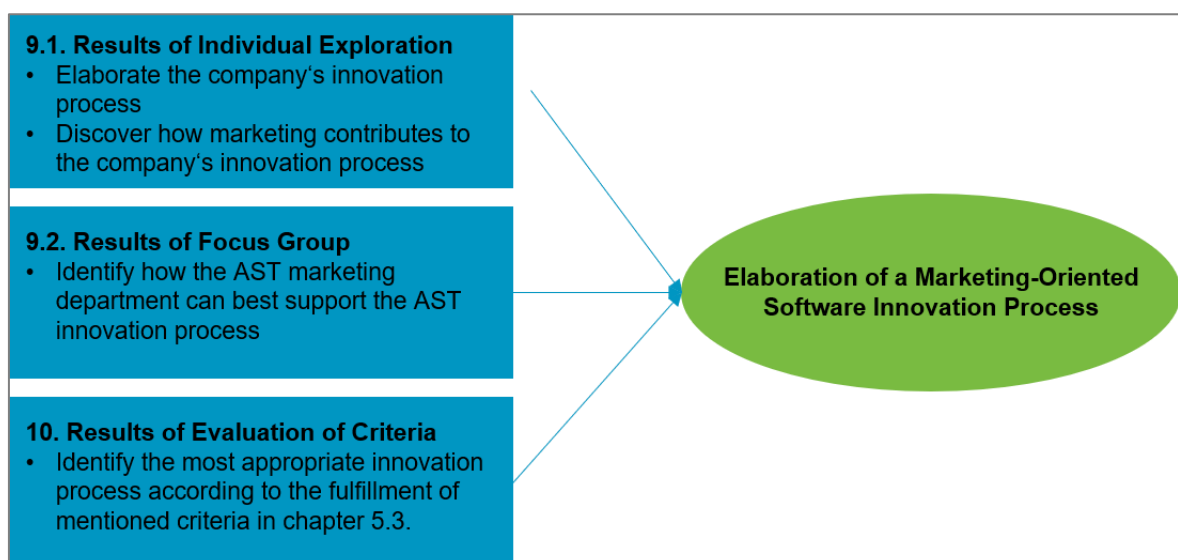
Figure 16: Procedure to Elaborate a Marketing-oriented Software Innovation Process (own presentation)

8.3. Target Group

In total, 15 interviews will be conducted within the primary research. These participants shall work in an international software company and be familiar with the innovation process of the company. In addition, these participants shall have a management position. The individual exploration can be considered as benchmark to give AST external insights how other international software companies carry out their innovation process.

The results of these 15 interviews shall serve as a basis for the focus group within AST. This focus group shall consist of product managers and head of the software development as these persons are involved in the release process. In addition, the head of the AST marketing department shall be a member of the focus group in order to discuss a possible collaboration with the head of the software development and product managers.

The sampling of qualitative market research is based on a purposive sampling. This means that the selection of participants is done deliberately. Therefore, relevant characteristics have to be defined in order to find the right interview partners (cf. Oberzaucher 2012, 39f.).

To find the right participants for the individual explorations, participants shall fulfill the following criteria:

- Participants have to work in an international software company because AST is operating in an international market.
- Participants should have a management position as these persons are decision-makers within the software innovation process.
- Participants should work in the business development, marketing or product management department.
- Participants should be familiar with the company's innovation process.

9. Qualitative Market Research

As already mentioned in the previous chapter, the market research is divided into two parts. First, 15 interview partners from international software companies provided insights into their innovation process and how marketing is integrated in it. The results of the individual exploration served as a basis for the focus group. In this focus group, participants discussed the viability of the results of the external interviews. In addition, the participants evaluated how the results can be used at AST.

The interviews were recorded and transcribed in order to analyze the results with the data analysis software program MAXQDA. The results of the qualitative market research are presented in the next sections. Section 9.1. demonstrates the results of the individual explorations while section 9.2. presents the findings of the focus group.

9.1.   Benchmark with International Software Companies

The 15 individual explorations took place from the 19th of February to the 19th of March 2019 and were executed via Skype. Table 5 provides an overview of the interviewees.

Name	Company	Job Title
Jeroen Buring	3DS Professional Solutions Channel (SOLIDWORKS)	Director Strategic Account
Sandeep Chilumula	Deepen AI	Head of Business Development and Strategy (India)
Roland Drewinski	CONTACT Software	Director Marketing
Michael Graf	Conweaver	Director Marketing
Regina Hoffmann	Virtual Solutions AG	Director Marketing
Maximilian Kissel	Soley	CEO
Garm Lucassen	Sefci	Software Product Manager
Gerhild Maier	UPPER Solutions GmbH	Head of Professional Services
Martijn Pilich	Hike One	Strategist, Designer and Partner
Lisa Rein	Mimeo GmbH	Marketing Executive
S.R.	Online Retailer	Business Development Manager
Dominik Rüchardt	PTC	Head of Business-, Market- and Partner Development Central Europe
Georg Simon	Software AG	SVP Digital Business Platform Marketing & Product Management
Bernd Stöger	Knapp AG	Managing Product Manager
Miguel Valenzuela	SAP Hybris	Director Cloud Partner Management

Table 5: External Interview Partners (own presentation)

The interviewees were asked how the marketing department is contributing to the innovation process – from the identification phase to the reflection phase. Furthermore, they were asked if process criteria mentioned in section 5.2. are lived throughout the company. The available evidence suggests that companies differentiate between marketing and product marketing. Marketing itself is responsible for communication and lead generation while product marketing supports the innovation process from the beginning to the end.

9.1.1. Marketing Integration in the Identification Phase

Interviewees were asked about the importance of market observation and how regularly the environment is analyzed. In general, market observation is considered to be important. Only two participants do not analyze the market as customers are expressing wishes at an early stage.

Companies tend to continuously observe the competitors, customers, and trends of the industry in order to stay on track and generate ideas for the new software version.

"Due to the high amount of competitors, it is becoming more difficult to differentiate yourself from competitors…That is why I think it is becoming more important to continuously carry out a competitor analysis and market research in order to set yourself apart from the competition."[1] (Participant 4)

"We look at what competitors are doing, how the industry is moving and we look at all layers of the eco-system." (Participant 2)

"The sample of data you take – I would say – more on a macro basis because I am more in a global market. Therefore, I need to see the industry and trends." (Participant 15)

The market information is, for instance, gathered during conversations with customers, at conferences and (competitor) events, and via social media channels. The findings usually serve as a basis for generating ideas for the new software version. Figure 17 provides an overview about how ideas for new software versions are gathered.

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[1] Translation by author, original quote available in appendix p. A-19
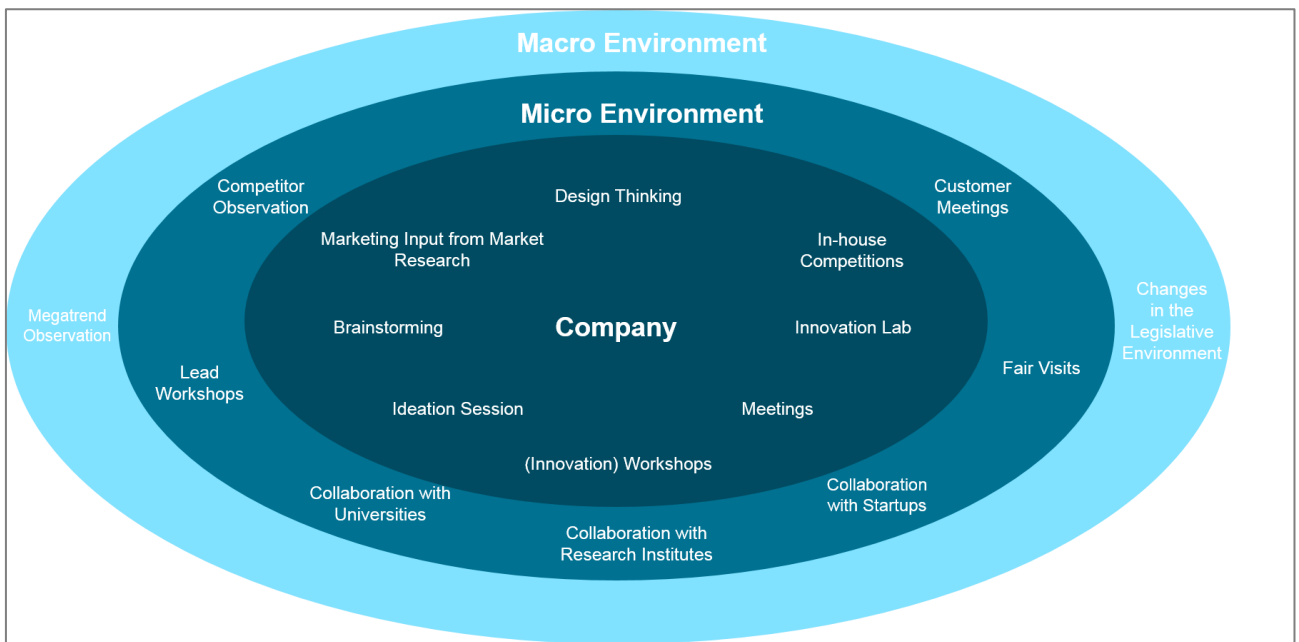
Figure 17: Idea Generation Methods (own presentation)

The idea generation methods are divided into three layers:

- Company
- Micro environment
- Macro environment

Within the company, it seems that creativity techniques (brainstorming, design thinking, ideation session) are used to create ideas. But marketing insights from the market research, meetings, and workshops are also used to gather ideas.

Regarding the micro environment, ideas are developed by listening as well as talking to customers and observing competitors. Furthermore, some companies collaborate with research institutes, startups and universities to evolve ideas.

Companies place significant importance on providing customer-oriented new software versions. Therefore, companies make use, for example, of customer meetings and customer events to collect demands.

"Obviously, listening to customers is the highest priority for us." (Participant 2)

Customer observation is considered important to develop ideas. However, companies focus more on customer requirements and market trends, as imitating the competitors means that the company is not able to keep up with the offers of the competitors.

73

"I think if you focus too much on what your competitors are doing, you are already too late. You have to be ahead of time. Once the people have already seen what our competitors have published, it is already too late." (Participant 15)

Regarding the third layer, macro environment, companies tend to observe trends in the industry but also consider legislative changes.

"This is sort of PESTEL related. A lot of our most recent ideas came either from dynamics in the startup world or in the legislative world." (Participant 7)

As companies are convinced that customer focus is crucial, customers tend to be involved in creating ideas. Within the company, product managers seem to be responsible for gathering ideas.

5 participants stated the idea generation is done by all employees of the company.

"Basically, we try to collect information from everybody. I would advise every company to do so."[2] (Participant 11)

"Ideas can be generated by everyone. This can also be done by the custodian or the customer. There is no fixed process regarding the idea generation. I do not think that anyone believes that this is done in a meeting in which you focus a bit on gathering ideas. Instead, ideas are developed everywhere. The idea can be generated at the customer who uses the software. Ideas can be evolved by the developer who develops the software. Ideas can also be generated during a coffee break when someone is reporting proudly to another about his product and gets a solution for his problem."[3] (Participant 13).

9.1.2. Marketing Integration in the Selection Phase

Interviewees were asked how the viability of generated ideas is evaluated. In general, following seven criteria are taken into account:

- Availability of resources (employees, time frame etc.)
- Cost-benefit considerations
- Customer focus
- Market potential
- Market trend

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[2] Translation by author, original quote available in appendix p. A-19
[3] Translation by author, original quote available in appendix p. A-19

- Sustainability of the product
- Technical feasibility

Participants place great importance on customer-driven solutions. Therefore, ideas are evaluated according to their impact on customers.

"We start with the customer – what ideas are important to the customer and can be put into practice and allows us to prepare a business case? Of course, we do not implement something with what we cannot earn any money because this would be of disadvantage for the company. But in general we start with the customer and what kind of impact the idea has on the customer."[4] (Participant 11)

According to the statements of the interviewees, product managers are typically responsible to evaluate the feasibility and viability of generated ideas. However, product managers also depend on the opinion of R&D in order to guarantee a successful implementation of ideas. In a few cases, product managers and R&D involve marketing in the idea viability analysis. This is demonstrated in the quote below.

"That tasks are combined for business and product teams. In business teams marketing people are involved. They do research the market, like:

- *What is the demand for the market?*
- *How does the market supply chain look like?*
- *Who is going to buy the product?*
- *How can we reach them?"* (Participant 2)

Although marketing is not integrated in the selection phase of the participant's company, participant 2 is convinced that marketing has the potential to contribute to the second phase of the innovation process.

"Yeah, marketing should be integrated in decision-making. But how much influence – I do not see it really actively there. I think it has more potential than what we see nowadays. That is my perception." (Participant 15)

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[4] Translation by author, original quote available in appendix p. A-19

9.1.3. Marketing Integration in the Preparation Phase

Typically, marketing is not involved in the software development. However, product marketing and the head of the R&D department are responsible for monitoring the development process.

Marketing, on the other side, prepares the communication measures to promote the software release. The developed software is typically promoted before the release date.

