

**KAUNAS UNIVERSITY OF TECHNOLOGY  
SCHOOL OF ECONOMICS AND BUSINESS**

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**APPLICATION OF PROJECT MANAGEMENT STANDARDS IN  
SMALL AND MEDIUM-SIZED ENTERPRISES (SMEs)**

**MASTER THESIS**

**Supervisor** Prof. Dr. Ruta Ciutiene

**Kaunas, 2018**

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**Project Management (621N24002)**

**MASTER THESIS**

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"Application of Project Management Standards in Small And Medium-sized Enterprises (SMEs)"

**DECLARATION OF ACADEMIC INTEGRITY**

14 May 2018  
Kaunas

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## SANTRAUKA

Pastaraisiais dešimtmečiais, verslo pasaulyje, projektai ir projektų valdymas tampa vis labiau svarbesni. Įmonės bando tobulinti projektų valdymą, kad sumažintų išlaidas ir laiką, bei pagerintų projektų rezultatų kokybę. Kaip šio siekio dalis, buvo parengta keletas nacionalinių bei tarptautinių standartų ir gairių, skirtų įmonėms suteikti geriausią projektų valdymo praktiką.

Šių standartų ir gairių trūkumas yra tas, kad jiems reikia skirti labai daug laiko ir išteklių, norint juos pristatyti ir integruoti įmonei. Darbuotojai turi būti apmokyti, o daugybė verslo procesų pritaikomi iš naujo arba įvedami visiškai nauji. Šias pastangas galima valdyti tik didžiosioms tarptautinėms įmonėms, kurios turi personalą, dirbantį tik su projektų valdymu, bet ne mažoms ar vidutinėms įmonėms, kadangi jos neturi papildomo darbuotojo vykdyti tik šias funkcijas. Šios kompanijos turi ypatingų savybių, kurios sudaro kliūtis, norint įvesti projektų valdymo standartus. Pagrindinės kliūtys yra finansinių išteklių, skirtų įdiegti ir sertifikuoti, trūkumas, bei kvalifikuoto personalo trūkumas.

Dėl šių priežasčių MVĮ reikia, jog projektų valdymo požiūris būtų ypatingai pritaikytas prie šių įmonių charakteristikų. MVĮ sudaro Europos ekonomikos pagrindą, o geras projektų valdymas ne tik sutaupo pinigų ir laiko, bet taip pat gali būti labai svarbus veiksnys MVĮ išlikimui. Dėl šios svarbos, šio baigiamojo magistro darbo tikslas yra ištirti, kaip taikyti esamus projektų valdymo standartus MVĮ.

Pasiekti šį tikslą, buvo atlikti penki etapai:

1. **Išanalizuoti MVĮ projektų valdymo standartų pritaikymo iššūkius:** šio etapo metu analizuojamos MVĮ ypatingos savybės ir sėkmės veiksniai projektuose;
2. **Išanalizuoti ir palyginti svarbiausius projektų valdymo standartus pasaulyje:** tai apima judrių ir tradicinių projektų valdymo palyginimą. Be to, tiriami svarbiausi standartai tarp judrių ir tradicinių projektų;

3. **Plėtoti mokslinių tyrimų modelių paraiškai, taikant projektų valdymo standartus MVĮ:** remiantis literatūros tyrimų rezultatais, sukurtas tyrimo modelis, kuriuo remiantis būtų galima atlikti tolesnius tyrimus šia tema;
4. **Atlikti tyrimus siekiant apibrėžti MVĮ poreikius:** remiantis anksčiau sukurtu tyrimų modeliu, atliekami empiriniai tyrimai lyginant Vokietijos ir Lietuvos MVĮ.
5. **Sukurti MVĮ projektų valdymo standartų taikymo modelį:** kaip galutinis rezultatas, šiame darbe pateikiamas modelis, kaip gairės MVĮ projektų vadovams, kuriuos projektų valdymą įrankius ir metodus taikyti.

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## INTRODUCTION

**Relevance of the Topic.** The increase in the adaption of project management disciplines to accomplish work in different sectors and industries is significant. The economic pressure to reduce the “time to market” leads to the fact that projects rarely operate in isolation within organizations. Most of the time projects need to satisfy broader strategic priorities. This pressure caused an increase in the number of projects conducted simultaneously within organizations. Therefore, managing their interdependencies and multiple implementations became more complex (Too and Weaver, 2014).

Consequently, project management and project management standards are regarded as an important factor in modern organizations. For this reason, organizations must decide how they want to apply project management. The most natural way is to introduce one of the many project management standards existing in literature. The introduction of a project management standard is time consuming and causes high costs for the implementation. For these reasons organizations try to reduce the risk as much as possible. The main questions should be “Which standard fits the current needs the best”, “Which standard will suit best in the future” and “To which extent do we want to apply this standard” (Ahlemann, Teuteberg, & Vogelsang, 2009; Grau, 2013).

Answering these questions is a challenge for organizations, due to the number of existing standards and the differences between those. Organizations need to identify a standard which is widely used among project partners and stakeholders to establish a consensus and to simplify the cooperation. Another core criterium is whether the standard is applicable for the type of organization and the type of projects the organization usually runs. Only if this is the case, the standard can be implemented efficiently, and it can unfold the real benefits for the organization to make it more effective (Ahlemann et al., 2009).

The final goal of project management standards is to increase the probability for successful project delivery (Kerzner, 2001). On a more detailed level, the main goals are: reaching a high quality of project results, simplification, control and process improvement. Further goals are the facilitated introduction of new team members which also includes the easier replacement of team members to make teams more flexible, as well as clear responsibilities, customer impression, visible progress and status reporting and education. A good project management standard will guide project manager through controlled, managed and visible set of activities in order to achieve project results (Špundak, 2014).

The challenge of introducing a project management standard is even bigger for small and medium-sized enterprises (SMEs). SMEs are the backbone of the European economy. 9 out of 10 enterprises in Europe are SMEs. They generate two out three jobs there. In 2013 over 21 million

SMEs provided 88.8 million jobs in Europe. In 2015 they created more than 85% of the new jobs in Europe. For these reasons the European Union (EU) decided to strengthen the focus on these enterprises. As there is no official definition of SMEs, which is applied worldwide, the European commission decided to introduce their own definition.

SMEs are divided in three subcategories which are defined by their staff headcount and turnover. Alternatively, the total balance sheet can also be applied. According to the European Commission a medium-sized enterprise has less than 250 employees and turnover which is smaller than 50 million euro or a balance sheet which is in total smaller than 43 million euro. Enterprises are classified as small with less than 50 employees and a turnover or a total balance sheet which is smaller than 10 million euro. An enterprise is classified as micro, if it has less than 10 employees and turnover or total balance sheet which is smaller than 2 million euro (European Commission, 2015).

One of the main challenges applying project management in SMEs is that they cannot afford full time professional project managers and fulltime teams. SMEs are more likely to run projects in a way where the owner is managing the projects part time while he is running the company fulltime. For this reason, it is not possible to expect SMEs to apply the full complexity of project management standards. Most of the SME's even try to run projects the best they can without applying any formal project management methodology or standard (Meister, 2006). According to these challenges, the **problem** investigated by this research is how to apply a project management standard in a SME in a way to utilize most of the benefits of a project management standard without increasing the complexity on a level, that is no longer manageable without professional project management teams.

**Object.** Project management standards in SMEs

The **purpose** of this thesis is to analyze the current state of the art of project management standards and to develop a research model to investigate how project management standards can be applied in SMEs. The research model is designed for a deeper investigation of SMEs and their needs.

Five main **objectives** have been recognized to archive this.

- 1) Analyze the challenges of applying project management standards in SMEs;
- 2) Analyze and compare the different project management standards in the world;
- 3) Develop a research model for the application of project management standards in SMEs;
- 4) Carry out research to define the needs of SMEs;
- 5) Create suggestions for the application of project management standards in SMEs;

To reach these objectives, this thesis will first analyze the main challenges applying project management in SMEs. Furthermore, key success factors for applying project management will be

investigated. Afterwards, the two main streams of project management are introduced, and the main representatives are shortly described. Based on the results, an own research with middle-sized IT companies will be carried out to investigate their needs for project management.

In order to get a broader impression, the research is conducted in SMEs with Germany and Lithuania in form of survey. On the one hand, both countries have commonalities, for example both countries are part of the European Union, so SMEs in both countries have the possibility to get support by the European Union. Furthermore, the main business market for SMEs in both countries is the European Union (European Commission, 2015). On the other hand, the overall economic situation in the countries is different, which may lead to different points of view how projects need to be managed. Germany is the largest country in Europe with a population of 82.7 million and one of the largest economies in the world with a GDP of 3.478 trillion US dollar (The World Bank, 2018). The overall value of exported goods and services in 2015 was 1.471 trillion US dollar. SMEs contributed 483 billion US dollar (OECD, 2018). Lithuania in comparison, is a small Baltic country in the north of Europe with a population of 2.8 million and a GDP of 42.739 billion US dollar (The World Bank, 2018). The total value of exported goods and services was 28.184 billion US dollar. SMEs contributed 16.117 billion US dollar to it, which is in proportion a higher contribution than in Germany (OECD, 2018). The importance of SMEs for the economy of both countries is proven by the number of enterprises and the number of persons employed. In Germany there were 2 232 081 SMEs in 2016 which is 99,5% of the total amount of enterprises. They employed 17 million persons which are 62.8% of all persons employed in Germany (European Commission, 2017). In Lithuania there were 156 820 SMEs which are even 99.8% of all enterprises. They employed 695 446 people, which are 76.2% of all people employed. This is nearly ten percent more than the European average of 66.8% (European Commission, 2017).

The results of the surveys will be analyzed. To conclude the thesis the final results will be analyzed and ways of applying project management in SME's will be suggested.

**Research methodology.** The data for this thesis is collected from both primary and secondary sources. The main source for the theoretical background of this thesis are scientific literature and global project management standards. For a deeper analysis of the current situation and the needs of SMEs, qualitative research was applied as well. In this field the survey method was used to collect primary data for further analysis.

# 1 PROBLEM ANALYSIS OF PROJECT MANAGEMENT STANDARDS

This chapter will analyze current problems but also success factors for applying project management standards in SMEs. In order to analyze the specific problems of SMEs it is necessary to analyze briefly the special characteristics of SMEs, which lead to unique challenges and opportunities.

## 1.1 Characteristics of SMEs

There is a unique set of special issues that only SMEs deal with in general. The first one is *market failure*. SMEs often face market failures which lead to a more challenging environment in which to operate and compete with other players. These failures can happen in the fields of finance, research, innovation or environmental regulations. SMEs can have problems to access financial resources or to invest in research and innovation. A problem may be the lack of resources to comply with new environmental regulations. The second big issue for SMEs are *structural barriers*. This can be a lack of management and technical skills, rigidities in labor markets or limited knowledge regarding opportunities for international expansion (European Commission, 2015).

Further typical characteristics of SMEs are their close relationship with customers and the continuous innovation. Most of the SMEs are focused on a narrow market or a niche where they can specialize and excel in their fields. Additionally, SMEs employ selected and motivated employees. Due to the small size and number of employees many SMEs have simple structures and systems. This leads to the fact that many SMEs only have a loose division of labor and a small managerial hierarchy. Most of the activities are not or only minimally formalized and only a minimum effort in planning is needed. The power tends to be only in the hand of the chief executive (Recklies, 2001).

These simple systems facilitate flexibility and shorter reaction times to changes. Therefore, SMEs can adapt quickly to changes in their environment. But these systems are often based on the owner's personal experience and less on objective reasons. This leads often to situations where they remain unchanged even if the environment would require changes in structure and systems (Recklies, 2001).

Project management has an important role in facilitating the contribution to the economy. Projects represent about one third of the turnover of SMEs in general. However, in small and micro companies the share is even more than 40% of the turnover. Additionally, SMEs undertake projects also for innovation and growth and not only for delivering tailored products to the customer. In average SMEs spend three percent of their turnover on innovation. Therefore, it is crucial for the future development that this money is spent in an efficient and effective way. The total investments in projects of SMEs account for almost one fifth of the economy. This is more than the money spent

on large infrastructure projects in the western world. Even though, there is a higher focus on research regarding these large construction projects. A 10% improvement in the projects of SMEs would save 1 trillion US\$ worldwide (Turner, Ledwith and Kelly, 2010).

## **1.2 Challenges of applying project management in SMEs**

One of the main problems is that especially in micro and small enterprises project management is conducted by people for whom project management is not their main area of work. Most of the young companies are undertaking a significant number of projects managed by amateurs who do not receive any guidance from the general management and project management communities. Though, projects and project management are critical for the development (Turner et al., 2010).

SMEs require a different type of project management than the traditional forms of project management, which have been developed for larger projects. They require simpler and more people-focused forms of project management. During the transition from small to medium-sized companies the medium sized companies are more likely to employ specialist while micro and small companies are more likely to employ multi-task employees who are able to fulfill several roles in projects. For this reason, Turner et al. (2010) state that it is necessary to find different project management models for medium-sized and for micro as well as small-sized companies. Medium-sized companies need are more formalistic management practice to coordinate the input of specialists to projects. In contrast, micro and small-sized companies need an approach which is more flexible, and people focused, which facilitates a more laissez-fair management style. They called it lite version and micro lite version.

Turner, Ledwith, and Kelly (2009) showed that smaller companies undertake smaller projects. The median size of projects for micro companies was less than three months, for small companies three to six month and for medium-sized companies it was six to nine months. Additionally, larger companies had larger project team sizes. Projects will create better results when the procedures are tailored to the size or projects. For this reason, traditional approaches to project management will not meet the needs of SMEs. Therefore, the simpler and less bureaucratic project management practices needed for SMEs have a reduced range of core project management functionality.