9.1.4. Marketing Integration in the Software Release Phase

The promotion of the software release is seen as one of marketing's key tasks within the innovation process. Major releases tend to be promoted weeks or months before the actual software release date. Figure 18 provides an overview of chosen communication measures to promote the software release.
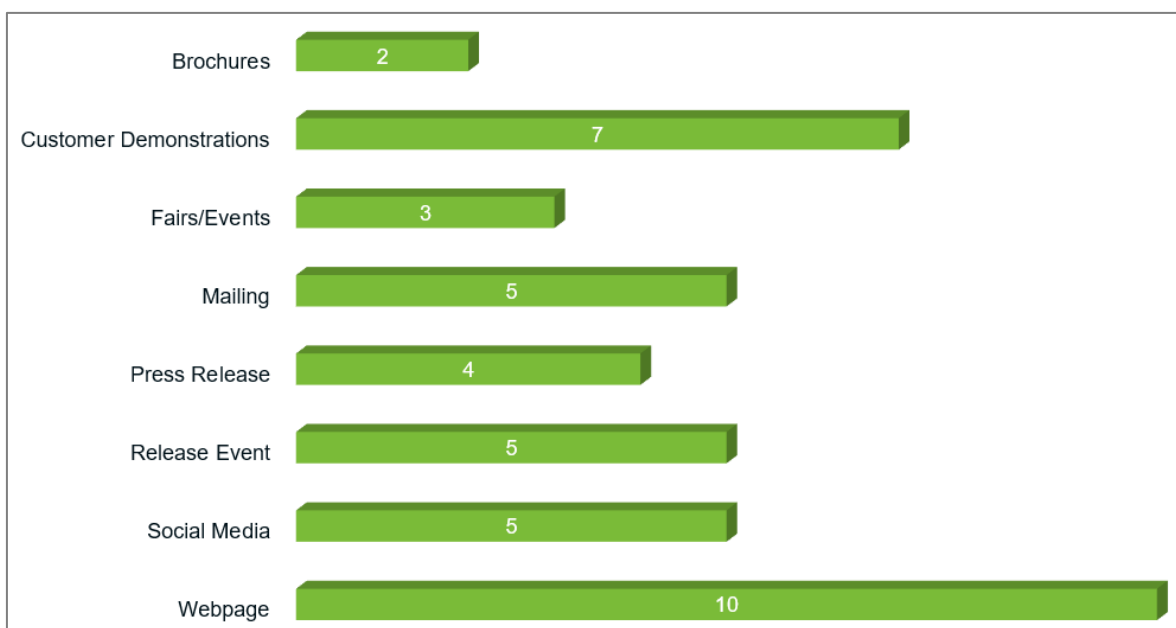
Figure 18: Selected Communication Measures for the Software Release (own presentation)

Typically, information about the new software release is provided on the company's webpage. Moreover, demonstrations seem to be valuable to companies. In this case, employees either visit the customers or invite customers to the company in order to present and demonstrate new software features.

"Our products are complex. That is why we think that the interaction with our products is an important element to understand what we are doing."[5] (Participant 12)

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[5] Translation by author, original quote available in appendix p. A-19

In addition, marketing is sometimes responsible to create emails, social media posts and organize release events. Those release events are mostly organized at big companies where existing customers are invited to gain knowledge about new features. The sessions of these events are typically provided online too.

One participant stresses that big companies tend to promote the release more widely while smaller ones do not make use of a wide range of communication measures.

"So you will do marketing events. You will do advertisements. You will do social media advertisements. But our customers won't be more than 10.000 people. So it is more relationship based. We tend to reach ours to go to industry events, software-as-a-service events etc. but we do not do any advertisement assets. We send out an email but we do not let's say put it outside. We do not do, for example, social media. We build a brand but we do not – we build it to very certain, specific people." (Participant 2)

Eleven participants stated that the success of promotion measures is evaluated afterwards.

"Marketing people will usually say: "That many people went to the event, that many read the press release, that many people looked at our banner." But for me what would be much more reachable data is: "We released this event / that functionality and I see today the people using that functionality in the software itself."" (Participant 15)

9.1.5. Marketing Integration in the Reflection Phase

In most of the cases, the success of the innovation process is evaluated.

The process is adapted on a regular basis. Details are changed and sprint meetings are organized in a different manner and so on. This means we permanently improve the process."[6] (Participant 6)

In rare cases, marketing is integrated in this reflection phase. However, product marketing is involved as the product manager is responsible for the life cycle of the product. If marketing is integrated the success of internal communication measures and product information collection / distribution are analyzed.

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[6] Translation by author, original quote available in appendix p. A-19

9.1.6. *Implementation of Process Criteria*

Participants were asked what kind of innovation process is followed by the company. Moreover, interviewees were asked if the described process criteria an innovation process should meet in section 5.2. are lived throughout the company. The results are described in the next paragraphs.

Applied Software Innovation Process

Interviewees were asked if they are familiar with the terms spiral model, Stage-Gate process, V-model, and waterfall model. According to the responses, it is assumed that the V-model and waterfall model are widely known. The Stage-Gate process seems to be known by half of the participants while the spiral model was only familiar to four interviewees.

The four mentioned processes are considered to be the traditional methods to innovate software. However, companies make typically use of an agile process design. This means that the development of software is divided into steps, so-called sprints. The aim behind this is to provide a minimum viable product and evolve the software over time. This approach guarantees a rapid time-to-market, enables fast customer feedback, and facilitates the adaption to changing market requirements. Of the traditional methods, the Stage-Gate process tends to be used more often too.

Consideration of Subprocesses

Participants were asked how often the actual status of the process is evaluated and if the process is divided into subprocesses or seen as a whole.

Twelve participants mentioned that the process is divided into subprocesses as this procedure allows to determine if the company is still on track or needs to seek improvements.

"I would say that we have 3 subprocesses. The first subprocess is called project pre-phase. Here we decide if we should go on with the project or not.

The second one is after the software implementation. In this phase we cannot decide whether we still want to continue or not but we can have a look at key performance indicators (KPIs). The third one is after the release. Here we have also a look at the customer satisfaction."[7] (Participant 8)

Employee Commitment

Open communication and regular meetings seem to be the essential elements to ensure that employees commit to the process. Four participants stated that the company's culture plays an important role to ensure commitment. Culture means that people have the same mindset as well as values.

"In my opinion, culture is the most important factor…Culture means that people have the same mindset as well as values according to which decisions are made."[8] (Participant 11)

In nine cases, marketing seems to make use of internal communication measures to ensure that employees are contributing to the process and stay up to date. Therefore, regular newsletters are sent out and organizes internal (team) events.

"Marketing definitely has some events internally with the entire company to try to make sure that the message is reached. The communication is done globally. We do it per continent – twice a year." (Participant 15)

Customer Integration

Interviewees were asked if customers are integrated in the innovation process and what kind of customers are chosen for it. Figure 19 illustrates that customers are integrated in the identification phase as well as software testing (= preparation phase). Typically, customers are in contact with the software when it is released.

Figure 19: Customer Integration in the Innovation Process (own presentation)

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[7] Translation by author, original quote available in appendix p. A-19
[8] Translation by author, original quote available in appendix p. A-20

On the basis of the interview results, high-value customers as well as lead customers / early adaptors are involved in the innovation process.

"At the beginning your software is not typically really good enough and fine but you need customers who are a bit forgiving and your early adaptors typically are…They manage to identify them based on statistics and they use research techniques to help to create products with those customers." (Participant 9)

In addition, it was mentioned that customers are in some cases chosen according to strategic relevance or could also be selected at random.

9.2. Internal Elaboration of a Possible Integration of AST Marketing in the Software Innovation Process

The results of the individual explorations were partly presented to the focus group. As mentioned in the research design, the chosen participants for the focus group work in the departments marketing, product management, and software development. Table 6 illustrates an overview of the participants.

Name	Company	Job Title
Andrej Kodrin	AVL List GmbH	Product Manager
David Greif	AVL List GmbH	Product Manager
Gert Petinger	AVL List GmbH	Senior Marketing Specialist
Jürgen Krasser	AVL List GmbH	Skill Area Manager
Maik Suffa	AVL List GmbH	Group Product Manager
Paul Herster	AVL List GmbH	Group Product Manager

Table 6: Internal Interview Partners (own presentation)

The results of the one-on-one interviews demonstrated that there seems to be a differentiation between product marketing and marketing. This means that product managers are typically responsible for most parts of the innovation process. This is the reason why participants of the focus group were asked to share their opinion about how the AST marketing department could be integrated in the different phases of the innovation process. The results are presented in the next sections.

9.2.1.   AST Marketing Integration in the Identification Phase

Participants seem to agree that marketing can play an important role in the identification phase of the innovation process. This means that the AST marketing department can support product management by carrying out a market analysis.

"Market analysis is very important. Okay, we have a rough idea about what exists, what's the competition, what are they doing. It is a little bit more difficult to find out what are the shares? What are the numbers? Which is important. And then often times we see like what portion of the pie we share in the market. This is always to me a little bit of a black box. It would be really good if we could together with marketing somehow evaluate what is the size of the pie in simulation business." (AST Internal 2)

"It would be helpful if marketing could support us. However, I think that marketing has to have a bit of a technical background to understand what we are talking about."[9] (AST Internal 5)

Through market research, the AST marketing department could provide valuable information about the competitors' software, what kind of technological problems exist, and customer acceptance regarding new technologies. The AST marketing department could also deliver inputs to the creation of ideas for new software features.

9.2.2.   AST Marketing Integration in the Selection Phase

Participants mentioned that ideas are selected according to the criteria capacities, internal skills available at AST, market potential, technical feasibility, and time frame.

According to one participant, marketing can solely be integrated if an affinity for technical topics exists. Only then is marketing able to provide valuable contribution to the selection of features for the next software release.

9.2.3.   AST Marketing Integration in the Preparation Phase

In general, it cannot be imagined that marketing is contributing to the preparation phase of the innovation process. However, one participant mentioned that the AST marketing department could support the definition of objectives as well as marketing measures. Regarding resource allocation, it can be imagined that marketing has a

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[9] Translation by author, original quote available in appendix p. A-20

final view at the development plan, compares this plan with the actual market situation and provides feedback about ways to better align with the current / potential future market-orientation.

9.2.4. AST Marketing Integration in the Software Release Phase

Participants agree that the AST marketing department should continue to contribute to the software release as the customers need to be informed about the completion of the latest software version.

Participants were informed that interview partners from the individual explorations typically promote the release weeks or months before the actual release date. This is the reason why the members of the focus group were asked if it can be imagined to promote the release before the release date.

According to the participants, an earlier promotion is solely conceivable if a punctual software release can be guaranteed.

"Usually, we are late with the release. So it would be challenging to actually release on a specific day. That is the most challenging thing. If we do so, then I see this as a big potential to promote this because then you are also seen by the customers in a complete different way. But if you are postponing then and if this kind of an event you cannot do that. You have to fix it and then you have to have it. And that is the case that we are not able to do this today. That is a bottleneck." (AST Internal 1)

"I would not promote it earlier. This is too risky. Because if you do not keep your schedule then you lose your reputation. This is dangerous." (AST Internal 2)

9.2.5. AST Marketing Integration in the Reflection Phase

According to the participants of the focus group, solely the software development process is monitored on a regular basis during the so-called planning workshop. However, it is not monitored if defined product targets were met, existing customers are satisfied with the offered features, and how many new customers were acquired because of the new software release. According to the participants, it "would be cool"[10] (AST Internal 5) if this information could be provided by the AST marketing department.

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[10] Translation by author, original quote available in appendix p. A-20

10. Selection of a Software Innovation Process

In order to find an appropriate innovation process for the business unit AST, this chapter focuses on checking if the nine process criteria mentioned in section 5.3. are met by the four introduced innovation processes in section 5.1. These four processes are the spiral model, the Stage-Gate process, the V-Model, and the waterfall model. The following sections provide insights about what criteria are met by every single innovation process.

10.1. Criterion 1: Enablement of Cross-Functionality

An innovation process should enable a software provider to integrate employees from various departments as a collaboration between employees can decrease the time-to-market. Subsequently, this section explains if this criterion is met by the four innovation processes.

According to the literature, it is not described that marketing is involved in the spiral model. Consequently, it can be assumed that no cross-functionality is given throughout this process.

The Stage-Gate process allows the involvement of employees from various departments. The collaboration of cross-functional teams can influence the time-to-market but also increase the success probability of the innovation (cf. Edgett 2015, p. 2).

It seems that marketing is solely involved at the beginning of the V-Model by defining business requirements together with the software development team. Afterwards, marketing seems to only be contributing again during the operation and maintenance phase.

According to the literature, it could not be discovered if marketing is contributing much to the waterfall model. This is the reason why it is assumed that no cross-functionality is enabled in the waterfall model.

10.2. Criterion 2: Customer Integration throughout the Innovation Process

The integration of customers in the innovation process can have an impact on the success probability of a new software version. This is why section 10.2. provides information whether or not this criterion is met by the four innovation processes.

Customer needs and requirements are captured in the spiral model. In addition, customers are integrated in the testing phase of the process. This means that a

prototype is provided to customers who then give feedback to developed software (cf. Schuh/Müller/Rauhut 2012, p. 175f.).

The Stage-Gate process focuses on developing differentiated products, finding solutions for customer problems, and offering a unique selling proposition to customers. Therefore, customers are integrated in the process from the beginning in order to guarantee the development of a customer-oriented product (cf. Edgett 2015, p. 2).

Customers seem to be solely involved at the beginning of the V-Model by demanding certain software requirements (cf. Schuh/Müller/Rauhut 2012, p. 174). Otherwise, it seems that the V-Model can be seen as an internal approach.

The waterfall model makes it possible to integrate customers at the beginning of the process as well as during the testing phase. This means that customers are able to inform the software provider about their requirements. In addition, developed software is provided to chosen customers in order to get feedback before the actual release date. This allows a company to adapt its software according to customer feedback (cf. Agarwal/Tayal 2009, p. 30f.).

10.3.   Criterion 3: Availability of Quality Gates

Quality gates ensure that the company keeps an overview of the process and is able to adapt the process or the software development if needed at an early stage. Section 10.3. discusses in which innovation process quality gates are included.

The spiral model focuses on analyzing risks as well as the actual status of the process on a regular basis. Due to its various cycles, it can therefore be concluded that the spiral model comprises quality gates (cf. Boehm n.d., p. 7f.).

As already mentioned in section 5.1.2., the Stage-Gate process consists of stages and quality gates. This means that each stage is followed by a quality gate. In those quality gates it is checked if the actual status of the innovation meets defined criteria of the previous quality gate. Furthermore, it must be checked if the innovation meets criteria for the actual phase. This approach allows the innovation team to decrease the product failure rate, improve the time-to-market, and concentrate on efficient innovations (cf. Stošić/Milutinović 2014, p. 45f.).