Turner et al (2009) identified that the main barrier to the adoption of project management in SMEs was the lack of support or even resistance from the founder, mostly due to a lack of knowledge about project management and possible benefits. Companies are more likely to apply project management if the founding entrepreneur or CEO sees the benefits and if the practices are simple to adopt and apply. Project team members of micro and small-sized companies want to be engaged in the development of project plan to development commitment to the plans. Therefore, project

management practices in SMEs should be easy to learn and simple to apply, and clearly demonstrate their benefits (Turner et al., 2010).

Realizing the benefits and the contribution of project management to project success and also for the organizations profits is in general a challenge for organizations of all sizes.

Turner et al. (2010) conducted a survey among 87 SMEs from Ireland (46), Britain (22), rest of Europe (6), Australia (11) and the Far East (2) to get deeper insights about the needs of SMEs in projects management. The survey focused on the following fields: The nature of the company, the nature of projects within the company, the use of project management and project management practices used. The size of the companies was well mixed. The biggest industry was the service industry (39%). The results regarding the nature of projects showed that smaller companies have a higher proportion of projects than larger companies. In the first two years more than 60% of the companies spend over 60% of their turnover in projects, which shows the significant contribution to their business. The results suggested that mainly the age of the company determines the extent in which project management is used. Another result was that no micro or small-sized company had project teams with more than 10 people. Only half of the micro-sized companies employ dedicated project managers. Likewise, the age of the company is the main factor. Companies between three and 10 years employ dedicated project managers by 65%. Companies which are older than 10 years employ dedicated project managers by 71%. The size of the companies does not play a big role whether companies use project management or not. Eighty to ninety percent encourage project manager or have a company policy to apply project management for external projects. For internal projects the numbers decrease to 75% to 85%. Regarding the application of tools, the survey showed that the use of requirements, work break down structures and milestones is most of the time seen as essential. Agile methods are thought to be very bureaucratic and the earned value analysis is only used by 11% of the companies (Turner et al., 2010). The results showed that projects are substantial for the development of SMEs. It seems that the age is more important than the size for the use of project management. Project management is widely applied in internal and external projects. SMEs use a reduced range of tools compared to larger companies.

Ihesiene (2014) conducted a survey among 240 Nigerian SMEs and listed the following ten challenges for SMEs from the biggest challenge to the smallest challenge. Not all of these challenges can be recognized for SMEs in general. Some of them are related to the fact that Nigeria is a developing country with a relatively unstable political situation and an economy that is not strong developed. Therefore, the order might be different in developed countries.

- 1. Management Problems:** this consist of problems relating over bearing owner-financier influence, poor organizational leadership, lack of strategic planning, lack of initiatives, workplace politics and the alignment of organizational goals to owner personal goals;
- 2. Corruption:** this refers to a wide range of corrupt practices taking place during project delivery like fraud, bribery, over invoicing, over stocking, supply of fake project items as well as legal, economic and disciplinary compromises;
- 3. Limited Finance:** this includes issues related to prohibitive cost of project management software and supporting information and communication techniques, project management skill acquisition, cost of engaging project management experts, and the inability to secure sufficient facilities form banks for projects;
- 4. Limited PM Knowledge:** this relates to the project management knowledge gap problem associated with myths of project management. This myth includes, project management is not necessary for small enterprises, project management slows business processes down, project management practices are time consuming and bureaucratic, project management skills are to specialized, project management is an administrative burden and project management is always capital intensive. The poor knowledge of projects nature and lack of historical documentations about closed projects is also included;
- 5. Personnel Shortage:** this includes the lack of requisite project management personnel with extensive knowledge of project management skills, tools and techniques. In SMEs most of the projects are handled by amateurs with a lack of balanced technical and personal skills, that are necessary for effective management of projects;
- 6. Environmental Problems:** this describes all environmental factors. In the case of Nigeria for example disruptive attention and activities of government agencies or law enforcement. This is also extended to disruptive weather situations, cultural orientations, and religious beliefs;
- 7. Policy Problems:** this represents unstable economic policies, multiple taxation/levies, multiple clearance and permits, negative policies on innovation transfers, inefficiency of institutions, rivalry among different parts of government and a lack of developmental frameworks.
- 8. Labor Mobility:** this relates to redeployment, resignations, transfers, promotions and re-designation of project team members. Many projects fail due to the high rate of project management professional mobility during which the incoming project management personnel alter the course of project implementation, project management and predefined project outcomes;
- 9. Awareness Problems:** this describes issues that hinder the acceptance, adoption and diffusion of project management innovative practices. This can be a lack of sufficient project



management awareness, lack of opinion leaders and project management success references.

Weak communication channels are also part of this problem;

**10. Nature of SMEs:** this considers the features of the SME like the age, the type of business and organizational experience;

### **1.3 Success factors for applying project management in SMEs**

There is no single set of critical success factors that can be applied in the same way to all projects. However, SMEs should focus on areas of project management that are considered as critical factors and that can reduce the work load significantly. Under consideration of the resource situation of SMEs it is more beneficial to focus on these key factors instead of trying to implement every aspect of project management listed in literature (Meister, 2006).

Pinto and Rouhiainen (2001) list the following ten success factors for project management in general (p. 86):

- 1. Project mission:** clearly defined goals and general directions;
- 2. Top management support:** willingness of top management to provide the necessary resources and authority/power for implementation;
- 3. Schedule/plan:** detailed specifications of individual action steps for system implementation;
- 4. Client consultation:** communication, consultation and active listening to all parties;
- 5. Personnel:** recruitment, selection and training of the necessary personnel for implementation;
- 6. Technical tasks:** availability of technology and expertise to accomplish specific technical steps;
- 7. Client Acceptance:** selling the final product to its ultimate intended user;
- 8. Monitoring and feedback:** timely provision of comprehensive control information at each stage;
- 9. Communication:** provision of an appropriate network and necessary data to all key stakeholders;
- 10. Trouble Shooting:** ability to handle unexpected crisis and deviate from plan;

Some of the success factors like top management support and personnel are matching to the previously presented challenges of SMEs. Meister (2006) analyzed the ten success factors for the application in the context of SMEs. He criticized that the success factors are universalistic and do not consider that the nature of every projects is different. Therefore, he added recommendations for SMEs in the following fields:

**Business Case:** As many SMEs are relatively small, project failures are likely to mean financial disasters or even the end of the company. For this reason, financially risky projects and projects which are not in line with the company strategy should never be compiled without justification. Creating a business case is a tool to justify the project by its financial return or strategic advantage. This ensures also the support of the top management. Especially, smaller companies should consider a look at their ability to undertake the project. This includes resources, knowledge and time.

**Project Planning:** for the success of projects not the plan itself is crucial but the planning. SMEs should only include topics that are beneficial for the project and keep in mind that the plan does not have to be large, sometimes a few pages are already sufficient. Standards like “A Guide to the Project Management Body of Knowledge” or PRINCE2 provide guidelines, templates and checklists for developing the project plan. Two planning tools are crucial for the project success. The Work Breakdown Structure (WBS), which is deliverable-oriented hierarchical decomposition of all work that has to be executed to accomplish the project objectives and the Statement of Work (SOW). It is a narrative description of the products and services that will be supplied to the customer. It includes the needs and requirements of the contractor. These two tools already assure, that the project scope and the specification of the work are done, understood and documented.

**Project Metrics:** metrics are a key factor to measure the progress of the project. To be able to measure the progress against success factors, it is necessary to have metrics. Additionally, it is only possible to manage things efficiently if they are measurable. For this reason, it is necessary to provide metrics for cost, schedule and scope completion at all times of the project. The previous mentioned WBS and SOW are good baselines for metrics.

**Quality and Risk:** two key factors besides scope, cost, and time are quality and risk, which also need to be monitored closely. Quality and risk planning should be included in the project plan. The quality part needs to be managed on two levels. The first level is the quality of the project, which means for example the quality of project management processes. The second level is the quality of the outcome of the project. The management of the quality of the processes is nearly the same for all projects, whereas the outcome quality is a specific and unique aspect for every project.

The risk management starts already with the business case. Risk must be mentioned there in terms of risks to the business and risks the project itself. The risk identification process is not a one-time process but needs to be carried out at the beginning of the project and be an ongoing process with a predetermined frequency. Every risk needs to be assessed, a strategy to reduce or eliminate the risk needs to be developed. Afterwards the risks need to be monitored and controlled.

**Systematic View:** the systematic view refers to the fact that it is very easy to get stuck in the details of project execution and lose the sight of the big picture. Companies as well as projects are complex systems that maintain their existence through the interaction of mutual parts. Combining the company view and project view change the way the system behaves. As an effect the system behavior will change as the project goes through its lifecycle. Neither the company owner nor the project manager can afford to lose sight of the system's behavior or get involved into the details for a longer time. In order to manage and integrate all aspects of the project, the project manager needs to maintain the view of the whole system, instead of being involved on a detailed level.

**Project Leadership:** project leadership plays a major role in project success. The difference between management and leadership is that management produces a certain degree of predictability, relies on control and motivates people to stick to standards. In contrast, leadership produces changes, focuses on people, relies on trust, challenges the status quo and inspires the people to change. There is no doubt about the importance and positive impact of good leadership has on projects. Leading and managing projects requires full time commitment and dedication.

*Summarized it can be said, that SMEs have their own special characteristics and that projects and good project management are crucial for the success of the SMEs. There are several challenges SMEs have to face while applying project management. Two of the biggest are the lack of resources, which includes financial resources, project management knowledge and qualified employees, and the lack of support by the company owners / CEOs, which is most of the time caused by a lack of knowledge about project management. Due to these facts, SMEs need a simple project management model which is easy to learn and only applies the parts of project management which are crucial for the company and its projects. There are several key success factors SMEs can use for orientation. Project management standards incorporate these key success factors and offer tools that SMEs can choose according to their needs.*

## 2 THEORETICAL SOLUTION FOR THE APPLICATION OF PROJECT MANAGEMENT STANDARDS IN SME'S

In this chapter the theoretical background for the application of project management standards in SME's will be analyzed. For a deeper understanding, the definition of a standard will be investigated. Afterwards the two main streams of project management standards will be compared. In addition, three main standards of both streams will be shortly described.

### 2.1 Project management standards

It is important to understand the term 'standard' to comprehend the purpose of project management standards. The term originates from middle English and Old French and is used in conventional language (Ahlemann et al., 2009). The International Organization for Standardization defines a standard as a "*document established by consensus and approved by a recognized body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context*" (International Organization for Standardization, 1996). This definition was also adopted by Project Management Institute (PMI): "*A standard is a document, established by consensus and approved by a recognized body, which provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context*" (Project Management Institute, 2017). Standards can be seen as socio-economic constructs reflecting a balance of perspectives between stakeholders. It is crucial for a standard to be beneficial, to ensure that the group of stakeholders who are accepting this standard is as large as possible. Each additional stakeholder applying a standard makes the standard more beneficial for the community and increases its efficiency. Worldwide are over 1000 organizations that developed over half a million standards (Ahlemann et al., 2009).

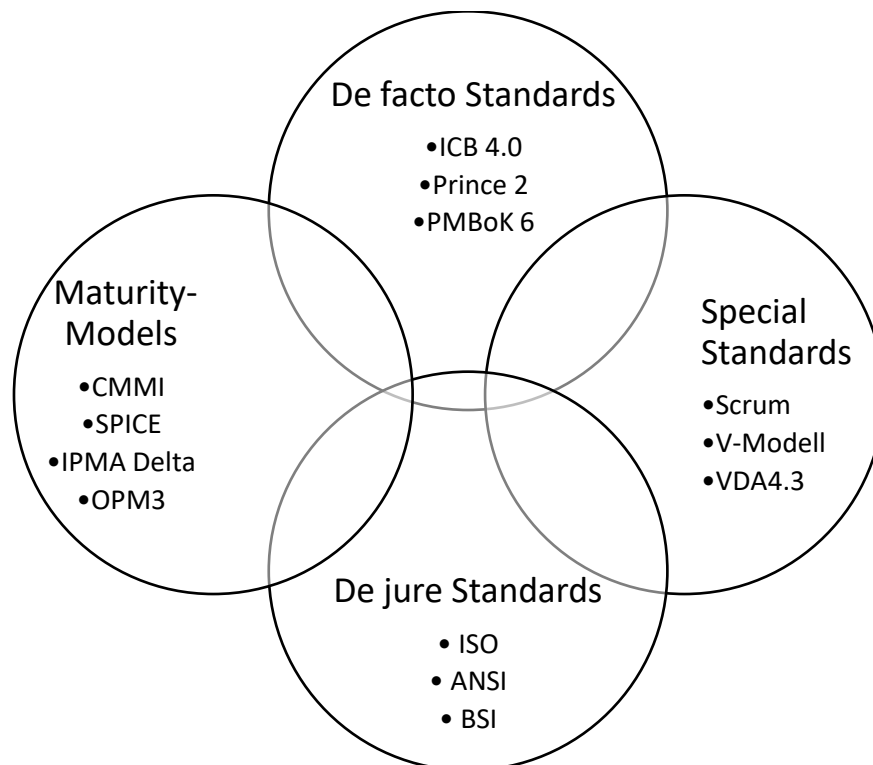
According to (Grau, 2013) standards can be categorized into four different kinds of standards. The first kind are *specialized standards*. Some specialized standards are developed for certain industries like the IT or the automotive industry to fulfill the exact needs of a certain industry to make the standard more efficient and easier to apply. Examples in the field of project management would be the v-model (IT) or VDA4.3 (automotive). Especially big customers are able to force small and medium sized companies to adopt such special standards by using their financial power. An even more specialized group of standards are the so-called company specific standards. Although it is illogical to call them standards, because company specific regulations are according to the mentioned definitions no real standards. These company regulations are often called standard in organizations which are not aware of existing standards or whose project managers are not able to apply existing standards.

The second category of standards comprises the *De facto Standards*. To create De facto Standards, professional communities often produce information which is discussed, cumulated and condensed in a so called “Body of Knowledge”. These collections of knowledge are then presented to the community as books, on the web or in complex systems for training and certification. Examples in terms of project management are the International Competence Baseline 4.0 (ICB 4.0) published by the International Project Management Association (IPMA), the Project Management Body of Knowledge 6 (PMBOK 6) published by PMI and Projects In Controlled Environments (PRINCE 2) published by Office of Government Commerce (OGC). De facto Standards are also often called methodologies as they are no official standards.

*Official (de jure) Standards* are the third category of standards according to Grau (2013). These standards are published by an official standard body. At the international level this is ISO. At the national level these are National Standard Bodies (NSB’s) which are member of ISO. Worldwide recognized examples are the American National Standard Institute (ANSI), the British Standard Institute (BSI) and the German National Standards Institute (DIN). Additionally, European standards (EN) should be considered. All of these standards are not binding by themselves, but they can become mandatory by law or when they become part of contracts. The advantage of ISO standards is that they are spread worldwide. Some national standards are spread also internationally because of the economic power of their respective national industries. The process of developing a standard is very transparent. This makes it easier to find a consensus way. This kind of decision making support trust building and ensures that all the interested parties are able to make use of the results even though they are competitors.

The last category of standards are *Maturity-Models*. Maturity models are based on the concept of process maturity. The first maturity model was the Capability Maturity Model (CMM) published by the Software Engineering Institute of Carnegie-Mellon University 1991. Maturity models are used to asses and measure the current performance of an organization and develop guidelines how the organization can be improved. They can be also used for benchmarking with other organizations. Therefore, maturity models are divided in different levels. Each level has specific goals that need to be achieved to reach this level of maturity. In terms of project management maturity models are used to measure an organization’s ability to deal with projects (Görög, 2016). General examples would be the CMMI, the new version of CMM and SPICE (ISO 15504), which are both mostly used in the field of software development. In the field of project management good examples are The Organizational Project Management Maturity Model (OPM3) published by the PMI and the IPMA Delta (Grau, 2013).

Figure 1 summarizes the four different categories of standards and shows that there are interrelations between the different categories and that it is not always possible to distinguish them exactly. Additionally, there are also some other terms like methodology, approach, framework and method in the field of project management. The difference between this terms and official standards is mainly in the volume of existing documentation and whether they are from an official institution or not. Especially the terms methodology and standard can be seen as synonyms. If not mentioned differently, the terms are handled equally in this thesis as they all provide guidance how to manage projects.



**Figure 1 Different categories of standards (designed according to Grau, 2013)**

Even though standards can be classified differently, they have some things in common. In terms of project management, standards have become increasingly comparable in content and structure over the last decade. Despite differences on the detailed level all project management standards contain four elements (Ahlemann et al., 2009):

- *Terminology*: One of the most important function of a project management standard is to set and harmonize the project management terminology to allow all practitioners to communicate in the same language and to reduce the amount of misunderstandings.
- *Functions*: Typically, project management standards also contain a functional decomposition of project management. One possible way are the knowledge areas, another way is presenting

an outline that structures the whole field of project management in terms of its main tasks such as time management or cost management.

- *Process description:* The functional decomposition of project management does usually not contain information about the meaningful sequence in which project management tasks should be carried out. These sequences are provided by process descriptions that frequently also define which inputs are necessary for the processes and what the outputs should be.
- *Organizational models:* More and more standards also provide organizational models for the execution of projects. For example, organizational units such as project offices are introduced, and project committees are defined.

According to (Kerzner, 2001) characteristics of a good standard are recommended: level of details, usage of templates, standardized planning, time management and cost controlling techniques, standardized reporting, flexibility for usage on all projects, and flexibility for quick development. Furthermore, the standard needs to be understandable to user, accepted and usable within organization, it uses standardized project lifecycle phases, and that it is based on guidelines and good business ethics (Špundak, 2014).

### **2.1.1 Traditional vs Agile project management**

Nowadays there are two main streams in project management: Traditional and agile project management. The following subchapters will analyze the main ideas of both streams and describe possible applications.

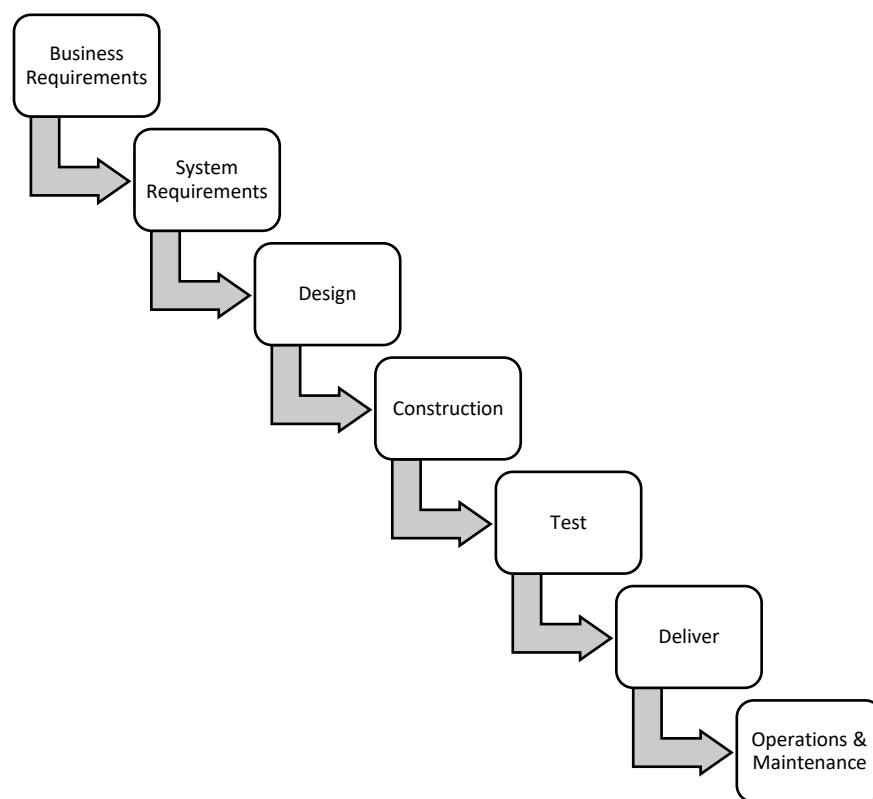
#### ***2.1.1.1 Traditional project management***

The first stream is *traditional* project management. Traditional project management is based on the ideas of the beginning of project management in the 1950s. This means project management involves very disciplined and deliberate planning and control methods. Traditional approaches are distinct in project life cycle phases which are easy to recognize. All tasks are completed one after another in an organized sequence. This requires that a significant part of the project is planned up front. The basic idea of traditional project management assumes that events affecting the project are predictable and that tools and activities are well understood. Furthermore, projects themselves are seen as relatively simple, predictable and linear, with clear defined boundaries which makes it easy to plan in detail and follow the plan without changes. For this reason, traditional projects are clearly defined with well documented and understood features, functions, and requirements. Once a phase is completed it is not expected to go back to this phase again. Traditional projects are managed against the planned budget, schedule and scope. Metrics and variance are tracked against the planned baselines, which have been set up before the project. Traditional project managers focus on the

reduction of risks and want to preserve the constraints of time and money. One advantage of traditional approaches is that they can be applied in distributed work teams of specialists and junior members because of the well-defined requirements and documentations. The ultimate goal of traditional project management is achieving optimization and efficiency in following initial detailed project plan. This means completing the project within planned time, budget and scope (Fernandez and Fernandez, 2008; Hass, 2007; Špundak, 2014; Wysocki, 2009).

The traditional approach is dominant in nearly all bodies of knowledge produced by project management organizations. This is most likely caused by the fact that most of the first versions of the bodies of knowledge were created in the 1980's. During this time there was no other approach than the traditional for managing projects. The following versions of the bodies of knowledge were updated with new ways of current practices but were not drastically changed (Špundak, 2014).

The simplest and most famous model of the traditional approach is the waterfall model which is shown in figure 2 (Hass, 2007).



**Figure 2 Waterfall Project Life Cycle Model (designed according to Hass, 2007)**

The project is split up in several phases which are processed one after another and there is no planned way of going back, if a later phase shows that were mistakes were made in one of the previous phases. The idea is to collect all requirements first, convert them into a design, implement the design and test it afterwards. After testing successfully, the result is delivered and taken into operation.



Known limitations of this approach are the fact that projects rarely follow the sequential flow and that clients usually find it difficult to state all requirements early in the project. This makes it sometimes nearly impossible to plan the exact outcome of the project at the beginning. One of the expected advantages of the traditional approach, the robustness, which means that the same methods and techniques could be applied in all forms in projects, is increasingly mentioned as one of the disadvantages. More and more authors state, that “one size does not fit all”. The reason for this is that the business environments as well as the projects themselves are becoming more complex with higher number of tasks and complex interrelations. Traditional project management is based on mostly hierarchical and linear task relations and cannot properly reflect the complexity and dynamics of today’s projects. This leads also to the next disadvantage of traditional project management. Due to unpredictable and dynamic changes in the project environment or within the project, changes to the initial plan are nearly unavoidable but this option is not considered in many traditional models like the waterfall model (Fernandez and Fernandez, 2008; Hass, 2007; Špundak, 2014).

### **2.1.1.2 Agile project management**

Because of the disadvantages of traditional project management and the growing request for continuous innovation within all industries, several new approaches of project management were created. Nearly all these models were connected with the field of software engineering and development. These new approaches used several different names which all emphasized the difference to traditional approaches. All of these models have in common that they are characterized by their adaptability to changes during the project life cycle and to different kind of projects in general. Adaptability is the new key characteristic instead of predictability which is the key characteristic of the traditional approach (Špundak, 2014).

The most famous approach is the second stream of project management standards which is called *Agile project management (APM)*. This approach is gaining ground in the business world, especially in IT software development projects and high-tech companies. The approach is based on the Agile Manifesto for Software Development which was created by a group of practitioners in 2001 and that already contained many of the agile or lightweight methods, practices and tools that are used today (Conforto, Amaral, da Silva, Di Felippo, and Kamikawachi, 2016).

The aim of the agile manifesto was to discover better ways of developing software. The main goal was to increase the customer satisfaction and to decrease the failure rate of software projects. The agile idea has four core values (agilemanifesto.org, 2001):

1. **Individuals and interactions** over processes and tools;
2. **Working software** over comprehensive documentation;

3. **Customer collaboration** over contract negotiation;
4. **Responding to change** over following the plan;

These core values underline the shift in mind in comparison to traditional project management. The agile approach focused on communication and not only following instructions. This includes the emphasis on collaboration between project team members. The team members are much more involved into the decision-making process as well as in the formal and informal communication, in comparison to the traditional approach (Špundak, 2014).

Beside the four core values, there are twelve principles which are the basis of the Agile Manifesto and which are behind every agile approach. They represent some of the previously described characteristics of agile approaches. Some of them are directly related to software development, but most of them can be applied in every industry by converting them to the needs of other industries (Manifesto for Agile Software Development, 2001):

1. Our highest priority is **to satisfy the customer** through early and continuous delivery of valuable software;
2. **Welcome changing requirements**, even late in development. Agile processes harness change for the customer's competitive advantage;
3. **Deliver working software frequently**, from a couple of weeks to a couple of months, with a preference to the shorter timescale;
4. Business people and developers must **work together daily throughout the project**;
5. **Build projects around motivated individuals**. Give them the environment and support they need, and trust them to get the job done;
6. The most efficient and effective method of conveying information to and within a development team is **face-to-face conversation**;
7. **Working software is the primary measure of progress**;
8. Agile processes **promote sustainable development**. The sponsors, developers, and users should be able to **maintain a constant pace** indefinitely;
9. Continuous **attention to technical excellence and good design** enhances agility;
10. **Simplicity**--the art of maximizing the amount of work not done--is essential;
11. **The best architectures, requirements, and designs emerge from self-organizing teams**;
12. At regular intervals, **the team reflects on how to become more effective**, then tunes and adjusts its behavior accordingly;

According to Fernandez and Fernandez (2008) there are three different strategies which help to classify agile approaches and fit to different types of projects. The *Iterative Strategy* consists of a

number of repeated phases with feedback loops after each completed phase. At the end of each phase there might be a partial solution. The strategy is a learning-by-doing strategy that uses sub solutions to discover the best approach for the final solution. The strengths are that the customer can review current solutions and suggest improvements, that the scope can be changed after each iteration and changing business conditions can be adapted fast. The weaknesses are that the customer needs to be more active, and that the final solution cannot be specified with the customer at the beginning of the project. An example for this strategy is Scrum, which will be discussed in more detail in chapter 2.3.1.

The second strategy is the *Adaptive Strategy*. This strategy is similar to the iterative strategy. The biggest difference is that the feedback after each iteration helps to adjust the next iteration and influences the direction of the final solution. It fits best to projects which have no clear solution. To remove the uncertainty the solution is found via continuous changes from iteration to iteration. Therefore, the success depends highly on the ability to change processes between every iteration. The strength is that the adaptive strategy does not waste any time or non-value-added work and that it provides the maximum business value with the given time and cost constraints. The weaknesses are that the customer involvement needs to be meaningful throughout the whole project and that the delivery cannot be exactly identified until the end of the project. Examples are Adaptive Project Framework and Adaptive Software Development (Fernandez and Fernandez, 2008).