Due to its various testing phases, it can be said that the V-Model considers quality gates (cf. Singh Dhami 2016, p. 241).

The waterfall model does not contain quality gates. This means that no feedback is provided to employees during the innovation process (cf. Schuh/Müller/Rauhut 2012, p. 170).

10.4.   Criterion 4: Conduction of a Strategic Situation Analysis

A strategic situation analysis enables a company to discover market trends, to compare itself with competitors, and to learn about customer requirements. This analysis allows companies to adapt its software to market changes. Subsequently, the conduction of a strategic situation analysis plays an important role in an innovation process. Therefore, section 10.4. explains by which innovation process the criterion is met.

The spiral model follows a customer-driven approach. Subsequently, customer requirements are analyzed (cf. Schuh/Müller/Rauhut 2012, p. 175f.). However, it seems that market trends are not taken into account.

The Stage-Gate process enables the innovation team to collect information about the market and, subsequently, to use these findings to develop ideas (cf. Stošić/Milutinović 2014, p. 45).

Customer requirements are taken into account by the V-Model (cf. Schuh/Müller/Rauhut 2012, p. 174).

The waterfall model contains a requirement analysis which enables a software provider to create software according to stakeholders' demands (cf. Agarwal/Tayal 2009, p. 28f.).

10.5.   Criterion 5: Generation of Ideas

The results of the market analysis constitute the basis for the generation of ideas for the new software version. Section 10.5. explains which innovation process takes an idea generation phase into account.

Ideas are generated at the beginning of the spiral model (cf. Schuh/Müller/Rauhut 2012, p. 175).

Within the scope of the Stage-Gate process, an identification phase ensures that ideas are gathered for the new innovation (cf. Cooper 2016, p. 22).

The V-Model translates customer requirements into possible features within the company (cf. Singh Dhami 2016, p. 242).

The waterfall model enables a company to use findings of the requirements analysis to generate ideas for the new software.

10.6.   Criterion 6: Screening of Ideas

To reduce the risk of failure, an innovation process must allow a company to evaluate the feasibility and viability of the gathered ideas. This is the reason why section 10.6. discusses which innovation process also contains an idea evaluation phase.

The spiral model was designed to control risks (cf. Agarwal/Tayal 2009, p. 34). Therefore, it can be concluded that requirements are selected according to their feasibility but also their viability.

The feasibility and viability of generated ideas are screened within the Stage-Gate process (cf. Cooper/Sommer 2016, p. 3).

Generated ideas within the V-Model are evaluated regarding their feasibility (cf. Singh Dhami 2016, p. 242).

The waterfall model allows software providers to evaluate the feasibility but also viability of ideas and, subsequently, chose appropriate ideas for the software development (cf. Agarwal/Tayal 2009, p. 28f.).

10.7.   Criterion 7: Preparation of a Business Case

An innovation process must allow a company to prepare a business case. Therefore, section 10.7. describes which innovation process involves a phase in which a business case can be prepared.

As already mentioned before, the spiral model follows a risk-driven approach. Hence, a business case preparation is done within the company (cf. Boehm n.d., p. 7f.)

The Stage-Gate process involves the preparation of a business case (cf. Cooper 2016, p. 22).

The V-Model allows the involved persons to prepare a business case (cf. Schuh/Müller/Rauhut 2012, p. 173).

After defining appropriate software features, the waterfall model enables a software provider to prepare a business case. This case includes, for instance, a time plan with required resources as well as costs (cf. Agarwal/Tayal 2009, p. 28f.).

10.8.   Criterion 8: Defined Software Release Phase

The software release is the most decisive phase of an innovation process as the company discovers if the developed software is able to fulfill the customers' demands. Section 10.8. explains that all four innovation processes take a software release phase into account.

After various software tests, the spiral model enables the innovation team to implement the software and provide it to customers (cf. Schuh/Müller/Rauhut 2012, p. 175).

The Stage-Gate process contains a clear launch phase (cf. Cooper/Sommer 2016, p. 3).

The developed software is provided in the implementation and maintenance phase of the V-Model (cf. Schuh/Müller/Rauhut 2012, p. 175).

The waterfall model contains a phase in which the software is provided to customer. In addition, this process enables a company to perform maintenance (cf. Schuh/Müller/Rauhut 2012, p. 170).

10.9.   Criterion 9: Reflection on Process

An innovation process must allow a company to reflect on the process and adapt it if necessary. Therefore, the process must enable a software provider to reflect on its innovation process. Section 10.9. explains which of the four innovation processes contain a reflection phase.

Due to its risk-driven approach, the spiral model allows an innovation team to reflect on the innovation process. This reflection enables an innovation team to discover if changes in the process are needed (cf. Agarwal/Tayal 2009, p. 34).

As already mentioned in section 10.3., the Stage-Gate process also consists of quality gates that reflect the actual status of the innovation. After the software release, the Stage-Gate process provides a possibility to reflect on the process and adapt it if necessary (cf. Stošić/Milutinović 2014, p. 45).

According to the literature, it seems that the V-Model ends with the operation and maintenance of the software. However, it is not stated that the process is reflected at the end (cf. Schuh/Müller/Rauhut 2012, p. 173).

The waterfall model does not contain a reflection phase after the software release (cf. Schuh/Müller/Rauhut 2012, p. 170).

11. Software Innovation Process for AST

Section 9.1. outlines how international software companies integrate marketing in the company's innovation process. Moreover, it is described what type of innovation process is used within these companies. Section 9.2., on the other side, explains how the AST marketing department can support the different phases of an innovation process in the best way. Chapter 10 identifies the most appropriate innovation process according to the fulfillment of mentioned criteria in section 5.3. Therefore, the aim of chapter 11 is to merge the findings of the previous two chapters in order to elaborate a marketing-oriented software innovation process at the business unit AST. Therefore, section 11.1. provides an overview of what innovation process shall be used within AST. In addition, it is explained how the AST marketing department can contribute to the chosen process from the beginning. Section 11.2. discusses the implementation of measures as well as control.

11.1. Recommended Software Innovation Process Buildup

To choose an appropriate innovation process for an organization, nine criteria must be met. Therefore, chapter 10 provides an overview of what criteria are met by the spiral model, the Stage-Gate process, the V-Model, and the waterfall model. The results of this evaluation are summarized in figure 20. All fields marked in green show that the criterion is met by the process while red marked fields demonstrate that the criterion is not fulfilled in the process.

	Spiral Model	Stage-Gate Process	V-Model	Waterfall Model
Enablement of Cross-Functionality	RED	GREEN	RED	RED
Customer Integration	GREEN	GREEN	RED	GREEN
Availability of Quality Gates	GREEN	GREEN	GREEN	RED
Strategic Situation Analysis	RED	GREEN	GREEN	GREEN
Generation of Ideas	GREEN	GREEN	GREEN	GREEN
Screening of Ideas	GREEN	GREEN	GREEN	GREEN
Preparation of a Business Case	GREEN	GREEN	GREEN	GREEN
Defined Software Release Phase	GREEN	GREEN	GREEN	GREEN
Reflection on Process	GREEN	GREEN	RED	RED

Figure 20: Overview of Fulfilling Criteria for the Evaluation of an Innovation Process (own presentation)

As shown in figure 20, the Stage-Gate process is the only process that fulfills all nine criteria. Therefore, it is recommended to choose this process approach for the business unit AST. The structure of this process is illustrated in figure 21.

Figure 21: Buildup of the Stage-Gate Process (based on Cooper 2017, p. 49)

The participants of the focus group were asked in which phases of the innovation process a contribution of the AST marketing department can be imagined. The participants agreed that marketing could be integrated in the identification, the selection, partly in the preparation, the software release, and the reflection phase. Applied to the Stage-Gate process, this means that the AST marketing department could contribute to the phases identification, screening, business case, and software release. This approach is illustrated in figure 22.

Figure 22: Conceivable Integration of AST Marketing in the Stage-Gate Process (own presentation)

The findings of the individual explorations demonstrate that international software companies make use of agile processes. The agile approach is characterized by the following principles:

- Business people are able to collaborate with software developers.
- Face-to-face communication is considered to be the best way to communicate.
- The success of a team is reflected on a continuous basis and adjusted accordingly.
- The motto "keep it simple, stupid" is followed.
- Customer satisfaction is achieved by delivering software at an early stage. Therefore, companies focus on providing a minimum viable product.
- Customer collaborations are considered to be crucial.
- The development team focuses on developing software instead of comprehensive documentation.

Due to these principles, it is recommended to integrate the agile approach in the Stage-Gate process. The agile approach makes use of short development cycles, the so-called sprints. At the beginning of a sprint, a so-called sprint planning meeting takes place where the necessary tasks are defined. Afterwards, a team works on these defined tasks. During the sprint, regular status meetings allow a company to exchange information and statuses. At the end of a sprint, the results of the sprint are demonstrated, and the project is passed into the next sprint. Figure 23 illustrates how the innovation process can look like for AST. In this case, the agile approach is merged with the Stage-Gate process.
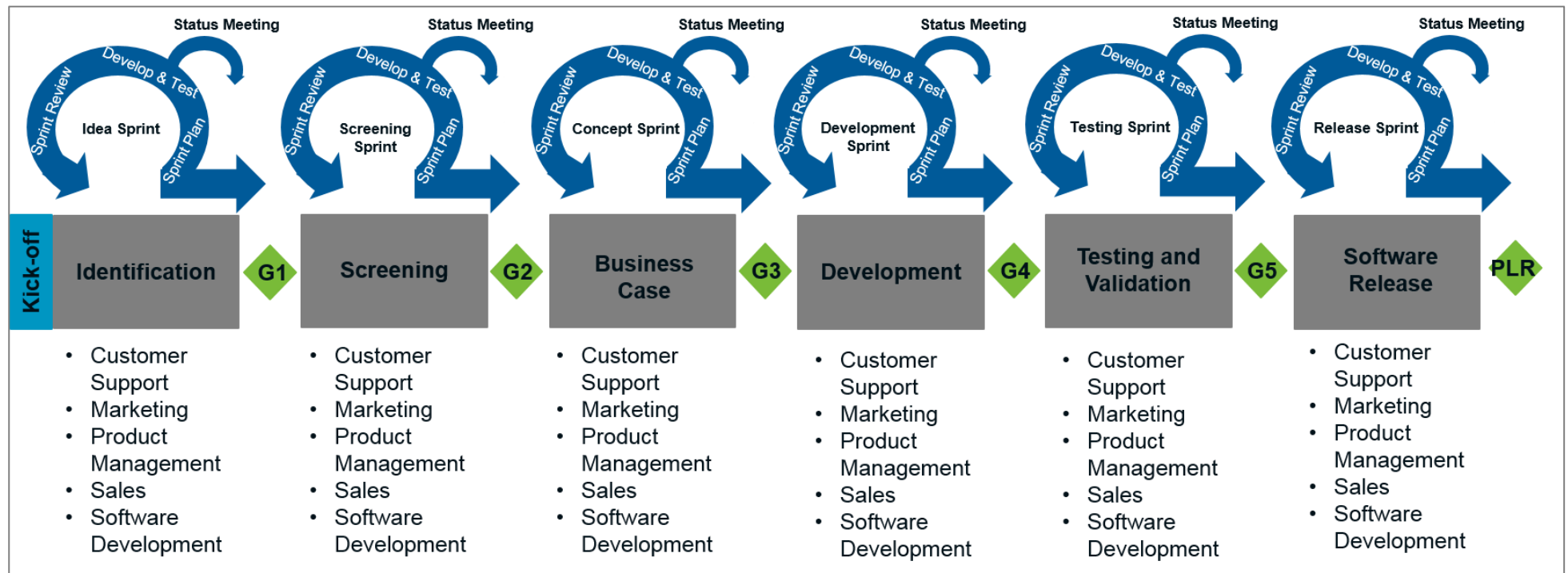
Figure 23: Final Stage-Gate Process (own presentation)

This merger allows AST to integrate the marketing department from the beginning, and hence, ensure that customer and market orientation are being considered and incorporated throughout the entire innovation process. Moreover, the involvement of all departments guarantees that all employees are informed about the current status of the new software version. In addition, this process approach enables the business unit to check on a regular basis if the innovation process is proceeding successfully and according to plan. Consequently, it can be ensured that the software version is released on time due to the structured process approach.

As illustrated in figure 23, customer support, marketing, product management, sales, and software development are involved in the process from the beginning. The head of each of these five teams shall become a member of a so-called core team which is responsible for the conduct of the process. The implementation of the agile Stage-Gate process is described in the following sections. Furthermore, it is explained how the AST marketing department can contribute to the different phases of the agile Stage-Gate process.

11.1.1. *Recommended Implementation of the Kick-off Meeting*

At the beginning of the process, a kick-off meeting shall take place between the members of the core team. As a result of the kick-off meeting, it shall be defined which market topics are considered to be the most important for the new software version. This information should be provided by the marketing department. Moreover, customer feedback is considered to be important by the agile process. Therefore, it shall be discussed which lead customers shall be involved in the process.

Recommended AST Marketing Input in the Kick-off Meeting

Currently, no comprehensive market analysis is carried out for a new software release. Instead, product managers as well as other business functions observe the market individually and do not store the gathered information centrally. However, participants of the focus group agreed that marketing should provide market information in order to adapt features to the market demand. Moreover, it would be helpful if marketing could provide information about the market potential. Therefore, it is recommended to already provide market information in a kick-off meeting. The

presentation of findings could guarantee that actual market trends as well as customer needs are considered for the generation of ideas.

To collect information about the actual market status, a customized artificial intelligence (AI) tool would be helpful for the AST marketing department. AST is already making use of the customer relationship management (CRM) tool Salesforce. This provider offers the possibility to extend the CRM tool with an AI tool. As Salesforce is already implemented as well as known within the company, the AST marketing department should consider using the Salesforce AI tool in order to analyze the worldwide market. This analysis would enable the marketing department to calculate the market potential but also to discover the competitors' software.