The *Extreme Strategy* is the third strategy and it is close to the Adaptive strategy. The difference is that also the goal of the project needs to be discovered and converged upon, instead of only adjusting after each iteration the solution to converge upon a goal. Research and development projects are typically for this strategy. The lack of goal is often referred to “chaos”. Projects often end up with a final result completely different from the original intent. The strengths are that it is possible to keep several options for the solution open as long as possible and that there is an early look at a number of partial solutions. The weaknesses are that the search for solutions might be at all wrong places and that there is no guarantee for any business value at the end of the project. Examples for this strategy are INSPIRE and Flexible (Fernandez and Fernandez, 2008).

In summary, agile approaches are defined by their ability to create and to respond to changes to increase the value in a turbulent business environment and to find a balance between flexibility and stability. The iterative approach assures a higher control in uncertain environments. Furthermore, it often helps to create a faster execution by providing early benefits. The satisfaction of the customer is also many times higher because of his involvement and the possibility to react on current results immediately after each iteration. The same goes for the project team itself. Many team members feel more valued because of the high level of freedom and their influence on the project. Another benefit

of the agile approach is the high learning curve caused by the feedback loops after each iteration which allows to find improvements faster than in the traditional approach (Špundak, 2014; Wysocki, 2009).

The high customer involvement is also one of the disadvantages of the agile approaches. To run an agile project successfully, the customer needs to be highly involved during the whole project. Not every customer is willing to do this. Another disadvantage is the setup of teams. The agile approaches prefer small collocated teams to enable daily face-to-face conversation. Especially in big projects it is nearly impossible to locate the full team at one place during the whole project life cycle. To soften this problem, a high effort in digital communication is necessary. Another disadvantage is the fact that the final solution cannot be clearly defined at the beginning of the project. This creates legal risks because the final outcome is not clearly defined in the contract. Furthermore, opponents of the agile approach see it as an excuse for poor execution of basics and necessary principles of project management (Špundak, 2014; Wysocki, 2009).

Table 1 shows a brief comparison of the two project management streams based on the previous results presented in this chapter.

Table 1 Comparison between Traditional and Agile project management

	<b>Traditional</b>	<b>Agile</b>
<b>General approach</b>	Linear	Iterative
<b>Focus</b>	Reduction of risks with well documented features, functions and requirements	Being flexible and able to react on changes within the project or business environment
<b>Planning</b>	All planning in the beginning	Small planning steps through the whole project
<b>Change</b>	Avoiding risk	Welcoming change
<b>Project Team</b>	Clear roles and activities	More freedom and higher involvement
<b>Customer involvement</b>	Only at the beginning and end of the project	Throughout the whole project
<b>Controlling</b>	Based on the scope, time and cost baseline	Focus on business value
<b>Distribution</b>	Easy because of clear roles, requirements and documentation	Difficult because small collocated teams are necessary
<b>Commitment</b>	Relatively low	High level of commitment is necessary, this includes the living of the agile idea to fulfill the role

The table shows that both approaches are different. But it is still not possible to say that one generally outperforms the other. As both approaches have their advantages and disadvantages it depends on the project which approach is more suitable.

### **2.1.1.3 Application of traditional and agile project management**

Obviously, the traditional approach is more appropriate for projects with clear initial user requirements and with clear goals which leads to a low level of uncertainty. In these projects a low change rate is expected, and it is not necessary to involve the customer intensively in the project. The main effort is on the initial planning and afterwards on the linear following of the project plan aiming to optimize of project activities and efficiency in their execution. The traditional approach suits for projects where a formal level of documentation is required at any time, for example typical engineering and construction projects. In general, the traditional approach seems to be more appropriate for large projects. In this case large projects can be defined by the number of team members, by the amount and complexity of requirements or by the duration of the project. Furthermore, the organizational environment plays an important role in choosing the right approach. If the organization is not prepared or willing to use a new approach the traditional approach is most of the time the only available option. As the traditional approach provides more control it is often useful to apply it in bigger organizations where several organizational units are involved in one single project. The level of control provides also benefits in projects where the team members cannot agree on one approach, the team in general is less experienced, the fluctuation level is expected to be high or where the project manager is not able to be in contact with the team on a daily base. The traditional approach should also be preferred in projects where the results are very critical and the consequences of system failure can be serious (Boehm, 2002; Špundak, 2014; Wysocki, 2009).

In contrast the agile approach has its strength especially in all creative and innovative projects like research and new innovative product-development projects. All these kinds of projects are characterized by the high level of uncertainty, unclear project goals or incomplete and unpredictable requests. These factors lead to the assumption that there will be significant changes during the project. Due to the expectation of changes it is necessary that the project can be designed iterative and the customer is willing in a high involvement. The iterative approach helps in a fast implementation because only necessary aspects are done. This can be useful for projects with tight time constraints. Typical agile projects are executed by small teams and often within a small organization. An example would be a standalone software project with emphasis on the interface. In contrast to the traditional approach the human factor plays an immense role, especially the communication between the project team members. For this reason, it is recommended to choose very good or even the best people available for agile projects. As already mentioned, the team members should work in a common location in a small team. One consequence of the high level of communication instead of extensive documentation is that most of the knowledge within the project is tacit. Due to the significant changes in the way of working the organization and also the customer

need to be prepared before applying an agile approach (Boehm, 2002; Špundak, 2014; Wysocki, 2009).

There are typical usages for both of approaches and often it is most efficient to combine both of them. In the end, there must be a match between the project, culture, project team, customers, and the project strategy that is selected (Fernandez and Fernandez, 2008; Špundak, 2014; Wysocki, 2009).

## **2.2 Traditional project management standards**

There are plenty of standards which are based on the traditional approach and deliver a full framework for the operation of projects. Some of the standards with a wide spread acceptance are the already mentioned PMBOK, ICB4 and PRINCE2. Further standards are ISO 9000, the Project and Program Management (P2M) by the Engineering Advancement Association of Japan and the C-PMBOK by the Chinese PM conference (Sanjuan and Froese, 2013). The following subchapter will focus on the three standards mentioned first, as they are well recognized in Europe and this thesis will focus on two European countries Germany and Lithuania later on.

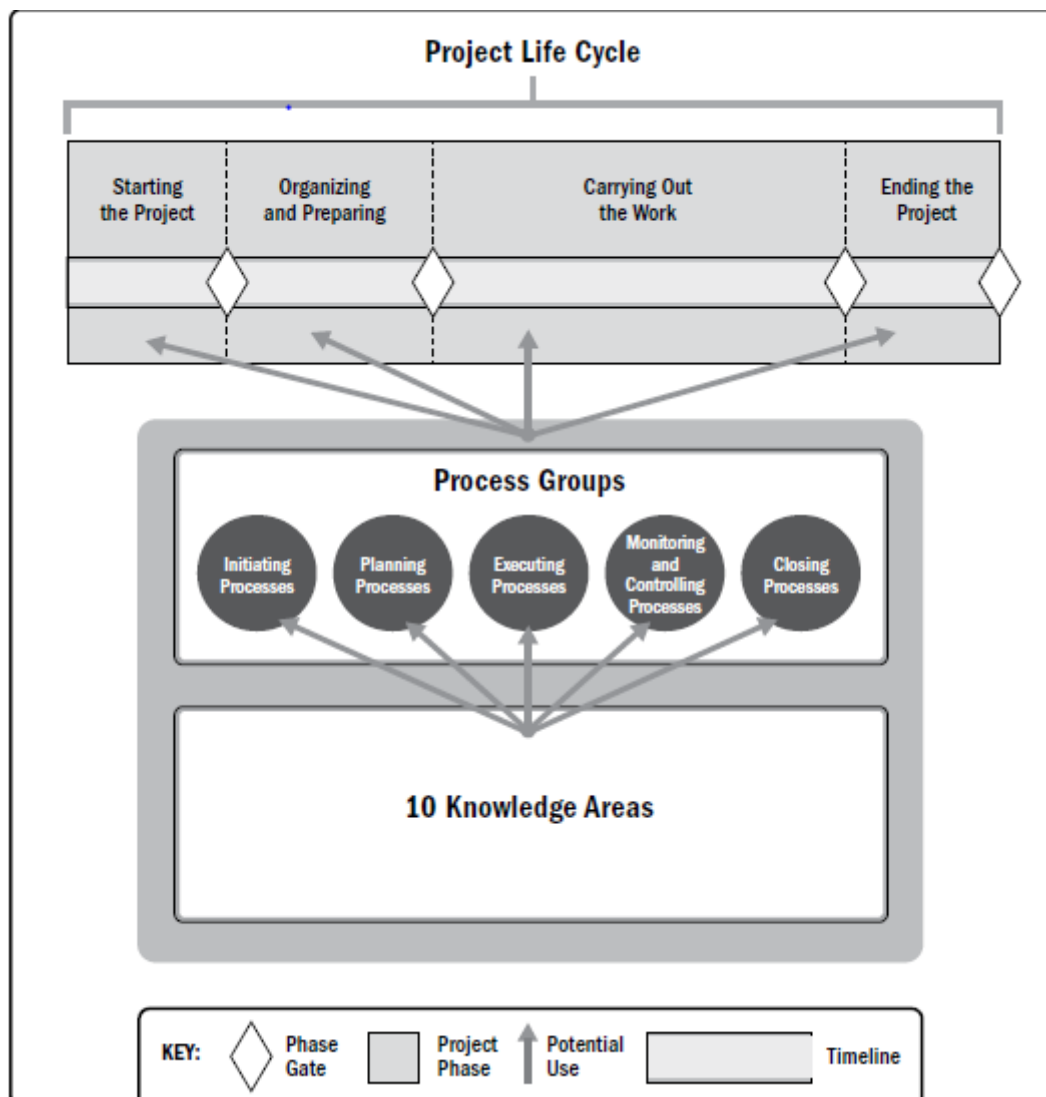
### **2.2.1 PMBOK Guide**

The PMBOK is one of the most commonly used project management standard in the world. It was created by the PMI with the purpose to ensure a set of knowledge principles in project management. The main aim is to guide projects managers to complete projects successfully. The PMI was founded in 1969 with the objective to serve the interests of the industry of project management. The main idea was that tools and techniques of project management are common even among completely different industries like IT and construction. In 1981 the PMI authorized the development of what became “A Guide to the Project Management Body of Knowledge” (PMBOK Guide). The first version was published in 1987. The latest version is the version six which has been published in 2017. The PMBOK is officially approved as a standard by the American National Standard (ANS) and by the American National Standards Institute (ANSI) (Matos and Lopes, 2013; Project Management Institute, 2017).

The PMI defines the PMBOK as a term that describes knowledge within the profession of project management. This includes proven traditional practices that are widely applied as well as innovative practices that are emerging within the profession. The content of the PMBOK is generally recognized and seen as good practice. This means the knowledge and practices described are applicable to most projects most of the time. There is a general agreement that the application of the knowledge, skills, tools, and techniques to project management processes can enhance the chance of success of many projects. The PMI describes the PMBOK not as a methodology but as foundation

upon which organizations can build methodologies, policies, procedures, rules, tools, techniques needed to practice project management (Project Management Institute, 2017).

Figure 3 shows the basic structure of project management according to the PMBOK.



**Figure 3 Interrelationship of PMBOK® Guide Key Components in Projects** (*Project Management Institute, 2017, p. 18*)

The project lifecycle is seen as series of phases that a project passes through from its start to completion. The four shown project phases are a collection of logically related project activities that culminate in completion of one or more deliverables. At the end of every phase there is a gate where the decision needs to be made whether to continue with the next phase, to continue with modification or to end the project. Project management processes are described as a systematic series of activities directed toward a final result where one or more inputs will be acted upon to create one or more outputs. The next key terms are the project management process groups. These are described as a logical grouping of project management input, tools, techniques, and outputs. The project management process groups are not equal to the project phases. The last key components of the

PMBOK are the project management knowledge areas. These are identified as areas of project management defined by their knowledge and requirements. They are described in terms of their component processes, practices, inputs, outputs tools and techniques.

Projects are divided into five project management process groups. These process groups contain in total 49 processes. These processes are divided into ten different knowledge areas. The processes are interrelated, and the output of one process is the input for following processes. Besides this, the project management process groups have as final outputs different documents which are defined in PMBOK. Additionally, to the structure shown in figure 4, PMBOK contains for example also role descriptions, different organizational structures, and many of tools to apply within projects. In version six it also contains advices how to apply project management according to PMBOK in combination with agile approaches (Project Management Institute, 2017). The PMI publishes also several other books and documents which complement the PMBOK on detailed level.

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

**Figure 4 PMBOK Project Management Process Group and Knowledge Area Mapping** (*Project Management Institute, 2017, p. 25*)



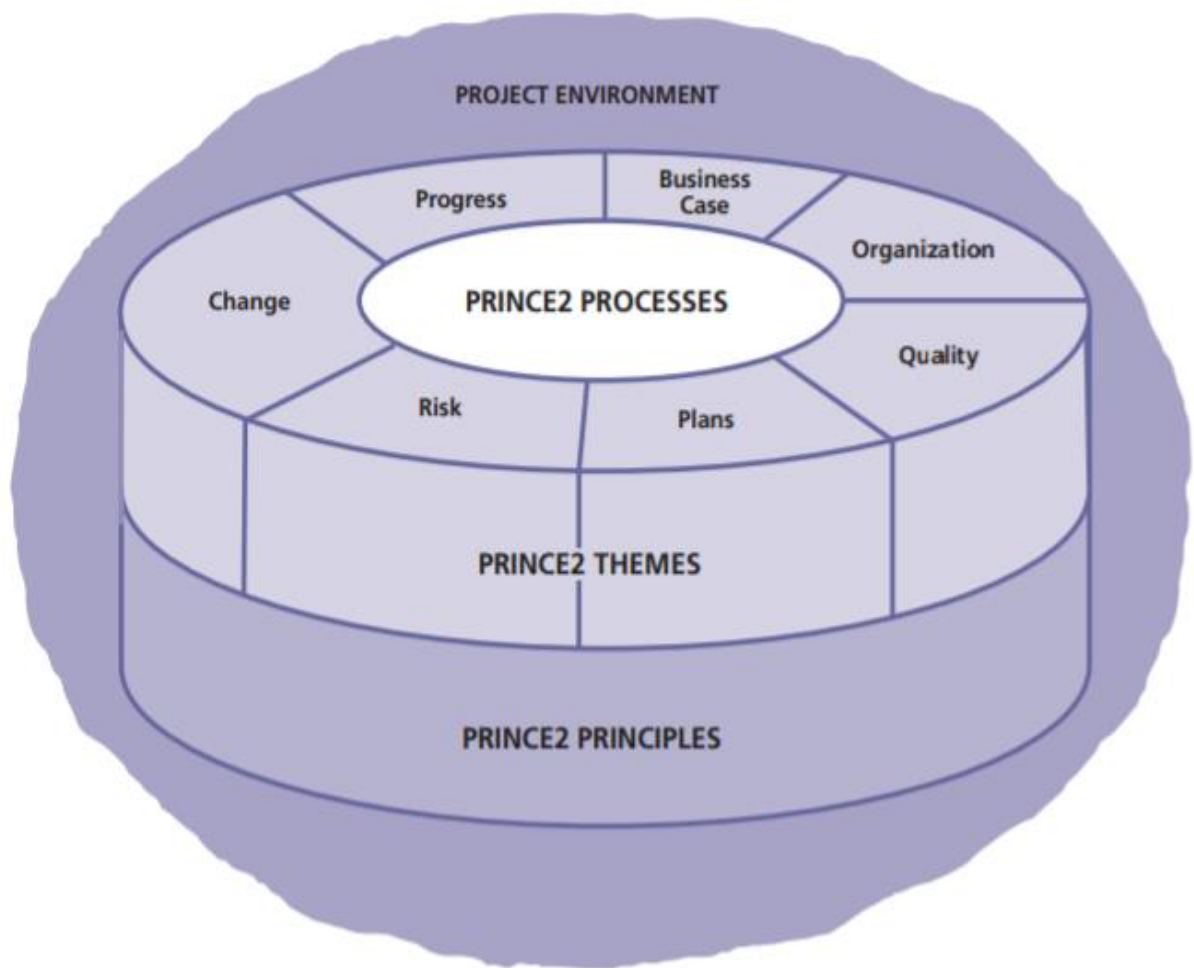
## 2.2.2 PRINCE 2

The first version of Projects in Controlled Environments (PRINCE) was created in 1989 by the Central Computer and Telecommunications Agency (CCTA) in Great Britain which is now called the Office of Government Commerce (OGC). It was a structured method of project management based on experience gained in thousands of projects and on the contribution of sponsors, managers, academics, trainers, and consultants. The first publication of PRINCE2 was in 1996 and since then PRINCE and PRINCE 2 are registered trademarks of the British Government. The biggest revision happened in 2009 where the seven principles, which are explained later, were introduced and in 2017 where the scalability and flexibility were improved. However, the name remained PRINCE 2 because the core idea did not change (Matos and Lopes, 2013).

The main features of PRINCE2 are based on the business focus and on an organizational structure directed to the project management team. The planning is executed with orientation towards the final product and its emphasis is on the division of the project into phases. PRINCE2 projects are driven by the projects business case which describes the organization's justification, commitment and rationale for the deliverables or the outcome. During the project the business case is regularly reviewed to ensure that the business objectives, which often change during the lifecycle of the project, are still met. PRINCE2 provides a common language across all parties involved in a project. It provides the necessary controls and breakpoints to work successfully within a contractual framework. PRINCE2 gives fundamental importance to roles and responsibilities within the project. The management is done by stages with defined deviation tolerance on cost, time, quality, scope, risk and benefits (Matos and Lopes, 2013; Sanjuan and Froese, 2013).

The PRINCE2 methodology consists of four integrated elements which are shown in figure 5. The first element are the seven principles. These are guiding obligations and good practices which determine whether the project is manageable using PRINCE2 or not. Unless all of them are applied, it is not a PRINCE2 project. The seven principles are (Office of Government Commerce, 2009):

- Continued business justification
- Learn from experience
- Defined roles and responsibilities
- Manage by stages
- Manage by exception
- Focus on products
- Tailor to suit the project environment



**Figure 5 Structure PRINCE 2** (*Office of Government Commerce, 2009*)

The second element are the seven themes. They describe the aspects of project management that have to be addressed continually. The strength of PRINCE2 is that the themes are designed to work together effectively and to be applicable for different kind of projects of all industries. All the themes have to be applied but they should be tailored to the needs of the project. All themes have a purpose, which describes why it is important to the successful project delivery. Every theme explains terms and definitions that are used in the theme. There are also responsibilities which describe the key theme for each PRINCE2 role. Additionally, every theme contains the PRINCE2 approach to the theme which describes the particular aspects of project management that are required for the PRINCE2 process to be fully effective. Table 2 shows the seven themes and which key questions to project management they answer.

Table 2 The seven themes of PRINCE2 adapted from (*Office of Government Commerce, 2009, p. 17*)

Theme	Answers
<b>Business Case</b>	Why?
<b>Organization</b>	Who?
<b>Quality</b>	What?
<b>Plans</b>	How? How much? When?
<b>Risk</b>	What if?
<b>Change</b>	What's the impact?
<b>Progress</b>	Where are we now? Where are we going? Should we carry on?

The third element of PRINCE2 are the seven processes. They provide the set of activities required to directly manage and deliver a project successfully. The processes describe a step-wise progression through the project lifecycle, from getting the project started to the project closure. Each of the processes provide checklists of recommended activities, products, and related responsibilities. Figure 6 shows the seven processes and the responsibilities.

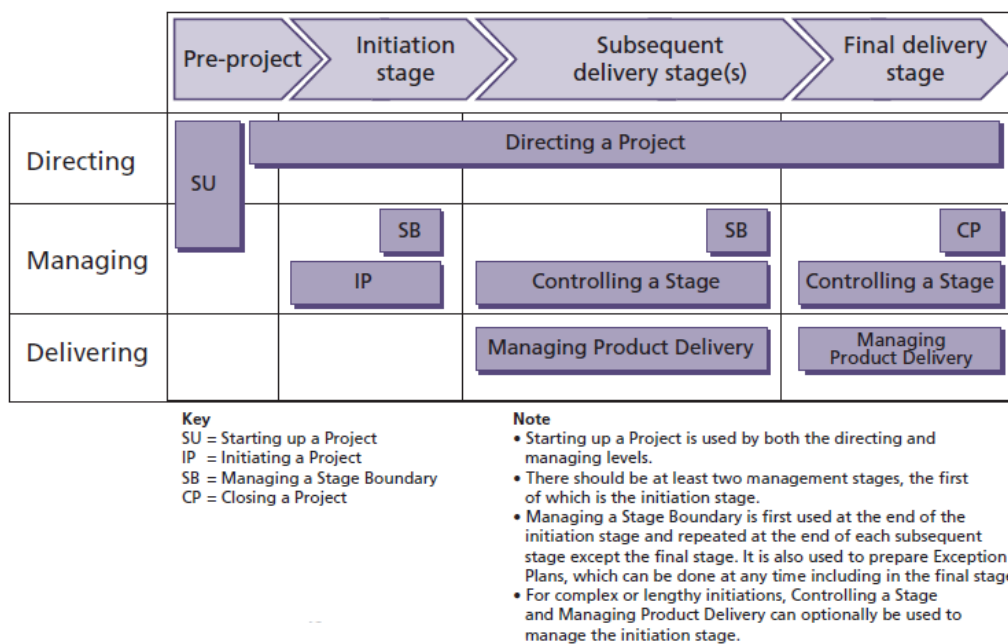
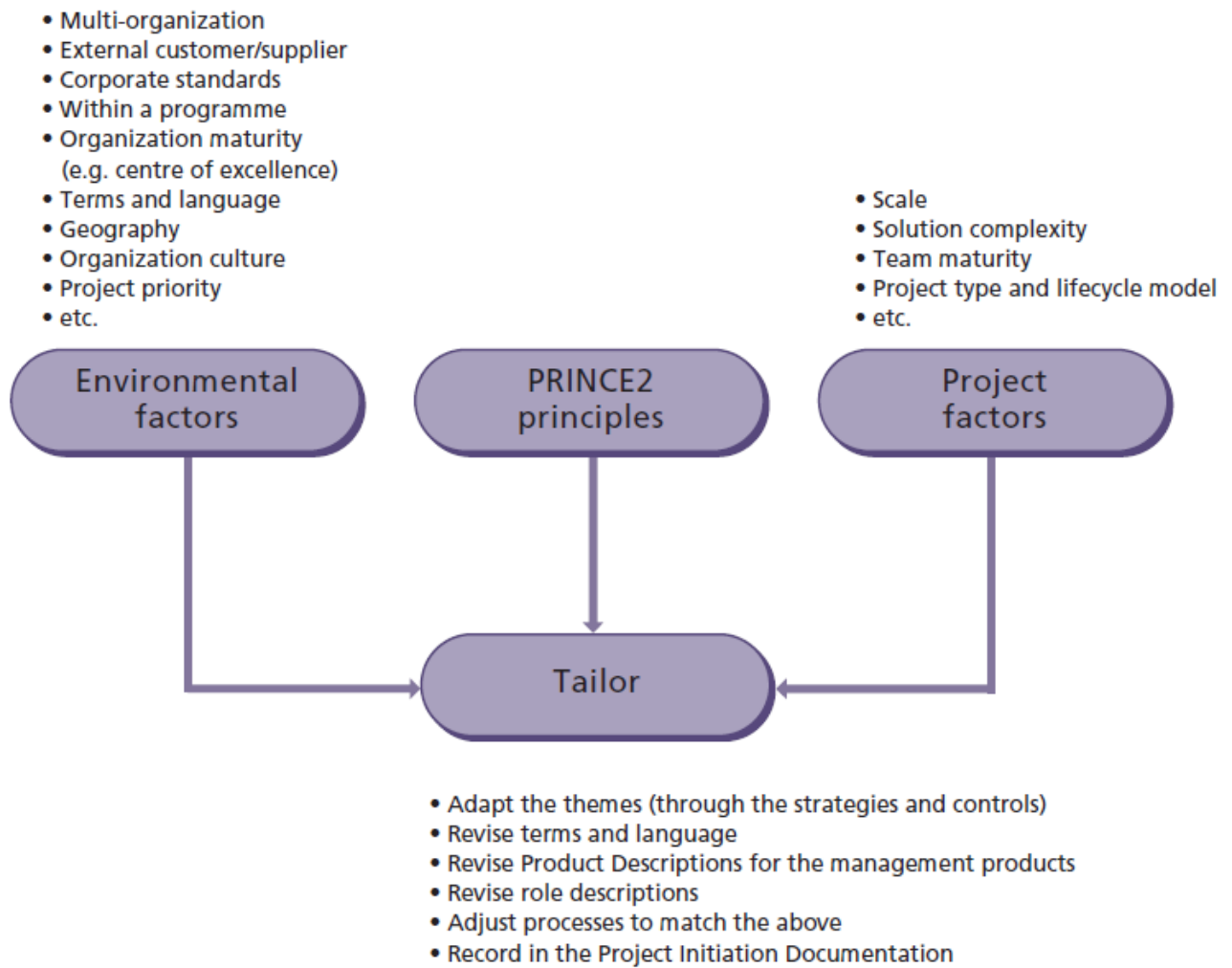


Figure 6 The seven processes of PRINCE2 (*Office of Government Commerce, 2009, p. 113*)

The last element of PRINCE2 is the project environment. As already mentioned PRINCE2 can be used for every project. Therefore, it is necessary to tailor the PRINCE2 method, so it fits the context of the project. Tailoring means that the correct amount of planning, control, governance, and the use of processes and themes (Office of Government Commerce, 2009).



**Figure 7 Tailoring PRINCE2** (*Office of Government Commerce, 2009, p. 216*)

Figure 7 shows that the tailoring is influenced by three factors. The mandatory PRINCE2 principles are the basis. Additionally, the project factors like scale, complexity and type are considered. The last aspect are environmental factors, which can be organizational factors like the culture and the structure of the organization or factors like geographical distribution of project members and possible language barriers (Office of Government Commerce, 2009).

Summarized PRINCE2 is as well as PMBOK a process based methodology which offers a full framework for managing projects based on best practices and experiences. One of the biggest strength of PRINCE2 is its ability to adapt to every project by tailoring it to the project needs.