11.1.2. *Recommended Implementation of the Identification Phase*

After defining the core topics for the new software version in the kick-off meeting, the head of each department shall provide the outcome to his or her department. This marks the start of the idea sprint in which every team individually defines the tasks for the identification phase and generates ideas for the new software version. Customer support and sales shall develop ideas together with selected lead customers. This collaboration with lead customers shall also enable AST to discover customer needs.

The gathered ideas shall be generated and stored in the tool Jira. Every employee shall have access to this tool in order to guarantee the central storage of ideas.

The generated ideas are reviewed regularly by the core team in status meetings. This core team is also responsible to evaluate the probabilities of success of these ideas with defined criteria during the gate 1 meeting. This means that a rough estimate shall be made to decide which ideas pass the gate and which ones shall be eliminated.

Recommended AST Marketing Input in the Identification Phase

The AST marketing department shall store ideas in the tool Jira. In addition, the head of the marketing team shall review gathered ideas with the core team in a status meeting to guarantee that market-view is taken into account.

11.1.3. Recommended Implementation of the Screening Phase

The members of the core team shall communicate the outcome of the gate 1 meeting to their respective teams. This meeting marks the beginning of the screening sprint in which every team individually checks the feasibility and viability of gathered ideas. Software development shall check the technical feasibility of gathered ideas while customer support and sales check the viability of ideas in consultation with the lead customers. Product management shall be involved in the evaluation of the feasibility and viability of ideas as product managers need to keep an overview of their software. In regular status meetings, the core team shall provide the findings of the individual teams. As a final result, screened ideas shall be defined during the gate 2 meeting. Furthermore, feedback from chosen lead customers ensures that customer orientation is being considered.

Recommended AST Marketing Input in the Screening Phase

As the marketing department has observed the market, the AST marketing department shall check if generated ideas comply with findings of the market analysis. This means that information about competitors' software, market trends but also market potential are taken into account for evaluating gathered ideas for new software features. Due to this this approach, it is ensured that ideas remain aligned with the market orientation.

11.1.4. Recommended Implementation of the Business Case Phase

After defining features for the new software version, the individual teams prepare the business case in the concept sprint. Customer support and sales are responsible to provide information about customer needs while product management, marketing, and software development are responsible to define as well as to describe the features. These description shall include the key messages, the targets, and the unique selling proposition (USP) of new features. In regular status meetings, the core team shall discuss about achieved findings. As a result of the gate 3 meeting, the core team shall create the development plan. In addition, the key messages, targets, and the USP of features shall be finalized.

Recommended AST Marketing Input in the Business Case Phase

It is recommended to create a template for product managers which enables them to define the key messages, targets, and the USPs of new features. As customer-orientation is considered important, the template shall also make it possible to think about following aspects:

- Customer needs – reflect the basic motivation for the particular development
- Differentiation – mention main differentiations to competitors
- Rational benefits – address the rational view of the customer
- Emotional benefits – address the emotional view of the customer
- Reason why – state why the target group shall trust the rational and emotional benefits

Apart from the creation of the template, marketing shall provide support to product managers and software development in defining key messages, targets, and USPs. This accurate description of demanded features makes it easier for software developers to understand the importance of the needed features. Marketing, on the other side, can use these detailed descriptions to start creating marketing material for the promotion of the software release. Furthermore, marketing can use this material to create training material for the customer support as well as the sales employees to guarantee that the right messages are promoted in the market.

11.1.5.   Recommended Implementation of the Development Phase

During the development sprint the software development team is responsible to develop the features for the new software version. In regular status meetings, the head of the software development provides status updates to the other member of the core team. Customer support and sales shall inform lead customers about the actual development status. As a result of the gate 4 meeting, the quality as well as the attractiveness of the software prototype shall be checked. In addition, the core team shall check if defined key messages, targets, and the USPs of features are met.

Recommended AST Marketing Input in the Development Phase

As illustrated in figure 22, the AST marketing department is not directly involved in the development phase. However, marketing shall begin with the creation of the marketing material.

11.1.6.   Recommended Implementation of the Testing and Validation Phase

During the testing sprint, the software validation team is responsible to test the developed features. Customer support and sales shall provide the software prototype to lead customers in order to collect their feedback. In addition, training material shall be provided to customer support and sales to guarantee that employees promote the right messages in the market and that they will be able to support customers. In regular status meetings, the core team shall be informed about the lead customers' feedback and the current testing status by the software validation team. As a result of the gate 5 meeting, the developed and tested software needs its last check before it can be released.

Recommended AST Marketing Input in the Testing and Validation Phase

As illustrated in figure 22, the AST marketing department is not directly involved in the testing and validation phase. However, marketing shall finalize the promotion material and inform affiliates about the planned release date. In addition, marketing shall provide the created training material to customer support and sales.

11.1.7.   Recommended Implementation of the Software Release Phase

During the release sprint customer support, product management, and sales shall visit customers but also conferences to inform existing customers as well as potential customers about the software's new features. At the end of the agile Stage-Gate process, the core team shall review the entire process and align it if necessary.

Recommended AST Marketing Input in the Software Release Phase

The marketing material developed in the business case phase is send out to the defined target group. Therefore, marketing has already created the needed promotion material in the development phase. The success of the release promotion shall be controlled by the AST marketing department.

11.2. Implementation and Control

This section focuses on how the marketing-oriented innovation process can be implemented within the business unit AST and how the success of the implementation can be controlled.

The following steps shall be used to implement the marketing-oriented innovation process:

1. Establishing a sense of urgency
2. Creating the guiding coalition
3. Developing a vision and strategy
4. Communicating the defined vision
5. Empowering employees for broad-based action
6. Generating short-term wins
7. Consolidating gains and producing more change
8. Anchoring new approaches in the culture

First, the AST marketing department must establish a sense of urgency. This means that other business functions must be informed about why a change is needed. Instead of communicating the change within the entire business unit, it is preferred to address a select group of persons. Therefore, the monthly strategy meeting can be used as a platform to raise awareness for the importance of a marketing-oriented innovation process. This meeting is attended by the AST vice president, the heads of the software development as well as the customer support, the product managers, and the marketing managers. The task of marketing is to collaborate with these employees in order to develop a vision and a strategy of how and when the innovation process shall be implemented. After defining the vision and the strategy, it shall be communicated within the business unit that a new innovation process is implemented. This information could be communicated at the quarterly so-called info event. In the next step, trainings shall be provided to employees in order to guarantee that the new structure is understood. After attending trainings, employees shall perform chosen parts of the innovation process in order to get used to it. This step-by-step approach ensures that short-term wins can be achieved, and employees continue to contribute to the change. After achieving those short-term wins, more changes can be implemented. Finally, it must be ensured that the innovation process is anchored within the company culture.

12. Bibliography

Books
Agarwal, Bharat Bhushan/Tayal, Sumit Prakash (2009): Software Engineering, 2nd Ed., New Delhi: Laxmi Publications

Agarwal, Bharat Bhushan/Tayal, Sumit Prakash/Gupta, M. (2010): Software Engineering & Testing. An Introduction, Sudbury: Jones and Bartlett Publishers

Basu, Anirban (2015): Software Quality Assurance, Testing and Metrics, New Delhi: PHI Learning Private Limited

Black, Rex (2007): Pragmatic Software Testing. Becoming an Effective and Efficient Test Professional, Indianapolis: Wiley Publishing, Inc.

Bossert, James L. (1991): Quality Function Deployment. A Practioner's Approach, Milwaukee: ASQC Quality Press

Cadle, James/Paul, Debra/Turner, Paul (2010): Business Analysis Techniques. 72 Essential Tools for Success, Swindon: British Computer Society

Cadle, James/Yeates, Donald (2008): Project Management for Information Systems, 5th Ed., Essex: Pearson Education Limited

Charan, Ashok (2015): Marketing Analytics. A Practitioner's Guide to Marketing Analytics and Research Methods, Singapore: World Scientific Pub Co Inc

Elearn (2007): Reaching Your Goals through Innovation. Management Extra, Amsterdam/Boston/Heidelberg/London/New York/Oxford/Paris/San Diego/ San Francisco/Singapore/Sydney/Tokyo: Pergamon Flexible Learning

Fleisher, Craig S./Bensoussan, Babette E. (2015): Business and Competitive Analysis. Effective Application of New and Classic Methods, 2nd Ed., Upper Saddle River: Pearson Education, Inc.

Gaitanides, Michael (2012): Prozessorganisation. Entwicklung, Ansätze und Programme des Managements von Geschäftsprozessen, 3rd Ed., München: Verlag Franz Vahlen

Garzia, Carmine (2011): Managing the Strategic Innovation Process, Milano: EGEA

Griffin, Ricky/Pustay, Michael (2014): International Business. A Managerial Perspective, 8th Ed., Harlow: Pearson Education

Hill, Charles W. L./Jones, Gareth R. (2010): Strategic Management Theory. An Integrated Approach, 9th Ed., Mason: South-Western Cengage Learning

Hisrich, Robert D./Kearney, Claudine (2014): Managing Innovation and Entrepreneurship, Thousand Oaks: SAGE Publications, Inc.

Hitt, Michael A./Ireland, R. Duane/Hoskisson, Robert E. (2012): Strategic Management Cases. Competitiveness and Globalization, 10th Ed., Mason: South-Western Cengage Learning

Ihrig, Colin J. (2013): Pro Node.js for Developers, New York: Apress

Kahn, Kenneth B. (2006): New Product Forecasting. An Applied Approach, Armonk: M.E. Sharpe, Inc.

Laplante, Philipp A. (2003): Software Engineering for Image Processing Systems, Boca Raton: CRC Press

Lewis, William E. (2008): Software Testing and Continuous Quality Improvement, 3rd Ed., Boca Raton: Auerbach Publications

Magretta, Joan (2012): Understanding Michael Porter. The Essential Guide to Competition and Strategy, Boston: Harvard Business School Publishing

McManners, Peter (2014): Corporate Strategy in the Age of Responsibility, Surrey: Gower Publishing

Mohr, Jakki/Sengupta, Sanjit/Slater, Stanley (2010): Marketing of High-Technology Products and Innovations, 3rd Ed., Upper Saddle River: Pearson Education

Morschett, Dirk/Schramm-Klein, Hanna/Zentes, Joachim (2015): Strategic International Management. Text and Cases, 3rd Ed., Wiesbaden: Springer Gabler

Oberzaucher, Astrid (2012): Marktforschung für die praktische Anwendung, Wien: Linde Verlag

Perera, Rashain (2017): The PESTLE Analysis, s.l.: Nerdynaut

Pride, William M./Ferrell, O.C. (2016): Marketing, 18th Ed., Boston: Cengage Learning

Quack, Helmut (1995): Internationales Marketing. Entwicklung einer Konzeption mit Praxisbeispielen, München: Verlag Franz Vahlen GmbH

Schilling, Melissa A. (2013): Strategic Management of Technological Innovation, 4th Ed., New York: McGraw-Hill Irwin

Schmelzer, Hermann J./Sesselmann, Wolfgang (2010): Geschäftsprozessmanagement in der Praxis. Kunden zufrieden stellen. Produktivität steigern. Wert erhöhen, 7th Ed., München: Carl Hanser Verlag

Schürmann, Mathias (2016): Marketing. In vier Schritten zum eigenen Marketingkonzept, 3rd Ed., Zürich: vdf

Stummer, Christian/Günther, Markus/Köck, Anna Maria (2006): Grundzüge des Innovations- und Technologiemanagements, Wien: Facultas Verlags- und Buchhandels AG

Tidd, Joe/Bessant, John (2009): Managing Innovation. Integrating Technological, Market and Organizational Change, 4th Ed., Chichester: John Wiley & Sons

Trigwell-Jones, Mary (2016): Cambridge O Level Commerce Coursebook, 2nd Ed., Cambridge: Cambridge University Press

Trommsdorff, Volker/Steinhoff, Fee (2013): Innovationsmarketing, 2nd Ed., München: Verlag Franz Vahlen GmbH

Vahs, Dietmar/Brem, Alexander (2013): Innovationsmanagement. Von der Idee zur erfolgreichen Vermarktung, 4th Ed., Stuttgart: Schäffer-Poeschel Verlag

Walsh, Gianfranco/Deseniss, Alexander/Kilian, Thomas (2009): Marketing. Eine Einführung auf der Grundlage von Case Studies, 1st Ed., Berlin/Heidelberg: Gabler Verlag

Warren, Kim (2008): Strategic Management Dynamics, Chichester: John Wiley & Sons

Weiber, Rolf/Pohl, Alexander (2017): Innovation und Marketing, Stuttgart: W. Kohlhammer GmbH

E-Books
Ansoff, H. Igor et al. (2019): Implanting Strategic Management, 3rd Ed., Cham: Springer International Publishing AG [online] https://www.springerprofessional.de/implanting-strategic-management/16228784 [19.12.2018]

Aumayr, Klaus J. (2006): Erfolgreiches Produktmanagement. Tool-Box für das professionelle Produktmanagement und Produktmarketing, Wiesbaden: Betriebswirtschaftlicher Verlag Dr. Th. Gabler [online] https://link.springer.com/book/10.1007%2F978-3-8349-9081-5#about [06.11.2018]

Berekoven, Ludwig/Eckert, Werner/Ellenrieder, Peter (2009): Marktforschung. Methodische Grundlagen und praktische Anwendung, 12th Ed., Wiesbaden: Gabler Verlag [online] https://link.springer.com/content/pdf/10.1007%2F978-3-8349-8267-4.pdf [19.12.2018]

Bürkner, Reimer M. (2003): Erfolgreiche Software-Lizenzierung. Electronic License Management. Von der Auswahl bis zur Installation, Berlin/Heidelberg: Springer-Verlag [online] https://link.springer.com/book/10.1007/978-3-642-55518-3#about [11.10.2018]

Büter, Clemens (2010): Außenhandel. Grundlagen globaler und innergemeinschaftlicher Handelsbeziehungen, 2nd Ed., Berlin/Heidelberg: Springer-Verlag [online] https://www.springerprofessional.de/aussenhandel/3334634?searchResult=2.au%C3%9Fenhandel%20grundlagen%20globaler%20und%20innergemeinschaftlicher%20Handelsbeziehungen&searchBackButton=true [11.10.2018]

Buxmann, Peter/Diefenbach, Heiner/Hess, Thomas (2011): Die Softwareindustrie. Ökonomische Prinzipien, Strategien, Perspektiven, 2nd Ed., Berlin/Heidelberg: Springer-Verlag [online] https://link.springer.com/book/10.1007%2F978-3-642-13361-9 [13.07.2018]

de Bruijn, Hans/ten Heuvelhof, Ernst/in 't Veld, Roel (2010): Process Management. Why Project Management Fails in Complex Decision Making Processes, 2nd Ed., Berlin/Heidelberg: Springer-Verlag [online] https://www.springer.com/de/book/9783642139406 [04.10.2018]

Disselkamp, Marcus (2012): Innovationsmanagement. Instrumente und Methoden zur Umsetzung im Unternehmen, 2nd Ed., Wiesbaden: Springer Fachmedien [online] https://link.springer.com/book/10.1007%2F978-3-8349-4472-6 [04.10.2018]

Ferrell, O.C./Hartline, Michael D. (2014): Marketing Strategy. Text and Cases, 6th Ed., Mason: South-Western Cengage Learning [online] http://www.edwardyao.com/uploads/5/4/5/9/54592263/o.-c.-ferrell-michael-hartline-marketing-strategy-text-and-cases-cengage-learning-2012.pdf [03.12.2018]

Gleitsmann, Beate M. (2007): Internes Marketing, Unternehmenskultur und marktorientiertes Verhalten. Direkte, indirekte und moderierende Effekte, Wiesbaden: Gabler Verlag [online] https://link.springer.com/content/pdf/10.1007%2F978-3-8350-9490-1.pdf [29.10.2018]

Haller, Sabine (2017): Dienstleistungsmanagement. Grundlagen – Konzepte- Instrumente, 7th Ed., Wiesbaden: Springer Fachmedien [online] https://www.springerprofessional.de/dienstleistungsmanagement/12303658 [11.10.2018]

Hoisl, Barbara (2019): Produkte digital-first denken. Wie Unternehmen softwarebasierte Produktinnovationen erfolgreich gestalten, Wiesbaden: Gabler Verlag [online] https://www.springer.com/us/book/9783658230500 [31.10.2018]

Kepczynski, Robert et al. (2019): Implementing Integrated Business Planning. A Guide Exemplified with Process Context and SAP IBP Use Cases, Basel: Springer International Publishing, [online] https://www.springerprofessional.de/implementing-integrated-business-planning/15972400 [04.10.2018]

Kneuper, Ralf (2018): Software Processes and Life Cycle Models. An Introduction to Modelling, Using and Managing Agile, Plan-Driven and Hybrid Processes, Basel: Springer International Publishing AG [online] https://www.springer.com/de/book/9783319988443 [17.12.2018]

Kühnapfel, Jörg (2014): Nutzwertanalysen in Marketing und Vertrieb, Wiesbaden: Gabler Verlag [online] https://www.springer.com/de/book/9783658055097 [04.11.2018]

Kuß, Alfred (2012): Marktforschung. Grundlagen der Datenerhebung und Datenanalyse, 4th Ed., Wiesbaden: Gabler Verlag [online] https://link.springer.com/content/pdf/10.1007%2F978-3-8349-3853-4.pdf [02.11.2018]

Lehnen, Jens (2017): Integration von Lead Usern in die Innovationspraxis. Eine empirische Analyse der praktischen Anwendung des Lead User-Ansatzes, Wiesbaden: Gabler Verlag [online] https://www.springer.com/de/book/9783658193843 [27.12.2018]

Meffert, Heribert/Bruhn, Manfred (2012): Dienstleistungsmarketing. Grundlagen – Konzepte – Methoden, 7th Ed., Wiesbaden: Gabler Verlag [online] https://link.springer.com/book/10.1007%2F978-3-8349-3858-9 [14.10.2018]

Meffert, Heribert/Burmann, Christoph/Kirchgeorg, Manfred (2012): Marketing. Grundlagen marktorientierter Unternehmensführung. Konzepte – Instrumente – Praxisbeispiele, 11th Ed., Wiesbaden: Gabler Verlag [online] https://www.springer.com/de/book/9783834969163 [02.11.2018]

Michaelis, Michael (2009): Internes Marketing in Dienstleistungsnetzwerken. Konzeption und Erfolgsmessung, Wiesbaden: Gabler Verlag [online] https://link.springer.com/book/10.1007%2F978-3-8349-8272-8 [27.10.2018]

Olbrich, Rainer/Battenfeld, Dirk/Buhr, Carl-Christian (2012): Marktforschung. Ein einführendes Lehr- und Übungsbuch, Berlin/Heidelberg: Springer-Verlag [online] https://link.springer.com/content/pdf/10.1007%2F978-3-642-24345-5.pdf [02.11.2018]

Planing, Patrick (2014): Innovation Acceptance. The Case of Advanced Driver-Assistance Systems, Wiesbaden: Gabler Verlag [online] https://www.springer.com/us/book/9783658050047#aboutBook [19.12.2018]

Saavedra, Claudio A. (2016): The Marketing Challenge for Industrial Companies. Advanced Concepts and Practices, Basel: Springer International Publishing [online] https://www.springer.com/de/book/9783319306094 [04.10.2018]

Schawel, Christian/Billing, Fabian (2018): Top 100 Management Tools. Das wichtigste Buch eines Managers von ABC-Analyse bis Zielvereinbarung, 6th Ed., Wiesbaden: Springer Fachmedien [online] https://www.springerprofessional.de/top-100-management-tools/15317870?tocPage=11 [19.12.2018]

Tomczak, Torsten/Reinecke, Sven/Kuss, Alfred (2018): Strategic Marketing. Market-Oriented Corporate and Business Unit Planning, Wiesbaden: Springer Gabler [online] https://link.springer.com/book/10.1007/978-3-658-18417-9#about [29.12.2018]

Compilations and Handbooks

Abbas, Noura/Gravell, Andrew M./Wills, Gary B. (2008): Historical Roots of Agile Methods. Where Did "Agile Thinking" Come From?, in: Abrahamsson, P. et al. (ed.): Agile Processes in Software Engineering and Extreme Programming. 9th International Conference, XP 2008, Limerick, Ireland, June 10-14, 2008, Proceedings, Berlin/Heidelberg: Springer-Verlag, p. 94 – 103 [online] https://www.springer.com/de/book/9783540682547 [16.12.2018]

Bruhn, Manfred/Ahlers, Grit Mareike (2017): Integrated Communication in the Innovation Process. An Approach to Integrated Innovation Communication, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 205 - 225

Deschamps, Jean-Philippe (2017): Classic Root Causes of Innovation Failures. Things We All Know but Sometimes Forget, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 41 - 60

Dobrigkeit, Franziska/de Paula, Danielly/Uflacker, Matthias (2019): InnoDev. A Software Development Methodology Integrating Design Thinking, Scrum and Lean Startup, in: Meinel, Christoph/Leifer, Larry (ed.): Design Thinking Research. Looking Further: Design Thinking Beyond Solution-Fixation, Basel: Springer International Publishing, p. 199 - 227 [online] https://www.springerprofessional.de/design-thinking-research/16161198 [13.12.2018]

Horn, Christian Franz/Ivens, Björn Sven (2015): Corporate Prediction Markets for Innovation Management. Theoretical Foundation and Practical Examples for Business Use, in: Brem, Alexander/Viardot, Éric (ed.): Adoption of Innovation. Balancing Internal and External Stakeholders in the Marketing of Innovation, Basel: Springer International Publishing, p. 11 – 23 [online] https://www.springer.com/de/book/9783319145228 [27.11.2018]

Hoffmann, Marcus (2012): Die Ideenvorauswahl im Innovationsprozess (4S-Verfahren), in: Pepels, Werner (ed.): Launch – Die Produkteinführung. Wie Sie Produkte und Dienstleistungen erfolgreich in den Markt bringen, 2nd Ed., Düsseldorf: Symposion Publ., p. 47 – 60

Holzmüller, Hartmut H./Böhm, Bettina (2007): Potenzialanalyse, in: Albers, Sönke/Herrmann, Andreas (ed.): Handbuch Produktmanagement. Strategieentwicklung – Produktplanung – Organisation - Kontrolle, 3rd Ed., Wiesbaden: Gabler Verlag, p. 295 – 314 [online] https://link.springer.com/chapter/10.1007/978-3-8349-9517-9_13 [13.12.2018]

Hülsmann, Michael et al. (2017): Cognitive Diversity of Top Management Teams as a Competence-Based Driver of Innovation Capability, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 77 - 88

Kepper, Gaby (2008): Methoden der qualitativen Marktforschung, in: Herrmann, Andreas/Homburg, Christian/Klarmann, Martin (ed.): Handbuch Marktforschung. Methoden – Anwendungen – Praxisbeispiele, 3rd Ed., Wiesbaden: Gabler, p. 175 - 212

Kowalski, Markus et al. (2016): New Challenges in Innovation-Process-Management. A Criticism and Expansion of Unidirectional Innovation-Process-Models, in: Jeschke, Sabina et al. (ed.): Automation, Communication and Cybernetics in Science and Engineering 2015/2016, Basel: Springer International Publishing, p. 731 – 738 [online] https://www.springerprofessional.de/automation-communication-and-cybernetics-in-science-and-engineer/11049144?tocPage=1 [04.10.2018]

Kriemadis, Thanos (2018): Innovation, Creativity, New Product Development Processes and the Role of Science Parks, in: Vrontis, Demetris et al. (ed.): Innovation and Capacity Building. Cross-disciplinary Management Theories for Practical Applications, Basel: Springer International Publishing, p. 231 – 253 [online] https://www.springerprofessional.de/innovation-and-capacity-building/16094104 [15.11.2018]

Kröper, Madeleine/Bilgram, Volker/Wehlig, Ramona (2017): Empowering Members of a Brand Community to Gain Consumer Insights and Create New Products. The Case of the Vorwerk Thermomix Research Community, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 403 - 414

Mast, Claudia (2017): Managing Emotions Matters. A Balanced Framework for Communicating Innovations in Companies, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 175 - 184

Mayerhofer, Wolfgang (2009): Das Fokusgruppeninterview, in: Buber, Renate/Holzmüller, Hartmut (ed.): Qualitative Marktforschung. Konzepte – Methoden – Analysen, 2nd Ed., Wiesbaden: Gabler, p. 477 – 490 [online] https://link.springer.com/chapter/10.1007%2F978-3-8349-9441-7_30 [19.12.2018]

Pepels, Werner (2012): Ideengenerierung für Neuprodukte, in: Pepels, Werner (ed.): Launch – Die Produkteinführung. Wie Sie Produkte und Dienstleistungen erfolgreich in den Markt bringen, 2nd Ed., Düsseldorf: Symposion Publ., p. 15 – 45

Pfeffermann, Nicole (2017): Communication Model Design Innovation – Authentic Open Innovation Culture, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 113 - 129

Pfeffermann, Nicole (2017): What is Innovation Communication? A Dynamic Capability View, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 303 - 315

Schuh, Günther/Müller, Jochen/Rauhut, Marcus (2012): Gestaltung von Produktentwicklungsprozessen, in: Schuh, Günther (ed.): Innovationsmanagement. Handbuch Produktion und Management 3, 2nd Ed., Berlin/Heidelberg: Springer Verlag, p. 161 – 247 [online] https://ebookcentral.proquest.com/lib/wirtschaft/reader.action?docID=968729&query= [03.09.2018]

Schulz, Jörn/Steinhoff, Fee/Jepsen, Kathrin (2017): Strike while the Iron is Hot. User Centricity Adapted to the Agile Innovation Development Process, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 349 - 366

Seidenschwarz, Werner (2008): Aufgaben und Elemente eines umfassenden Prozessmanagement-Systems, in: Seidenschwarz, Werner (ed.): Marktorientiertes Prozessmanagement. Wie Process Mass Customization Kundenorientierung und Prozessstandardisierung integriert, 2nd Ed., München: Verlag Franz Vahlen GmbH, p. 9 - 51

Śledzik, Karol (2013): Schumpeter's View on Innovation and Entrepreneurship, in: Hittmár, Stefan (ed.): Management Trends in Theory and Practice. Scientific Papers, Zilina: EDIS – University of Zilina, p. 89 – 95

Thompson, Leigh/Schonthal, David (2017): Setting the Stage for Creativity. Upstream, Mid-Stream, and Downstream, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 17 - 28

Tyrväinen, Pasi/Selin, Joona (2011): How to Sell SaaS. A Model for Main Factors of Marketing and Selling Software-as-a-Service, in: Regnell, Björn/van de Weerd, Inge/De Troyer, Olga (ed.): Software Business, Berlin/Heidelberg: Springer, p. 2 – 16 [online] https://www.springerprofessional.de/software-business/3654686#TOC [13.12.2018]

Viardot, Eric (2017): Redefining Collaborative Innovation in the Digital Economy, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 265 – 290

Woodward, Ian C./Shaffakat, Samah (2017): Innovation, Leadership, and Communication Intelligence, in: Pfeffermann, Nicole/Gould, Julie (ed.): Strategy and Communication for Innovation. Integrative Perspective on Innovation in the Digital Economy, 3rd Ed., Basel: Springer International Publishing, p. 245 - 264

Journals and Professional Magazines
Al-khatib, Bilal Adel (2012): The Effect of Using Brainstorming Strategy in Developing Creative Problem Solving Skills among Female Students in Princess Alia University College, in: American International Journal of Contemporary Research, 2, no. 10, p. 29 – 38 [online] https://www.aijcrnet.com/journals/Vol_2_No_10_October_2012/4.pdf [03.12.2018] (peer-reviewed)