### 2.2.3 ICB 4

The fourth version of the individual competence baseline (ICB) was published as part of the 50<sup>th</sup> anniversary of the International Project Management Association (IPMA) which is the publisher of the ICB. The main motivation for the ICB was, that most of the standards, as PMBOK or

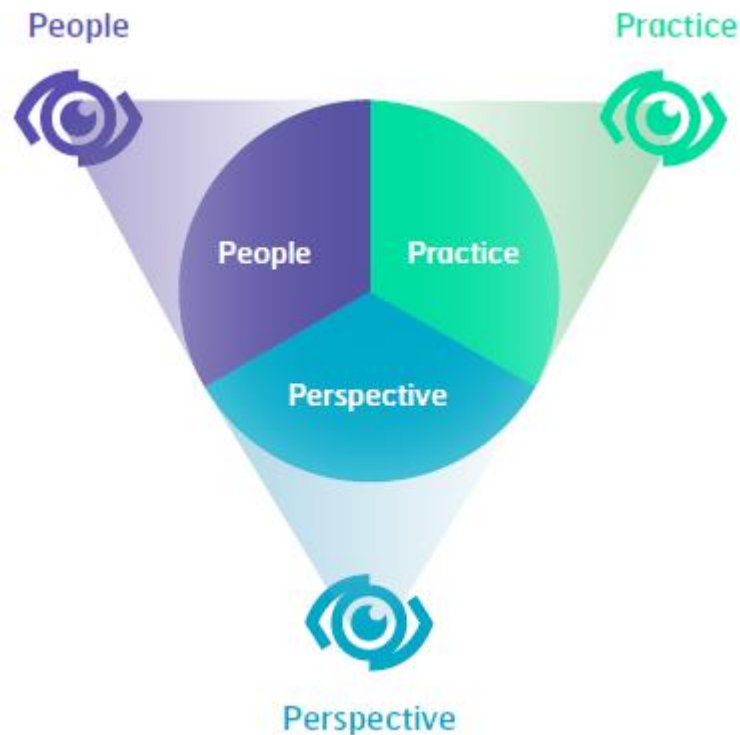
PRINCE2, are orientated on procedures and processes. Only very few standards are competency-based and specify the needed competences for good performance of people in project environments. For this reason, the main objective of ICB4 is to enrich and improve the individual's competences in project, portfolio, and program management and to provide an inventory of competences that, if fully realized, represent complete mastery in these domains. According to the ICB4 projects begin and end with people and competent execution is at the heart of every successful project. Therefore, ICB4 intends to support the growth of individuals, and also of organizations that have to perform in increasingly competitive project environments (IPMA, 2015; Vukomanovic, Young, and Huyink, 2016).

So, in contrast to process based standards, which ensures that companies have a universal approach in managing projects to achieve repeatedly consistent results, a competence based standard ensures that organizations possess people which can perform tasks in projects, programs and portfolios. This underlines that the ICB4 should not be perceived as similar but as complementary to all standards which focus more on the processes (IPMA, 2015; Vukomanovic et al., 2016).

ICB4 defines individual competences as the application of knowledge, skills and abilities in order to achieve the desired results. Inside this definition knowledge is defined as the collection of information and experience and individual processes. Skills are specific technical capabilities that enable individuals to perform a task and ability is the effective delivery of knowledge and skills in a given context. Hence, these three terms are related that skills require some relevant knowledge and abilities require skills and knowledge (IPMA, 2015).

Competences are subdivided into individual competences, team competences and organizational competences. Individual competences address knowledge, skills and abilities through experience. Team competences are the collective performance of individuals joined toward a common purpose. Organizational competences address the strategic capabilities of a self-sustaining unit of people. As project work is happening as collaborative work the competence development occurs collectively. However, the main focus on ICB is on the individual competence development. For organizational competence development the IPMA published another standard called "IPMA Organizational Competence Baseline"

The main concept of ICB4 is the eye of competences, shown in figure 8, which represents the universe of competencies for project, program and portfolio management. The competences are divided in the three domains People, Practice and Perspective. Each domain provides focus for the aspects of competences. Together they create the whole, balanced individual (IPMA, 2015).



**Figure 8 The eye of competences** (IPMA, 2015, p. 27)

ICB4 does not discuss competencies in terms of specific roles but more in terms of domains like individual work in project management. The reason for this is that roles and role titles vary strongly by language, industry, and focus. For this reason, the ICB4 is divided in the domains project, program and portfolio management. The three competence areas are defined as follows (IPMA, 2015):

- *People competencies* consists of the personal and interpersonal competences required to successfully participate in or lead a project, program or portfolio
- *Practice competencies* are the specific methods, tools and techniques that are used in projects programs or portfolios to realize their success
- *Perspective competencies* are the methods, tools and techniques through which individuals interact with the environment, as well as the rationale that leads people, organizations and societies to start and support projects, programs and portfolios

In total there are 29 elements with 5 elements in the perspective competences, 10 elements in the people competences and 14 elements in the practice competences which are shown in detail for projects in figure 9.

<b>4.3</b>	<b>Perspective</b>
4.3.1	<u>Strategy</u>
4.3.2	<u>Governance, structures and processes</u>
4.3.3	<u>Compliance, standards and regulation</u>
4.3.4	<u>Power and interest</u>
4.3.5	<u>Culture and values</u>
<b>4.4</b>	<b>People</b>
4.4.1	<u>Self-reflection and self-management</u>
4.4.2	<u>Personal integrity and reliability</u>
4.4.3	<u>Personal communication</u>
4.4.4	<u>Relations and engagement</u>
4.4.5	<u>Leadership</u>
4.4.6	<u>Teamwork</u>
4.4.7	<u>Conflict and crisis</u>
4.4.8	<u>Resourcefulness</u>
4.4.9	<u>Negotiation</u>
4.4.10	<u>Results orientation</u>
<b>4.5</b>	<b>Practice</b>
4.5.1	<u>Project design</u>
4.5.2	<u>Requirements and objectives</u>
4.5.3	<u>Scope</u>
4.5.4	<u>Time</u>
4.5.5	<u>Organisation and information</u>
4.5.6	<u>Quality</u>
4.5.7	<u>Finance</u>
4.5.8	<u>Resources</u>
4.5.9	<u>Procurement</u>
4.5.10	<u>Plan and control</u>
4.5.11	<u>Risk and opportunity</u>
4.5.12	<u>Stakeholders</u>
4.5.13	<u>Change and transformation</u>

**Figure 9 Competence elements for projects by ICB4 (IPMA, 2015, p. 38)**

Every competence element is given with a definition, the purpose, a description, needed knowledge and skills, and related competence elements. Furthermore, there are key competence indicators given which are divided in descriptions and measures. The key competence indicators provide the definitive indicators for successful project, program or portfolio management for one, two or even all three domains. The measures describe highly detailed the performance points within each key competence indicator (IPMA, 2015).

Summarized the ICB4 uses a different approach than PMBOK6 and Prince2. Instead of focusing on processes it focusses on competences that are needed to run a project successfully. The main idea is that competent people are the mayor success factor for projects. Therefore, ICB4 can be easily combined with other standards which focus more on roles and processes. Furthermore, the ICB4 is designed for projects, programs and portfolios and does not provide different standards for these three levels of managing projects.

### **2.3 Agile project management standards**

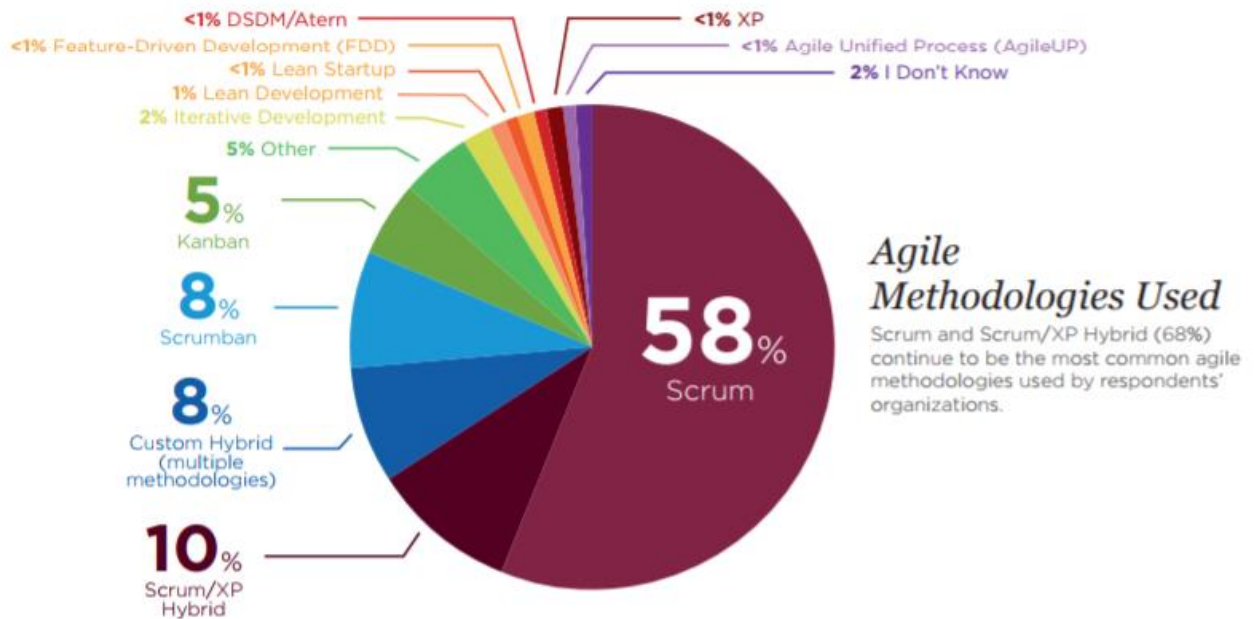
One of the “state of the art” publications in the field of agile project management is the State of Agile Report provided by Version One, a supplier of business software in the field of agile managing (Franková, Drahošová, and Balco, 2016). The latest version is the 11<sup>th</sup> which is based on a survey that was conducted between July and December 2016 and published on the 6<sup>th</sup> of April 2017. It presents several thousand responds mainly from North America (50%), Europe (28%) and Asia (10%). All sizes of organizations from < 1000 people (39%) up to organizations with over 20,000 (26%) are represented. The three main industries are Software Development (23%), Financial Services (14%) and Professional Services (12%) (Version One, 2017).

According to Version One (2017) the top reasons for adopting agile methodologies were “Accelerate product delivery” (69%), “Enhance ability to changing priorities” (61%) and “Increase productivity” (53%). This matches to the previously mentioned goals of agile approaches. The main benefits are according to the respondents “Ability to manage changing priorities” (88%), “Project visibility” (83%) and “Increased team productivity” (83%). Furthermore, the top three of the mentioned benefits of adopting agile approaches go in the same direction and fit to the reasons why organizations adopted agile methodologies.

Figure 10 shows which agile methods and practices are applied in the organizations of the respondents. By far the main method is Scrum with 58%. Followed by the hybrids of Scrum and Extreme Programming (XP) with 10% and Scrum and Kanban, which is called Scrumban, with 8%. These three methods are used by more than 75% of the respondents.



# AGILE METHODS AND PRACTICES



**Figure 10 Agile Methods and Practices from** (*Version One, 2017, p. 10*)

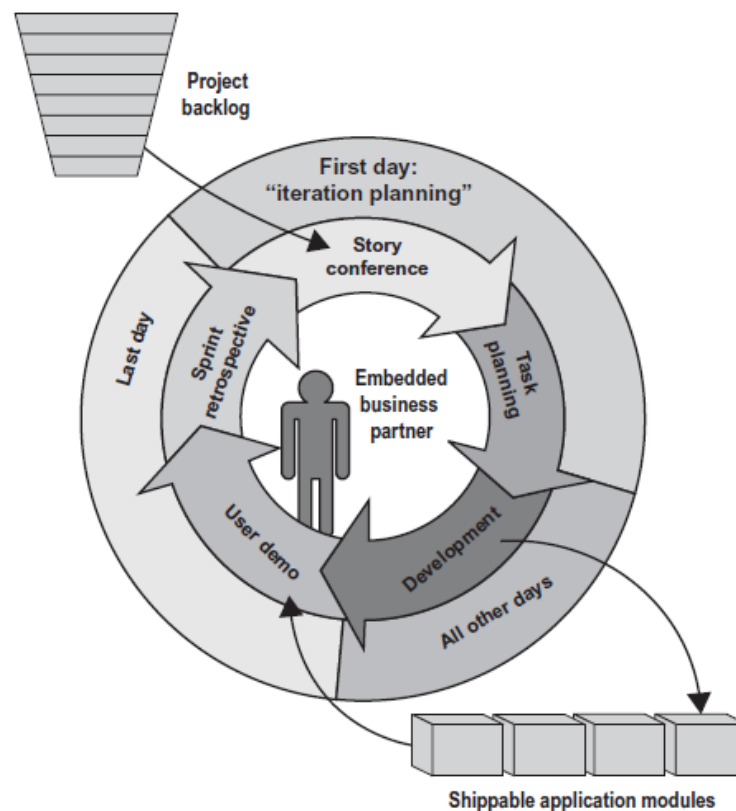
For this reason, the following subchapters will briefly describe Scrum, Scrumban and Extreme Programming.

## 2.3.1 Scrum

Scrum was developed during the early 1990s by Dr. Jeff Sutherland and Ken Schwaber who were blending the innovative new object orientated programming techniques with concepts of Japanese approaches of product development. Their experience of Scrum was also one of the biggest contribution to the Utah conference in 2001, where the previously described agile manifesto was created (Hughes, 2016).

Figure 11 shows the basic approach of Scrum. The most important aspect of Scrum is, that it embeds a business partner, who represents the customer, with the project team. Therefore, it is necessary that the business partner understands the business value of the project well, because most of the directions during the Scrum process are made by him. His role is called *product owner*, because the result of the Scrum project will reflect the decisions of the business partner. The product owner decides which features are built into the project and in which order. At the end of every iteration the product owner reviews the deliveries and decides whether to accept or reject them based on how well they fit to the business needs of the organization. In case of failure of the project, the whole project team failed but the main fault for the failure will be indicated to the project owner. Therefore, the product owner is one of the primary team leaders. For the success of Scrum, the close

collaboration between the project team and the product owner is crucial. For this reason, Scrum strongly urges that the project owner should be co-located with the project team and not operate from a distant office (Hughes, 2016).