Álvarez, Asunción/Ritchey, Tom (2015): Applications of General Morphological Analysis. From Engineering Design to Policy Analysis, in: Acta Morphologica Generalis, 4, no. 1, p. 1 – 40 [online] http://www.amg.swemorph.com/pdf/amg-4-1-2015.pdf [03.12.2018]

Balaji, S./Sundararajan Murugaiyan, M. (2012): Waterfall vs V-Model vs Agile. A Comparative Study on SDLC, in: International Journal of Information Technology and Business Management, 2, no. 1, p. 26 – 30 [online] http://www.jitbm.com/Volume2No1/waterfall.pdf [20.11.2018] (peer-reviewed)

Balkir, Nalan Bayraktar/Topkaya, Ece Zehir (2017): Synectics as a Prewriting Technique. Its Effects on Writing Fluency and Lexical Complexity, in: Eurasian Journal of Applied Linguistics, 3, no. 2, p. 325 – 347 [online] http://www.ejal.eu/index.php/ejal/article/view/166 [03.12.2018] (peer-reviewed)

Brady, Shane R. (2015): Utilizing and Adapting the Delphi Method for Use in Qualitative Research, in: International Journal of Qualitative Methods, 14, no, 5, p. 1 – 6 [online] https://journals.sagepub.com/doi/pdf/10.1177/1609406915621381 [03.12.2018] (peer-reviewed)

Cooper, Robert G. (2017): Idea-to-Launch Gating Systems. Better, Faster, and More Agile, in: Research-Technology Management, 60, no. 1, p. 48 – 52 [online] https://www.tandfonline.com/doi/full/10.1080/08956308.2017.1255057 [04.10.2018] (peer-reviewed)

Cooper, Robert G. (2016): Agile-Stage-Gate Hybrids. The Next Stage for Product Development. Blending Agile and Stage-Gate Methods Can Provide Flexibility, Speed, and Improved Communication in New-Product Development, in: Research-Technology Management, 59, no. 1, p. 21 – 29 [online] https://www.tandfonline.com/doi/full/10.1080/08956308.2016.1117317 [04.10.2018] (peer-reviewed)

Cooper, Robert G./Sommer, Anita F. (2016): Agile-Stage-Gate. New Idea-to-Launch Method for Manufactured New Products is Faster, More Responsive, in: Industrial Marketing Management, 59, p. 167 – 180 [online] http://www.bob-cooper.ca/images/files/articles/0/7-Agile-Stage-Gate-for-Manufacturered-Products.pdf [04.10.2018] (peer-reviewed)

Cooper, Robert G. (2011): The Innovation Dilemma. How to Innovate When the Market Is Mature, in: Journal of Product Innovation Management, 28, no. s1, p. 2 – 27 [online] https://onlinelibrary.wiley.com/doi/10.1111/j.1540-5885.2011.00858.x [04.10.2018] (peer-reviewed)

Ghafeer, Nour Aldeen M./Rahman, Adbul Aziz A. Abdul/Mazahrih, Basman J. (2014): The Impact of Target Cost Method to Strengthen the Competitiveness of Industrial Companies, in: International Journal of Business and Social Science, 5, no. 2, p. 250 – 263 [online] http://ijbssnet.com/view.php?u=http://ijbssnet.com/journals/Vol_5_No_2_February_2014/29.pdf [29.12.2018] (peer-reviewed)

Gorschek, Tony et al. (2010): A Lightweight Innovation Process for Software-Intensive Product Development, in: IEEE Software, 27, no. 1, p. 37 – 45 [online] https://www.researchgate.net/publication/44242233_A_Lightweight_Innovation_Process_for_Software-Intensive_Product_Development/download [01.12.2018]

Hsu, Chia-Chien/Sandford, Brian A. (2007): The Delphi Technique. Making Sense of Consensus, in: Practical Assessment, Research & Evaluation, 12, no. 10, p. 1 – 8 [online] https://pareonline.net/getvn.asp?v=12&n=10 [01.12.2018] (peer-reviewed)

Jokubauskienė, Raminta/Vaitkienė, Rimgailė (2017): Assumption of Customer Knowledge Enablement in the Open Innovation Process, in: Economics and Business, 31, p. 55 – 69 [online] https://content.sciendo.com/view/journals/eb/31/1/article-p55.xml [01.03.2019] (peer-reviewed)

Litcanu, Marcela et al. (2015): Brain-Writing Vs. Brainstorming. Case Study for Power Engineering Education, in: Procedia – Social and Behavioral Sciences, 191, p. 387 – 390 [online] https://www.sciencedirect.com/science/article/pii/S1877042815027123 [03.12.2018] (peer-reviewed)

Maglyas et al. (2017): Core Software Product Management Activities, in: Journal of Advances in Management Research, 14, no. 1, p. 23 – 45 [online] https://www.emeraldinsight.com/doi/pdfplus/10.1108/JAMR-03-2016-0022 [29.12.2018]

Mietzner, Dana/Reger, Guido (2005): Advantages and Disadvantages of Scenario Approaches for Strategic Foresight, in: International Journal of Technology Intelligence and Planning, 1, no. 2, p. 220 – 239 [online] https://www.inderscience.com/info/inarticle.php?artid=6516 [03.12.2018]

Potkány, Marek et al. (2017): Innovation of a Technological Product with Utilizing the Target Costing Methodology, in: International Review of Management and Marketing, 7, no. 2, p. 130 – 137 [online] https://www.econjournals.com/index.php/irmm/article/view/4026 [29.12.2018] (peer-reviewed)

Shanker Yadav, Ravi (2012): Improvement in the V-Model, in: International Journal of Scientific & Engineering Research, 3, no. 2, p. 1 – 8 [online] https://www.ijser.org/onlineResearchPaperViewer.aspx?Improvement-in-the-V-Model.pdf [10.12.2018]

Shen, X. X./Tan, K. C./Xie, M. (2001): The Implementation of Quality Function Deployment Based on Linguistic Data, in: Journal of Intelligent Manufacturing, 12, no. 1, p. 65 – 75 [online] https://link.springer.com/article/10.1023%2FA%3A1008955630880 [27.12.2018] (peer-reviewed)

Sholeh, Mehdi/Ghasemi, Ahmadreza/Shahbazi, Meisam (2018): A New Systematic Approach in New Product Development through an Integration of General Morphological Analysis and IPA, in: Decision Science Letters, 7, no. 2, p. 181 – 196 [online] https://www.researchgate.net/publication/322168302_A_new_systematic_approach_in_new_product_development_through_an_integration_of_general_morphological_analysis_and_IPA [03.12.2018] (peer-reviewed)

Singh Dhami, Harminder Pal (2016): Comparative Study and Analysis of Software Process Models on Various Merits, in: International Journal of Advanced Research in Computer Science and Software Engineering, 6, no. 9, p. 234 – 243 [online] http://ijarcsse.com/Before_August_2017/docs/papers/Volume_6/9_September2016/V6I9-0163.pdf [10.12.2018] (peer-reviewed)

Stošić, Biljana/Milutinović, Radul (2014): Possibilities of Opening up the Stage-Gate Model, in: Revista Română de Statistică, 62, no. 4, p. 41 – 53 http://www.revistadestatistica.ro/wp-content/uploads/2015/01/RRS_04_2014_A4.pdf [12.04.2019] (peer-reviewed)

Taferner, Benjamin (2017): A Next Generation of Innovation Models? An Integration of the Innovation Process Model Big Picture© Towards the Different Generations of Models, in: Review of Innovation and Competitiveness, 3, no. 3, p. 47 – 60 [online] https://doaj.org/article/3957a07260334cadb4fe5bee4419a25b [27.02.2019] (peer-reviewed)

Zhu, Mengmeng/Pham, Hoang (2017): Environmental Factors Analysis and Comparison Affecting Software Reliability in Development of Multi-Release Software, in: The Journal of Systems and Software, 132, p. 72 – 84 [online] https://www.sciencedirect.com/science/article/pii/S0164121217301036 [27.11.2018]

Zizlavsky, Ondrej (2015): Approaches to Innovation Process Assessment. Complex Results from an Exploratory Investigation, in: International Journal of Engineering Business Management, 7, p. 1 – 16 [online] https://journals.sagepub.com/doi/pdf/10.5772/62052 [27.02.2019] (peer-reviewed)

Contributions from Internet Sources
AVL List GmbH (2018): [online] https://www.avl.com/web/guest/simulation [24.09.2018]

Boehm, Barry W. (n.d.): A Spiral Model of Software Development and Enhancement [online] http://csse.usc.edu/TECHRPTS/1988/usccse88-500/usccse88-500.pdf [09.12.2018]

Chapman, Lee (2018): [online] https://www.trewmarketing.com/smartmarketingblog/5-tips-for-successful-product-launch [09.12.2018]

Claessens, Maximilian (2016): [online] https://marketing-insider.eu/market-segmentation-criteria/ [09.12.2018]

Cooper, Robert G./Edgett, Scott J. (2006): Stage-Gate® and the Critical Success Factors for New Product Development [online] https://www.bptrends.com/bpt/wp-content/publicationfiles/07-06-ART-Stage-GateForProductDev-Cooper-Edgett1.pdf [26.11.2018]

DAMCO (no year): Software Development Insights Report [online] http://www.damcogroup.com/software-development-report/Software%20Development%20Insights%20Report.pdf [17.08.2018]

Edgett, Scott J. (2015): Idea-to-Launch (Stage-Gate®) Model. An Overview [online] https://www.stage-gate.net/downloads/wp/wp_10.pdf [14.08.2018]

European Information Technology Observatory (2012/13): ICT Market Report 2012/13. Definitions & Methodology [online] http://www.eito.com/WebRoot/Store15/Shops/63182014/MediaGallery/Categories/Reports/EITO2012_Definitions_and_Methodology.pdf [14.08.2018]

European IPR Helpdesk (2018): [online] https://iprhelpdesk.eu/node/2024 [29.12.2018]

Garcia, Marian et al. (2007): [online] https://www.researchgate.net/publication/23512295_Quality_Function_Deployment_Can_Improve_Innovation_Efficiency_in_the_Food_Industry [27.12.2018]

Jiang, Liping/Ørts Hansen, Carsten (2016): Target Costing as a Strategic Tool to Commercialize the Product and Service Innovation [online] https://openarchive.cbs.dk/bitstream/handle/10398/9426/Target_costing_as_a_strategic_tool_to_commercialize_the_product_and_service_innovation.pdf [03.12.2018]

Kim, Song-Kyoo (2017): Systematic Innovation Mounted Software Development Process and Intuitive Project Management Framework for Technology Startups [online] https://arxiv.org/ftp/arxiv/papers/1708/1708.06900.pdf [03.12.2018]

Powell-Morse, Andrew (2016): [online] https://airbrake.io/blog/sdlc/v-model [10.12.2018]

Proffitt, Brian (2015): [online] http://community.redhat.com/blog/2015/12/guidelines-for-announcing-software-releases/ [10.12.2018]

Stevens, Eric (2010): Lead User's Theory adapted to Services. Towards Service User's Toolkit [online] https://hal.archives-ouvertes.fr/hal-00676683/document [27.12.2018]

Other Sources
AVL List GmbH (2018): AVL Corporate Presentation 2018 [unpublished source]

AVL List GmbH (2018): AVL Fact Sheet 2018 [unpublished source]

13. Appendix

Appendix: Table of Contents

Appendix: List of Figures

Appendix: List of Tables

1. Detailed Project Plan

Nr.	Proceeding	Start	End	Who
1	**Realisation of the Master Thesis**	13.07.2018	28.06.2019	S
2	Execution of Literature Research	13.07.2018	18.01.2019	S
	Master Thesis Application	15.12.2017	17.09.2018	S, E, U
4	Introduction of Master Thesis Topic	15.12.2017	15.12.2017	U
5	Master Thesis Topic assigned by AST	28.03.2018	28.03.2018	E
6	Preparation of Master Thesis Application Documents	28.03.2018	30.05.2018	S, E
7	Submission of Master Thesis Application Documents	28.05.2018	01.06.2018	S
8	Approval of Master Thesis Topic	02.06.2018	13.06.2018	U
9	Applications Documents submitted	01.06.2018	01.06.2018	S
10	Allocation of Master Thesis Coach	17.09.2018	17.09.2018	U
11	**Preparation Phase**			
12	Preparation of Documents for 1st Coaching	17.09.2018	18.09.2018	S
13	Contact Master Thesis Coach	18.09.2018	18.09.2018	S
14	Arrangement of 1st Coaching and Kick-Off Meeting	18.09.2018	29.09.2018	S, C
15	Transmission Documents for 1st Coaching	30.09.2018	30.09.2018	S
16	1st Coaching	03.10.2018	03.10.2018	S, C
17	Rework Documents according to Coach's Feedback	05.10.2018	09.10.2018	S
18	Preparation of Documents for Kick-Off Meeting	08.10.2010	09.10.2010	S
19	Transmission Documents for Kick-Off Meeting	09.10.2018	09.10.2018	S
20	Kick-Off Meeting	12.10.2018	12.10.2018	S, C, E
21	Rework Documents according to Coach's and Company's Feedback	15.10.2018	18.10.2018	S
22	**Preparation for Master Seminar 1**			
23	Writing of Initital Situation	17.09.2018	17.09.2018	S
24	Writing of Challenges	17.09.2018	17.09.2018	S
25	Defining Objectives (Company + Master Thesis)	17.09.2018	12.10.2018	S
26	Development of Frame of Reference and Preliminary Table of Contents	18.09.2018	18.09.2018	S
27	Writing of Company Presentation	12.09.2018	24.09.2018	S
28	Creation of Preliminary Bibliography	04.10.2018	16.10.2018	S
29	Creation of Preliminary Project Plan	24.09.2018	14.10.2018	S
30	Transmission of Documents for MS1	15.10.2018	15.10.2018	S
31	Rework of Documents for MS 1 according to Coach's Feedback	16.10.2018	17.10.2018	S
32	Documents for MS 1 submitted	19.10.2018	19.10.2018	S
33	MS 1 - First Attempt	25.10.2018	25.10.2018	S, C, U

Figure A-1: Detailed Project Plan – Part 1 (own presentation)

#	Task	Start	End	Res
33	MS 1 - First Attempt	25.10.2018	25.10.2018	S, C, U
34	Rework of Documents according to MS 1 Feedback	29.10.2018	31.10.2018	S
35	2nd Coaching	25.10.2018	25.10.2018	S, C
36	Preparation for Master Seminar 1 - Second Attempt	02.11.2018	10.11.2018	S
37	Company Meeting for Master Seminar 1 - Second Attempt	08.11.2018	08.11.2018	S, E
38	3rd Coaching - Rework of Documents for Master Seminar 1 - Second Attempt	12.11.2018	12.11.2018	S, C
39	Transmission of Documents for MS1 - Second Attempt	16.11.2018	16.11.2018	S
40	MS 1 - Second Attempt	21.11.2018	21.11.2018	S, C, U
41	Rework of Documents according to MS 1 Feedback	22.11.2018	25.11.2018	S
42	Transmission and Signing of Master Thesis Contract	07.12.2018	07.12.2018	S, C, E
43	Master Thesis Contract submitted	07.12.2018	07.12.2018	S
44	**Theoretical Part**			
45	Writing of Chapter 2: Software	11.11.2018	18.11.2018	S
46	Writing of Chapter 3: Software Innovation Process Buildup	19.11.2018	25.11.2018	S
47	Writing of Chapter 4: Innovation and Marketing	26.11.2018	12.12.2018	S
48	Writing of Chapter 5: Introduction of Software Innovation Processes	17.12.2018	27.12.2018	S
49	Stay Abroad	21.12.2018	22.12.2018	S
50	Christmas Holidays	24.12.2018	26.12.2018	S
51	New Year´s Eve & New Year´s Day	31.12.2018	01.01.2019	S
52	Writing of Summary of Theoretical Part	03.01.2018	04.01.2018	S
53	Transmission of Theoretical Part	07.01.2018	07.01.2018	S
54	4th Coaching (Theoretical Part, Research Design)	08.01.2019	08.01.2019	S, C
55	Rework of Theoretical Part and Research Design according to Coach's Feedback	14.01.2019	17.01.2019	S
56	Theoretical Part finished	11.01.2018	11.01.2018	S
57	**Preparation for Master Seminar 2**			
58	Preparation of Relevant Documents for MS 2	14.01.2019	17.01.2019	S
59	Transmission of Documents for MS 2	18.01.2019	18.01.2019	S
60	Documents for MS 2 submitted	18.01.2019	18.01.2019	S
61	MS 2	26.01.2019	26.01.2019	S, C, U
62	Rework Theoretical Part and Research Design according to MS 2 Feedback	28.01.2019	30.01.2019	S

Figure A-2: Detailed Project Plan – Part 2 (own presentation)

#	Task	Start	End	
63	**Market Research**			
64	Text Writing for ISPMA	19.12.2018	19.12.2018	
65	Development of Research Design	02.01.2019	06.01.2019	S
66	Selection of Interviewees	09.01.2019	19.03.2019	S
67	Development of Interview Guide	07.01.2019	20.01.2019	S
68	Arrangement of Interview Appointments	09.01.2019	19.03.2019	S
69	Transmission of Interview Guide	21.01.2019	21.01.2019	S
70	Rework of Interview Guide according to Coach's Feedback	22.01.2019	29.01.2019	S
71	Execution of Qualitative Interviews - Individual Explorations	19.02.2019	19.03.2019	S
72	Transcription of Individual Explorations	19.02.2019	19.03.2019	S
73	Evaluation and Interpretation of Results	25.03.2019	31.03.2019	S
74	Execution of Qualitative Interview - Focus Group	03.04.2019	03.04.2019	S
75	Transcription of Focus Groups' Input	03.04.2019	04.03.2019	S
76	Evaluation and Interpretation of Results	05.04.2019	10.04.2019	S
77	Market Research finished	10.04.2019	10.04.2019	
78	**Practical Part**			
79	Writing of Chapter 7: Presentation of AVL List GmbH	12.09.2018	24.09.2018	S
80	Writing of Chapter 8: Research Design	02.01.2019	06.01.2019	S
81	Writing of Chapter 9: Qualitative Market Research	25.03.2019	10.04.2019	S
82	Writing of Chapter 10: Selection of a Software Innovation Process	13.04.2019	14.04.2019	S
83	Writing of Chapter 11: Software Innovation Process for AST	15.04.2019	16.04.2019	S
84	Transmission of Practical Part	13.04.2019	13.04.2019	S
85	Easter	19.04.2019	22.04.2019	S
86	6th Coaching	14.04.2019	14.04.2019	S, C
87	Rework of Practical Part according to Coach's Feedback	14.04.2019	14.04.2019	S
88	Practical Part finished	10.04.2019	10.04.2019	
89	**Preparation for Master Seminar 3**			
90	Preparation of Relevant Documents for MS 3	10.04.2019	16.04.2019	S
91	Transmission of Documents for MS 3	17.04.2019	17.04.2019	S
92	Documents for MS 3 submitted	17.04.2019	17.04.2019	S
93	MS 3	26.04.2019	26.04.2019	S, C, U
94	Rework Master Thesis according to MS 3 Feedback	28.04.2019	30.04.2019	S

Figure A-3: Detailed Project Plan – Part 3 (own presentation)

	Task	Start	End	Resp.	2019
87	Rework of Practical Part according to Coach's Feedback	14.04.2019	14.04.2019	S	
88	Practical Part finished	10.04.2019	10.04.2019		
89	**Preparation for Master Seminar 3**				
90	Preparation of Relevant Documents for MS 3	10.04.2019	16.04.2019	S	
91	Transmission of Documents for MS 3	17.04.2019	17.04.2019	S	
92	Documents for MS 3 submitted	17.04.2019	17.04.2019	S	
93	MS 3	26.04.2019	26.04.2019	S, C, U	
94	Rework Master Thesis according to MS 3 Feedback	28.04.2019	30.04.2019	S	
95	**Finalisation Phase**				
96	Writing of Abstract and Summary	30.04.2019	30.04.2019	S	
97	Checking of Citations and Bibliography (e.g. Chronological Order)	01.05.2019	03.05.2019	S	
98	Finding and Contacting a Proofreader	01.04.2019	04.04.2019	S	
99	Proofread	02.05.2019	09.05.2019	P	
100	Rework of Master Thesis according to Proofread	10.05.2019	11.05.2019	S	
101	Unbound Master Thesis submitted	13.05.2019	13.05.2019	S	
102	Grading of the Master Thesis	CW 24	CW 24	C, U	
103	Printing and Binding of Master Thesis	10.06.2019	23.06.2019	S	
104	Bound Master Thesis submitted	28.06.2019	28.06.2019	S	
105	Arrangement for a Company Presentation	JUNE	JUNE	S, E	
106	Company Presentation	JUNE/JULY	JUNE/JULY	S	
107	Master Thesis finished	JUNE/JULY	JUNE/JULY	S	

S	Student		Work packages
C	Coach		
P	Proofreader		
E	Enterprise		Milestones
U	University		Dependencies

Figure A-4: Detailed Project Plan – Part 4 (own presentation)

2. Interview Guide – English Version
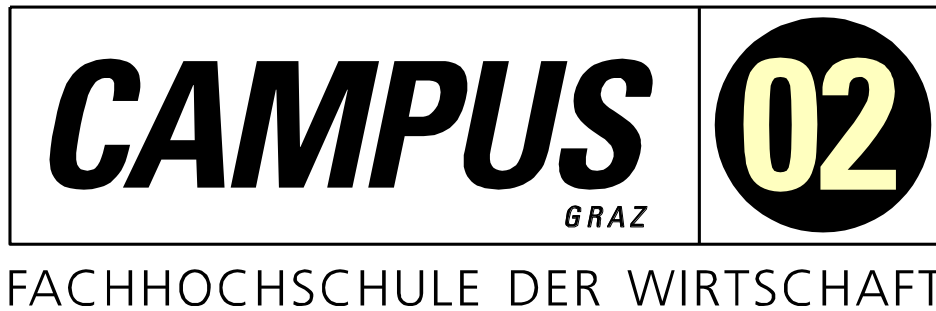
CAMPUS 02
GRAZ

FACHHOCHSCHULE DER WIRTSCHAFT

Interview Guide for the Master Thesis

Marketing Integration in an International Software Innovation Process

Procedure:

- 15 individual explorations
- Open questions
- The aim is to find out how marketing is integrated in a software innovation process.

Appointment for Interviews   …………………………….…….

- The appointments are agreed individually.
- Duration of the interview: approximately 45 minutes

Interviewee: …………………………………..

- Company   …………………………………..
- Position in the company   …………………………………..

**Interview Guide for the Individual Explorations**

Welcoming of Interviewee and Introduction	
• Introduce yourself • Introduce Campus02 • Brief introduction of interviewee (person, company function, area of activity, company, products) • Introduction of interview process (duration , consent to record conversation, anonymity)	MT Topic: *Marketing Integration in an International Software Innovation Process*
Icebreaker 1) What type of innovation is your company following – market-creating, sustaining or efficiency? 2) How often do you release a new software version per year? 3) How does your innovation process look like? Could you please explain it. 4) How is marketing integrated in this process?	Discover the company's focus/targets, Explain the 3 types of innovation (Christensen – see link) https://www.linkedin.com/pulse/after-40-years-studying-innovation-here-what-i-have-christensen/ *Market-creating:* create new markets *Sustaining:* improvements to existing products and services already on the market and typically targeted at customers who require better performance *Efficiency:* enables companies to do more with fewer resources (e.g. outsourcing company's activities) Discover how long the company's product life cycle/ release cycle (if answer: 2 weeks / 2 years: what does it depend on? Does it deal with market or sustaining innovation?)
Software Innovation Process Buildup & Innovation and Marketing	
Strategic Situation Analysis	
5) What are your company's trigger to develop a new software version? 6) What are the first steps? Why do you start with these tasks/ steps? 7) Who is involved in these tasks/steps at the beginning?	Find out if the company starts with its process according to the findings in the literature if marketing is not involved: do you plan to integrate marketing?
8) On a scale from 1 – 5, how important is it for you to know about customers, competitors, and trends in your industry?	1 = not important at all, 5 = very important

How often do you evaluate the market?	e.g. PESTEL, Five Forces, competitor analysis, customer analysis, potential analysis, SWOT, industry value chain
9) What marketing tools do you use in order to analyze your company's environment? (Why?)	
When do you start to carry out the market analysis?	Find out how much earlier marketing starts to analyze the company's environment
Who else is involved in analyzing the company's environment?	if marketing is not involved: do you plan to integrate marketing?
Idea Generation and Selection	
10) How do you create ideas for your new software version?	
Do you make use of any creativity technique, customer insights or similar possibilities?	
11) Who is involved in creating ideas for new software features?	if marketing is not involved: do you plan to integrate marketing?
12) How do you evaluate the business viability of generated ideas?	e.g. benefit analysis, checklist, pairwise comparison
What criteria must be met in order to say that an idea is viable for your company/business?	e.g. competitive advantage, economic factors, industry and market, strategic differentiation
13) Who evaluates the viability of an idea?	if marketing is not involved: do you plan to integrate marketing?
Preparation	
14) What are your next steps after defining what software release should be developed? Why?	e.g. definition of objectives and measures, resource allocation, time plan, budget, protecting software, software development, testing
15) Who is involved in your mentioned activities?	
16) How does marketing contribute to these activities?	if marketing is not involved: do you plan to integrate marketing?
Software Release – Market Introduction	
17) How do you promote the software release?	
18) When does the promotion of the software release start?	

19) Who is involved in the software release?	

Reflection	
20) Do you evaluate the innovation process after the software release? Why (not)?	
21) How do you evaluate the success of the promotion?	

Introduction of Software Innovation Processes	

Innovation Processes for Software	
22) Are you familiar with the terms spiral model, Stage-Gate process, waterfall model, and V-model? If yes, do you make use of any of them? Why? ➔ If no, do you use any other process? Why? (see question 3)	Discover what kind of process is used

Process Criteria	
23) Do you integrate your customers in the innovation process? If yes, how? In which phases of the innovation process do you integrate the customers? What kind of customers do you integrate in the process?	e.g. idea generation, software testing Discover if the company integrates lead customers in the process
24) How do you ensure that all involved employees commit to the process? 25) Does marketing contribute to the employees' commitment to the process? 26) How do you ensure that all employees are up to date regarding the innovation process?	Find out if internal communication tools are used within the organization e.g. intranet, newsletter, team meetings, workshops
27) How often do you evaluate the actual status of the process? Do you divide the process into subprocesses or see the process as a whole?	Find out if the company considers subprocesses
28) How do you ensure that the software is released on time?	

Thank you for your participation!

3. Interview Guide – German Version

CAMPUS 02
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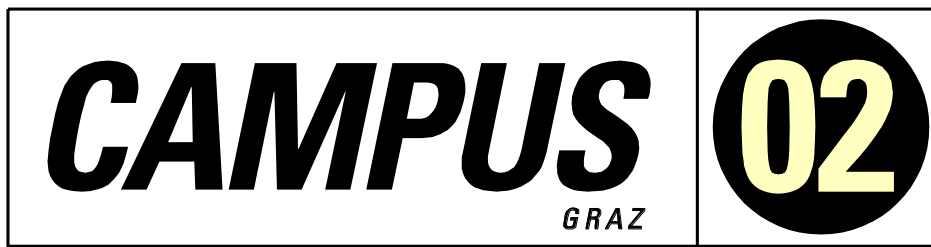
FACHHOCHSCHULE DER WIRTSCHAFT

Gesprächsleitfaden

Marketing Integration in an International Software Innovation Process

Ablauf:

- 15 Einzelexplorationen
- Offene Fragen
- Ziel der Befragung ist es, herauszufinden wie Marketing in den Software Innovationsprozess integriert ist.

Interviewtermin   ………………………….…..