**Figure 11 Basic essence of Scrum** (Hughes, 2016, p. 21)

The only other defined role for an individual in Scrum is the *scrum master*. Everyone else in the project is simply called *project team* or, as Scrum is still an approach for IT projects, *developer*. The scrum master is not a traditional project manager but instead he is a facilitator. For example, someone who knows the Scrum steps and techniques well and can remind the team if necessary which step should be conducted next. As the scrum master is not a traditional manager but more a facilitator, the amount of time needed for this role is relatively small (Hughes, 2016; Schwaber and Sutherland, 2017).

One of the main artifacts of Scrum are the *user stories*. They build the contrast to the big specification up front in the traditional waterfall strategy. User stories are very small pieces that are defined continuously throughout the project. A typical user story is only one or two sentences long and describes three key components. The *Who* is the stakeholder that will use the application of the user story according to the product owner. The *What* defines the usage of work that the defined actor will want to accomplish while working with the application. The last component is the *Why* which describes the value or business benefit the actor and the organization will derive from the usage.

After collecting all initial requirements, the user stories are prioritized. The prioritized list of all user stories, which represents all requirements of the product owner is called *product backlog* or *project backlog* (Hughes, 2016; Schwaber and Sutherland, 2017).

After finishing the project backlog the project team will start to transform the user stories into features working from top to bottom. This will happen in development iterations which are called *sprint* in Scrum. These sprints have all the same fixed duration. Therefore, they are called time-boxed. Typically, the length of one sprint is 2-4 weeks. The first day of the sprint is reserved for the *story conference* and the *task planning*. The last day of the sprint is reserved for the *user demo* and the *sprint retrospective*. All the other days of the sprint are dedicated to the development (Ellis, 2016; Hughes, 2016; Schwaber and Sutherland, 2017).

During the story conference the team discusses on a medium level of details the requirements implicit in the user stories. Often the effort is measured in an abstract unit called *story points*. The team estimates how many user stories they can finish within one sprint. These estimates are based on the experience of previous sprints. By measuring the story points of previous sprints, the team gets an impression of its velocity. After agreeing which user stories are possible for the sprint, these user stories are transferred to the *sprint backlog*. With the next step the Scrum cycle, which is shown in figure 11, can begin (Ellis, 2016; Hughes, 2016; Schwaber and Sutherland, 2017).

Before starting the development, the task planning is used to check the sprint backlog a second time. All listed user stories are analyzed and are decomposed in development steps which describe exactly what tasks need to be completed in order to finish the user story. For those development steps the labor hours are calculated and summed up. Only if the sum matches to the available working hours of the sprint the sprint backlog is accepted. If the sum does not match with the available hours all estimates are checked again. Only if this second estimate brings the same result, the sprint backlog has to be modified by adding or removing stories. If the sprint backlog is accepted during the task planning, the development begins (Ellis, 2016; Hughes, 2016; Schwaber and Sutherland, 2017).

After discussing the tasks for one day, it is expected that the team understands very well what their tasks are and that they can directly start to work. During the executing there are several agile methods possible to apply. Two of the most famous ones of Scrum are the story board, which is a swim lane diagram, which shows if a user story is still in the waiting status, under development, finished or approved and ready for delivery. The second technique is the burndown chart in which the total amount of story points, that need to be done in order to finish the sprint, is shown. The chart is updated on daily bases and after finishing a user story, the story point value of the user story is subtracted from the points left. The burndown chart is a fast and simple technique to show the

progress and if the team is performing as expected or not. At the end of the development the outcome needs to be a running feature of the project (Ellis, 2016; Hughes, 2016; Schwaber and Sutherland, 2017).

The user demo is the next step after development. During this step the product owner gets a demonstration of the outcome of the sprint and is able to check it by himself. One benefit is that the product owner gets already familiar with this part of the project and can use it after finishing the project. The product owner checks every user story and decides if he is accepting or rejecting it. In case of rejection the story goes back to the product backlog and needs to be considered for a second time within the next sprint. The rejected stories go to the top of the sprint backlog for the next iteration. If the product owner accepts a user story, the team can assume that this story is completely fulfilled, and no further changes are required (Ellis, 2016; Hughes, 2016; Schwaber and Sutherland, 2017).

The last step of a Scrum iteration is the iteration retrospective. The idea behind it is, that if the team would start directly with the next iteration, they would repeat many mistakes of the previous sprint. For this reason, the team reflects during the last half day on their effectiveness and tries to identify new policies and behaviors to work faster and with a higher quality in the next sprint. If the whole team agrees to a new behavior, the scrum master notes it down and takes care that they are applied in the following iterations (Ellis, 2016; Hughes, 2016; Schwaber and Sutherland, 2017).

Summarized it can be said that Scrum represents the values of the agile manifesto like early delivery, intensive cooperation with the customer and strong cooperation within the team.

### **2.3.2 Scrumban**

Scrumban is a combination of the previously described method Scrum and Kanban. Simplified Kanban is a methodology that focuses on just-in-time delivery and the efficiency of workflows. The main aim of Kanban is to accurately state what work needs to be done, and when it needs to be done. This is done by prioritizing tasks, defining workflows and lead times to delivery. Kanban stresses explicitly the most important tasks that need the most attention in order to reduce risks and to increase the flexibility among other tasks. The idea of Kanban is that the right work is done at the right time by the best team members according to their skillset. The second aim is the reduction of overhead. Only things that need to be done should be done and nothing more. Therefore, Kanban eliminates “waste” in every step (Lei, Ganjeizadeh, Jayachandran, and Ozcan, 2017).

The visualization of the workflow is a core aspect of Kanban. The *card wall* is the applied tool to visualize the process and tasks. It goes throughout the whole Kanban project. All necessary steps for the project are identified and all required tasks are written onto cards which are added to the

Kanban backlog. After a task is completed, it is moved downstream to the next step and a new task is moved upstream from the backlog to the step. Every task has to pass several steps until it is completed. In order to deliver the project in a certain time frame, every step has a maximum number of tasks that can be listed there. If a step reached the maximum number of tasks, the next tasks have to wait in a queue until another task in the step is finished and moved downstream to the next step. Kanban also visualizes which tasks are in progress and who is working on it at the moment. This shows bottlenecks from overloading and possible gaps between workflows. Colors can be used to visualize the status of the tasks (Lei et al., 2017; Reddy, 2016).

There are some similarities between Scrum and Kanban. Both approaches are agile and lean, which means both are flexible and do not plan everything upfront. They try to minimize the work to only the core things that have to be done and cut out all overhead. Furthermore, Scrum and Kanban break work down into smaller pieces and focus on self-organized teams, which are intent on delivering usable outcomes early and often. Scrum and Kanban are both designed to react to changes quickly and have limited work in process which is displayed highly transparently. One of the differences between both approaches is that Kanban is able to handle project interrupts and supports personnel with specialized roles and different skill sets. One of the biggest strengths of Kanban is repeatable work. It is also applicable for larger teams because the communication and planning overhead is very low. On the other hand, Scrum is better to apply in projects requiring deep collaboration and innovation. Scrum works best with small cross-functional teams and prefers generalists instead of specialists (Lei et al., 2017).

Scrumban can be defined as a hybrid agile methodology, which is designed to cope with dynamically changing customer requirements and frequent problems during the project. It is a framework that emphasizes on the discovery of knowledge by combining new principles and practices with existing ways of working. It uses some of the best practices of Scrum like the daily stand-up meetings, user-stories, and self-organized teams. Instead of the Scrum task board and the usage of sprints, it applies the Kanban style pull driven coordination mechanism on a board with work-in-progress limitations. The limitations control how many work items can be processed at once. The board stays persistent during the entire project and only the tasks and the priorities are changing. The pull mechanism ensures that the workflow of the project is improved. The prioritization of tasks is not mandatory but strongly recommended. The focus of Scrumban is stronger on the planning in comparison to Scrum where the focus is on releasing. Scrumban is mostly used for fast-paced processes like startups and for projects which require a continuous product manufacturing, where the environment around the project changes fast and is dynamic (Reddy, 2016; Yilmaz and O'Connor, 2016).

One of the strength of Scrumban is that can be easily combined with other processes and techniques. It uses for examples Kanban’s capability to integrate a broad variety of models and methods for the visualization and measurement. Organizations which introduce Scrumban have the opportunity to apply the techniques one after another to master the technique step by step. (Reddy, 2016)

### 2.3.3 Extreme Programming

Extreme Programming (XP) was created by 3 authors of the agile manifesto – Kent Beck, Ron Jeffries and Ward Cunningham. It contains several practices which are also now key elements of Scrum. The main values of XP are simplicity, communication, feedback, and courage. It is an approach which was clearly designed for software development projects and is based on 14 principles, 5 values, 13 primary practices and 11 corollary practices which are show in figure 12 (Angioni, et al., 2006):

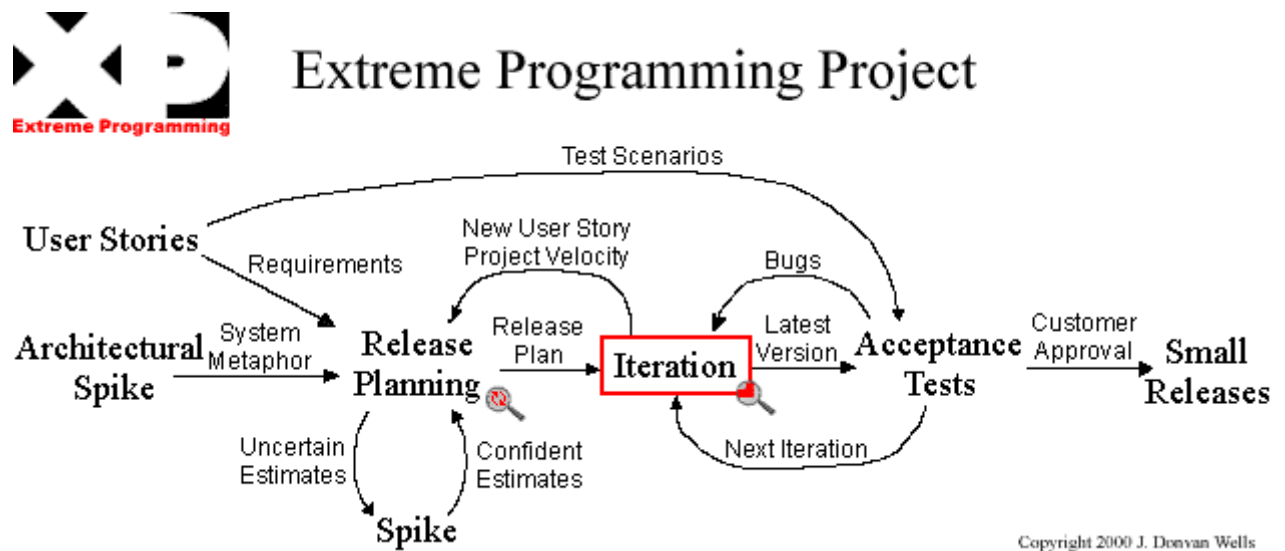
Extreme programming (XP)		
Values	Primary practices	Corollary practices
1 Communication	1 Sit together	1 Real customer involvement
2 Simplicity	2 Whole team	2 Incremental deployment
3 Feedback	3 Informative workspace	3 Team continuity
4 Courage	4 Energized work	4 Shrinking teams
5 Respect	5 Pair programming	5 Root-cause analysis
	6 Stories	6 Shared code
	7 Weekly cycle	7 Code and tests
	8 Quarterly cycle	8 Single code base
	9 Slack	9 Daily deployment
	10 Ten-minute build	10 Negotiated scope contract
	11 Continuous integration	11 Pay-per-use
	12 Test-first programming	
	13 Incremental design	
Principles		
1 Humanity		
2 Economics		
3 Mutual benefit		
4 Self-similarity		
5 Improvement		
6 Diversity		
7 Reflection		
8 Flow		
9 Opportunity		
10 Redundancy		
11 Failure		
12 Quality		
13 Baby steps		
14 Accepted responsibility		

**Figure 12 Values, principles and practices of XP** (Hughes, 2016, p. 18)

The value and principles have a lot in common with the values and principles of the agile manifesto. Communication and human beings are clearly in the focus instead of documentation and processes. The name extreme derives from the fact that XP carries extreme degree to some of the best practices, that are already used in traditional software developing. One example is that if unit testing produces code in higher quality, then it has to be applied to its extremes by writing unit test before

the actual code. In terms of communication this means that a person from the external customer is part of the team to ensure the right level of communication (Angioni, et al., 2006; Wells D. , 2009).

Figure 13 shows the structure of an XP project. The first step is the *architectural spike*. At this step the team creates a first very simple solution for the project goal, which is most of the time a very simplified prototype, to gain a deeper understanding of the project. With the gained insights the team and the customer develop a *system metaphor* which describes the project and the architecture in a way which is already familiar to the team and the customer. Based on this, the *release planning* starts. XP uses user stories to collect the requirements of the customer as well. During the release planning meeting the user stories are sequenced. The release plan defines which user stories will be implemented in which release. In case of unclear estimates during the planning, the team can use spikes again to understand the requirements better and to make confident estimates. Based on the confident estimates and the project velocity the release plan is created (Wells D. , 2009).