- Die Termine werden individuell vereinbart.
- Dauer des Interviews: ca. 45 Minuten

Interviewpartner   …………………………..

- Unternehmen   …………………………..
- Position im Unternehmen   …………………………..

Gesprächsleitfaden - Einzelexploration

| Begrüßung und Einleitung	
- Sich selbst vorstellen - FH Campus02 vorstellen - Kurze Vorstellung des Interviewpartners (Person, Unternehmensfunktion, Aufgabengebiete, Unternehmen, Produkte) - Interviewablauf vorstellen (Dauer, Zustimmung für die Gesprächsaufzeichnung einholen, Anonymität gewährleisten)	MT Thema: *Marketing Integration in an International Software Innovation Process*
Eisbrecherfragen 1) Welche Art von Innovation verfolgt Ihr Unternehmen – market-creating, sustaining oder efficiency („marktschaffend", „erhaltend", „effizient")? 2) Wie oft released Ihr Unternehmen eine neue Softwareversion pro Jahr? 3) Wie sieht Ihr Innovationsprozess aus? Könnten Sie diesen bitte kurz erläutern? 4) Wie ist Ihre Marketingabteilung in diesen Prozess integriert?	Den Fokus/die Ziele des Unternehmens feststellen, 3 Arten von Innovation erklären (Christensen – siehe Link) https://www.linkedin.com/pulse/after-40-years-studying-innovation-here-what-i-have-christensen/ market-creating (marktschaffend): neue Märkte schaffen sustaining (erhaltend): bereits existierende Produkte und Services am Markt verbessern, an Kunden gerichtet, die eine bessere Performance verlangen Efficiency (Effizienz): ermöglicht Unternehmen mit weniger Ressourcen mehr zu erreichen (z.B. Outsourcing von gewählten Unternehmenstätigkeiten) Den Produktlebenszyklus/Releasezyklus des Unternehmens ermitteln (wenn Antwort bspw.: 2 Wochen/ 2 Jahre: woran kommt es an? Liegt der Fokus des Unternehmens darauf, Märkte zu schaffen oder zu erhalten?)
Aufbau des Software Innovationsprozesses & Innovation und Marketing	
Strategische Situationsanalyse	
5) Was sind die Auslöser/Motive Ihres Unternehmens, um eine neue Softwareversion zu entwickeln? 6) Was sind dabei die ersten Schritte? Warum beginnen Sie genau mit diesen Schritten/Aufgaben?	Feststellen, ob das Unternehmen des Prozess gemäß den Ergebnissen in der Literatur startet

7) Welche Unternehmensfunktionen sind in diese Schritte/Aufgaben am Anfang beteiligt?	Wenn Marketing nicht involviert ist: planen Sie Marketing in Zukunft zu integrieren?
8) Auf einer Skala von 1 – 5, wie wichtig ist es für Sie das Unternehmensumfeld zu kennen, sprich zu wissen, was Konkurrenten machen, was für Trends in Ihrer Industrie auf das Unternehmen zukommen und wie Kundenbedürfnisse aussehen? In welchen regelmäßigen Abschnitten, erheben Sie die aktuelle Marktlage?	1 = überhaupt nicht wichtig, 5 = sehr wichtig z.B. PESTEL, Wettbewerbskräfte nach Porter, Konkurrenzanalyse, Kundenanalyse, Potenzialanalyse, SWOT, industrielle Wertschöpfungskette Feststellen wie viel früher Marketing mit der Analyse des Unternehmensumfeldes beginnt
9) Welche Marketinginstrumente verwendet Ihr Unternehmen, um das Unternehmensumfeld zu analysieren? (Warum?) Wann beginnen Sie für eine neue Softwareversion mit der Marktanalyse? Welche Unternehmensfunktionen sind noch in der Marktumfeldanalyse beteiligt?	 Wenn Marketing nicht involviert ist: planen Sie Marketing in Zukunft zu integrieren?
Ideengenerierung- und auswahl	
10) Wie werden Ideen für eine neue Softwareversion generiert? Nutzen Sie hierfür bspw. Kreativitätstechniken, Kundeneinblicke oder ähnliche Möglichkeiten?	
11) Wer ist daran beteiligt, Ideen für eine neue Softwareversion zu generieren?	Wenn Marketing nicht involviert ist: planen Sie Marketing in Zukunft zu integrieren?
12) Wie wird die Machbarkeit/Durchführbarkeit der generierten Ideen bewertet? Welche Kriterien muss eine Idee erfüllen damit Sie für das Unternehmen/das Business in Erwägung gezogen wird? 13) Wer bewertet die Machbarkeit/Durchführbarkeit einer Idee?	z.B. Nutzwertanalyse, Checkliste, Paarvergleich z.B. Wettbewerbsvorteil, ökonomische Faktoren, Industrie und Mart, strategische Differenzierung Wenn Marketing nicht involviert ist: planen Sie Marketing in Zukunft zu integrieren?

Vorbereitung	
14) Was sind die nächsten Schritte nachdem definiert wurde, welche Features für den Softwarerelease entwickelt werden sollen? Warum?	z.B. Definition von Zielen und Maßnahmen, Ressourcenzuteilung, Zeitplan, Budget, Patentschutz, Softwareentwicklung, Testing
15) Wer ist in diese Aktivitäten involviert?	
16) Was trägt Marketing zu diesen Aktivitäten bei?	Wenn Marketing nicht involviert ist: planen Sie Marketing in Zukunft zu integrieren?
Software Release – Markteinführung	
17) Wie bewerben Sie den Softwarerelease?	
18) Wann beginnen Sie mit der Bewerbung des Softwarereleases?	
19) Wer ist am Softwarerelease beteiligt?	
Reflexion	
20) Wird der Prozess nach dem Softwarerelease reflektiert? Warum (nicht)?	
21) Wird die Bewerbung des Softwarereleases evaluiert/ausgewertet?	
Vorstellung von Software Innovationsprozessen	
Innovationsprozesse für Software	
22) Sagen Ihnen Spiralmodel, Stage-Gate Prozess, Wasserfallmodell und V-Model etwas? Wenn ja, verwenden Sie einen von diesen Prozessen? Warum? ➔ Wenn nein, welchen Prozess verwenden Sie für Ihren Softwarerelease? Warum? (s. Frage 3)	Feststellen, welcher Prozess vom Unternehmen verwendet wird
Prozesskriterien	
23) Werden Kunden in den Innovationsprozess integriert? Wenn ja, wie? In welchen Phasen des Prozesses werden Kunden integriert? Welche Art von Kunden werden in den Prozess integriert?	z.B. Ideengenerierung, Software Testing feststellen, ob das Unternehmen Lead-Customers („Hauptkunden") in den Prozess integriert

24) Wie wird sichergestellt, dass alle beteiligten Mitarbeiter auch tatsächlich engagiert sind und sich am Prozess beteiligen?	Herausfinden, ob interne Kommunikationsinstrumente innerhalb des Unternehmens verwendet werden
25) Trägt Marketing dazu bei, dass beteiligte Mitarbeiter ihren Teil zum Prozess beitragen?	z.B. Intranet, Newsletter, Teammeetings, Workshops
26) Wie wird sichergestellt, dass alle beteiligten Mitarbeiter am letzten Stand der Dinge sind?	
27) Wie oft wird der aktuelle Status des Prozesses evaluiert? Wird der Prozess in Teilprozesse unterteilt oder wird der Prozess als Ganzes gesehen?	Feststellen, ob das Unternehmen den Prozesse in Teilprozesse gliedert
28) Wie wird sichergestellt, dass die Software pünktlich/zeitgerecht released wird?	

Vielen Dank für Ihre Teilnahme!

4. Interview Guide for Focus Group
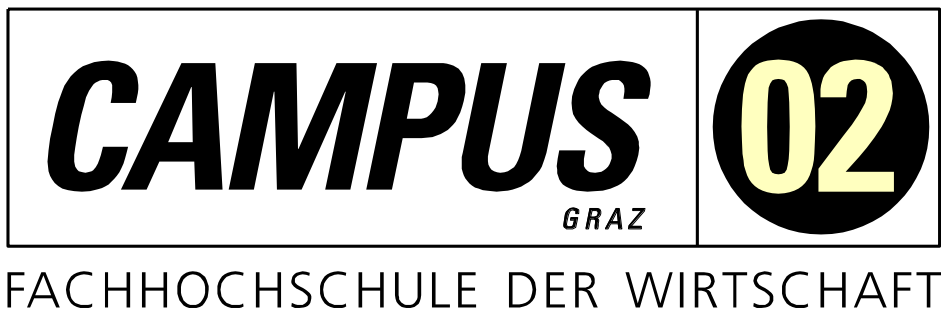
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FACHHOCHSCHULE DER WIRTSCHAFT

Interview Guide for the Master Thesis

Marketing Integration in an International Software Innovation Process

<u>Procedure:</u>

- Focus Group
- Open questions
- The aim is to find out how marketing can be integrated in the AST software innovation process.

<u>Appointment for Interviews</u> …………………………….…..

- The appointments are agreed individually.
- Duration of the interview: approximately 45 minutes

<u>Interviewee:</u> …………………………………..

- Company …………………………………..
- Position in the company …………………………………..

Interview Guide for the Focus Group

Welcoming of Interviewee and Introduction	
• Introduce yourself • Introduce Campus02 • Introduction of interview process (duration, consent to record conversation, anonymity)	MT Topic: *Marketing Integration in an International Software Innovation Process*
Icebreaker	
1) How can marketing support you?	Show where marketing is involved now (=Software Release) and demonstrate for what phases PM is responsible.

Software Innovation Process Buildup & Innovation and Marketing	
Strategic Situation Analysis	
2) How regularly do you evaluate the market?	Identify the regularity of market observation
3) How can marketing be integrated?	Show results from individual exploration (importance of market analysis)
Idea Generation and Selection	
4) How do you create ideas for new software features? What are these ideas based on?	Gain information about how ideas for new features are generated
5) Who is involved in creating ideas?	Show results from individual exploration (idea generation methods)
6) Where do you store ideas?	
7) Who has access to ideas?	
8) How do you evaluate the feasibility / viability of an idea? What criteria must be met?	Identify crucial criteria
9) Can marketing support you?	Discover if market support can be imagined
Preparation	
10) What are your tasks during the software development?	
11) What process do we use to develop software?	

12) Are customers integrated in the testing phase? What kind of customers?	If yes, where else can customers be integrated?
Software Release – Market Introduction	
13) Can you imagine to promote release earlier?	
14) Which other channels could be used?	
Reflection	
15) Do you evaluate the success of the process?	

Thank you for your participation!

5. Translated Quotes

[1] *„Die Differenzierung zwischen uns und unseren Wettbewerber wird natürlich immer schwieriger umso mehr Teilnehmer auf dem Markt sind…Deswegen ist aus meiner Sicht immer wichtiger, es kontinuierlich und immer tiefergehend eigentlich eine Wettbewerbsanalyse und auch Marktrecherche zu betreiben, um sich hier auch permanent auch so positionieren zu können, wie man sich eigentlich auch abhebt von den Konkurrenten."* (Participant 4)

[2] *„Grundsätzlich probieren wir – und das würde ich jedem Unternehmen raten – Ideen von jedem einzusammeln."* (Participant 11)

[3] *„Wie gesagt, die Ideengenerierung kann jeder sein. Das kann von mir aus auch der Hausmeister sein. Das kann auch der Kunde sein. Bei der Ideengenerierung gibt's keinen festen Prozess. Ich glaube, da glaubt auch keiner dran, dass man sagt, da setzt man sich mal montags hin und macht mal ein bisschen Ideengenerierung. Sondern die entsteht ja an allen Ecken und Enden. Die kann beim Kunden entstehen, der die Software benutzt. Die kann beim Entwickler entstehen, wenn er seine Software entwickelt. Die kann beim Kaffeekränzchen in der Cafeteria entstehen, wenn einer stolz über sein Produkt berichtet und kriegt eine Antwort dazu. Die Entstehung der Idee geht überall."* (Participant 13)

[4] *„Wir fangen immer beim Kunden an – was davon ist dem Kunden wichtig uns lässt sich auch umsetzen und hat natürlich auch einen Business Case dahinter? Wir machen natürlich nix per se, wo man sagt damit kann man kein Geld verdienen, weil das ist ja dann von Nachteil für die Firma. Aber grundsätzlich fangen wir beim Kunden an und schauen, was hat das für einen guten Impact auf den Kunden."* (Participant 11)

[5] *„Weil es handelt sich bei uns ja weiterhin um ziemlich komplexe Produkte und da ist das Erleben der Produkte schon ein ganz wichtiges Element im Verständnisprozess."* (Participant 12)

[6] *„Das passt sich auch regelmäßig an und wird im Detail dann wieder so verändert, die Sprinttreffen werden anders organisiert und so. Da liegt allem einer ständigen Iteration und Verbesserung."* (Participant 6)

[7] *„Ich würde sagen, es gibt eigentlich 3 Teile, wo wir uns sozusagen nach jedem Teil was anschauen. Der 1. Teil ist sicher die Projektvorphase und quasi gibt's eine*

Angebotsbeauftragung und danach kann man immer noch entscheiden, ob man überhaupt weitermacht oder nicht. Das 2. ist dann am Ende der Umsetzung. Da kann man jetzt nicht entscheiden, ob man weitermacht aber man kann zumindest die Kennzahlen anschauen. Und das 3. ist dann nach der Auslieferung eben auch mit der Zufriedenheit vom Kunden." (Participant 8)

[8] *„Der wichtigste Faktor meiner Meinung nach ist die Kultur…Kultur heißt, Menschen haben den gleichen Mindset und die gleichen Werte, nach denen man die Entscheidungen trifft."* (Participant 11)

[9] *„Da wär das zumindest prinzipiell sehr hilfreich, wenn das Marketing unterstützt. Was ich allerdings auch glaube, dass Marketing da ein bisschen was verstehen muss von den Dingen, um die es geht."* (AST Internal 5)

[10] *"Wäre cool."* (AST Internal 5)