**Figure 13 XP Project <http://www.extremeprogramming.org/map/project.html> accessed 16.01.2018**

Based on the release plan the first iteration starts. At the end of the iteration is the current version of the release. This version is checked with the acceptance test, which was predefined in the user stories. In case the customer approves the test, the small release is completed, and the next iteration starts as planned. In case bugs are found, these bugs are added to the tasks of the next iteration and are handled first, similar to Scrum. In case the team recognizes that the project velocity is estimated wrongly, it is possible to go back to the release planning before the start of a new

iteration in order to update the release plan with the new insights about the velocity (Wells D. , 2009).

## **2.4 Research model for the application of project management standards in SMEs**

The following research model is based on the previous findings about the state of the art of project management standards and the specifics of SMEs. The aim of the research model is to investigate which parts of project management SMEs need and to which extend, and in which form they apply it. The model is based on the ten knowledge areas of project management of the PMBOK. The reason for this is, that the PMBOK is one of the most recognized and applied standard in the world. It claims to cover all knowledge fields needed for project management and provides clear definitions and delimitations between the knowledge areas. An additional benefit is, that the names of knowledge area are descriptive also for people who are not familiar with PMBOK. The model incorporates most of the used tools of traditional and agile approaches for each knowledge area in order to examine which tools and techniques are in usage in SMEs, which tools and techniques are considered as useful and which tools and techniques are seen as overhead by project managers of SMEs.

Some of the investigated tools and techniques haven been mentioned in the literature research like the work breakdown structure or the business case for the traditional approach or the peak technique and user stories for the agile approach. Many of the agile tools are chosen directly from the descriptions of Scrum and XP. The traditional tools and techniques are mostly taken form the PMBOK and PRINCE2, because ICB4 is not process based and does not provide explicit tools and techniques. Many of the traditional tools have been already investigated by (Wells H. , 2012). The research was conducted in the field of information technology/ information system projects. However, the size of the companies was no factor of the research.

Wells H. (2012) research contained 70 popular tools and techniques which are discussed in literature. The aspects of his research were the usefulness of present practices and the potential impact of improved practice on project performance. Figure 14 shows the results of his research. Many tools in the list of the highest potential are in the field of organizational learning. This includes databases collecting information from previous problems and lessons learned. All these organizational learning tools have a relative low use in the short-term perspective and need strong organizational support to introduce them. The second field from which several tools are ranked with a potential is risk management. Most of the tools ranked with a very low potential have also a low usage rate, which shows that practitioners do not see a real contribution to the project in comparison to the needed effort.



The second column shows the intrinsic value which is calculated as follows:

$$\text{Present extent of use} + \text{Potential improvement} = \text{Intrinsic value}$$

	POTENTIAL	INTRINSIC VALUE
H I G H E S T	1 Database of lessons learned	PM software for task scheduling
	2 Lesson learned/post-mortem	Progress report
	3 Database of historical data	Scope statement
	4 Risk management documents	Requirements analysis
	5 Requirements analysis	Kick-off meeting
	6 Ranking of risks	Gantt chart
	7 Database of risks	Lesson learned/post-mortem
	8 Scope statement	Change request
	9 Database for cost estimating	PM softwr monitoring schedule
	10 PM softwr monitoring schedule	Work Breakdown Structure
	11 Work Breakdown Structure	Milestone planning
	12 PM softwr for multi-project	Statement of work
	13 Contingency plans	PM softwr resources scheduling
	14 PM softwr resources scheduling	Risk management documents
	15 PM software for task scheduling	Activity list
	16 Team building event	Quality inspection
	17 PM softwr for monitoring cost	Baseline plan
	18 Stakeholders analysis	Contingency plans
	19 Communication plan	Ranking of risks
	20 PM software for cost estimating	Client acceptance form
:	:	:
:	:	:
:	:	:
L O W E S T	56 Top-down estimating	Life Cycle Cost ("LCC")
	57 Self directed work teams	Graphic of risk information
	58 Learning curve	Parametric estimating
	59 Work authorization	Learning curve
	60 Trend chart or S-Curve	Quality function deployment
	61 Network diagram	Value analysis
	62 PERT Analysis	Trend chart or S-Curve
	63 Control charts	Critical chain method & analysis
	64 Bid documents	Control charts
	65 Bid/seller evaluation	PERT Analysis
	66 Decision tree	Cause and effect diagram
67 Cause and effect diagram	PM software for simulation	
68 Pareto diagram	Pareto diagram	
69 Bidders conferences	Decision tree	
70 Monte-Carlo analysis	Monte-Carlo analysis	

**Figure 14 Potential and intrinsic value of project management tools** (Wells H. , 2012)

The results of the intrinsic value were used to classify the tools in four categories which are shown in table 3. The first category super tools comprises two different groups of tools. The first group are tools with the most extensively use and those with the greatest potential for increased contribution to project performance. Despite the extensive use, there is still a large potential for an increased contribution to project performance when these tools are applied more and in a better way.

These tools are marked italic in the table. The second group of super tools are tool which show a very high score for use but not a high score for potential improvement. These tools are valuable to project management, but they are already used with their full potential (Wells H. , 2012).

Table 3 Project management tool evaluation

<b>Super Tools</b>	<b>Discredited Tools</b>	<b>Adequately Utilized Tools</b>	<b>Under-utilized Tools</b>
<i>Software for task scheduling</i>	Monte-Carlo	Activity list	Database of lessons learned
<i>Scope statement</i>	Decision tree analysis	Gantt chart	Database of historical data
<i>Requirements analysis</i>	Pareto diagram	Work authorization	Database of risks
<i>Lessons learned</i>	Cause and effect diagram	Self-directed work teams	Database of cost estimating
Progress report	Project management software for simulation	Top-down estimating	Project management software for
Kick-off meeting	Critical chain	Bid documents	Project management software for
Gantt char	Value analysis	Client acceptance form	Project management software for
Change request	Quality function deployment		Project management software for
			Project management software for
			Earned Value
			Feasibility study
			Stakeholder analysis
			Configuration review
			Graphic presentation of risk information

The discredited tools are the tools with the lowest intrinsic value, so they are rarely used and perceived as having very little potential. Organizations should strongly consider if it is beneficial to apply these tools. Even though, all tools are rarely used, some of them are considered to have some potential (Wells H. , 2012).

The group of adequately utilized tools are tools with are considerable high usage, but are considered to have no or no desirable potential for improvement. These tools are well understood and were reported as satisfactory. Organization, which apply these tools should continue and organization which do not apply these tools regularly might consider adopting them (Wells H. , 2012).

The last group are the under-utilized tools which are rarely used now but have a considerable high potential to contribute to improved performance. These tools can be considered as potential

investments and development opportunities. For introducing these tools project managers need organizational commitment and support (Wells H. , 2012).

Table 4 shows the final research model. All super tools according to (Wells H. , 2012) are incorporated. Most of the tools, which are considered to have to highest potential were used as well. As Wells H. (2012) conducted his research for project management in general, the aim of this model is to investigate if project managers of SMEs have the same selection or if they see the tools differently because of the special environment of SMEs.

Table 4 Research model

<b>Knowledge Area</b>	<b>Traditional tools and techniques</b>	<b>Agile tools and techniques</b>
<b>Integration Management</b>	<ul style="list-style-type: none"> <li>- Project Charter</li> <li>- Business Case</li> <li>- Feasibility study</li> <li>- Lessons Learned</li> <li>- Change request process</li> </ul>	<ul style="list-style-type: none"> <li>- Continuous integration</li> <li>- Sprint/Project retrospective</li> <li>- System metaphor / Project brief</li> </ul>
<b>Scope Management</b>	<ul style="list-style-type: none"> <li>- Work Breakdown structure</li> <li>- Stage gates</li> <li>- Requirement Documentation</li> <li>- Trend analysis</li> <li>- Variance analysis</li> <li>- Software for task scheduling</li> </ul>	<ul style="list-style-type: none"> <li>- User stories</li> <li>- Product Backlog</li> <li>- Release plan</li> <li>- Scope statement</li> </ul>
<b>Time Management</b>	<ul style="list-style-type: none"> <li>- Critical path method</li> <li>- Bar/Gant chart</li> <li>- Earned Value Management</li> <li>- Milestones</li> <li>- Monte Carlo simulation</li> <li>- PERT</li> </ul>	<ul style="list-style-type: none"> <li>- Sprints</li> <li>- Planning games</li> <li>- Spike</li> </ul>
<b>Cost Management</b>	<ul style="list-style-type: none"> <li>- Earned Value Management</li> <li>- Three Point Estimation</li> <li>- Lessons learned register</li> <li>- Monte Carlo simulation</li> <li>- Estimation database</li> </ul>	<ul style="list-style-type: none"> <li>- Agile Earned Value Management</li> <li>- Cost per Sprint</li> </ul>
<b>Quality Management</b>	<ul style="list-style-type: none"> <li>- Quality Metrics</li> <li>- Test and inspection planning</li> <li>- Cause-effect diagram</li> <li>- FMEA</li> <li>- Quality Register</li> </ul>	<ul style="list-style-type: none"> <li>- Customer approval</li> <li>- Automated tests</li> <li>- Daily meeting</li> <li>- Retrospective</li> <li>- Test driven development</li> </ul>
<b>Resource Management</b>	<ul style="list-style-type: none"> <li>- RACI/RASCI Matrix</li> <li>- Project organization chart</li> <li>- Team charter</li> <li>- Resource calendar</li> <li>- Resource Histogram</li> </ul>	<ul style="list-style-type: none"> <li>- Team velocity</li> <li>- 100% dedication to one project</li> <li>- Cross-functional teams</li> </ul>
<b>Communication Management</b>	<ul style="list-style-type: none"> <li>- Communication Plan</li> <li>- Kick-off meeting</li> </ul>	<ul style="list-style-type: none"> <li>- Daily stand up</li> <li>- Close allocation</li> </ul>
<b>Risk Management</b>	<ul style="list-style-type: none"> <li>- Risk Register</li> <li>- Risk Score</li> <li>- Risk Response Plan</li> <li>- Monte Carlos Simulation</li> <li>- Risk database</li> </ul>	<ul style="list-style-type: none"> <li>- Planning game</li> <li>- Simple Risk Register</li> <li>- Risk burndown chart</li> <li>- Brainstorming</li> </ul>
<b>Procurement Management</b>	<ul style="list-style-type: none"> <li>- Procurement Plan</li> <li>- Long and Short lists</li> <li>- Statement of Work</li> </ul>	<ul style="list-style-type: none"> <li>- Performance commitment</li> </ul>
<b>Stakeholder Management</b>	<ul style="list-style-type: none"> <li>- Stakeholder Register</li> <li>- Stakeholder Matrix</li> <li>- Stakeholder Engagement Plan</li> </ul>	<ul style="list-style-type: none"> <li>- Stakeholder representative in side of the team</li> <li>- Daily stand up</li> </ul>

In order to reach the research goals of this thesis the model has basically three dimensions. The ten knowledge areas are the first dimension. This dimension can be used to examine which knowledge areas are seen as crucial and which are not mandatory for project success. The second dimension is agile versus traditional management. It is possible to investigate for the overall project as well as for every single knowledge area whether project managers prefer an agile or a traditional approach. The third dimension are the single tools and techniques. The aim of the model is to have a categorization of the tools and techniques similar to the results of (Wells H. , 2012).

*In conclusion, after the analysis of the theoretical background it is clear that there are in general with the traditional and agile approach two different approaches for managing projects. Both of them have plenty of different methodologies which provide different tools and techniques. As SMEs are not capable of applying them to the highest possible extent, it is necessary to investigate which tools are the most beneficial ones. For this reason, an own research model was created.*

### 3 RESEARCH METHODOLOGY

In order to reach to objectives of this thesis, it is necessary to not only apply literature research, but also to conduct empirical research. The scientific research offered a general insight on the importance of structured project management, the current state of the art of project management standards, and the special needs and challenges for SMEs. The empirical research in combination with the presented research model is applied to gain further insides from the industry point of view.

The main finding of literature research regarding the application of project management standards was that the usage of organized project management causes financial benefit for the organization. It also increases the chance of project success, the quality of the project, and the results of the project. The most popular way for organized project management is applying or adapting a project management standard. There are two different kind of standards, traditional and agile. While the traditional approach focuses on heavy planning before the project and following the plan during the project, the agile approach is more open to change and run the project by small planned iteration. The analysis of SMEs showed that project management is very important for the business success but most of the SMEs do not apply professional project management because of a lack of knowledge and resources. For this reason, SMEs need a light version of project management, that is manageable with the given resources but still provides clear benefits for the enterprises.

The main **goal** of the research is to figure out which parts of project management SMEs see as crucial and in which way they can be applied.

To reach this goal, an empirical research, based on the previous findings and the resulted research model, will be conducted. It will be a quantitative research in form of two online surveys. Quantitative research is recognized as specific, well-structured and explicitly defined. Quantitative studies have a clear distinction between design and methods of data collection (Kumar, 2011). The surveys will be designed according to the model presented in figure 15.



**Figure 15 Survey Process designed according to** (*University of Wisconsin Office of Quality Improvement, 2010*)

During the first step, the goals and the target audience for the survey needs to be defined (University of Wisconsin Office of Quality Improvement, 2010). The target audience for the first survey are project managers inside of SMEs. The goal for the first survey is to investigate which parts of project management project managers apply at the moment and which they consider as useful to apply. Furthermore, the goal is to explore if project managers would prefer agile or traditional tools for every field of project management. The audience for the second survey, which will be very similar but on a higher level, are project team members in SMEs. The goal for the second survey is to investigate which parts of project management the project team members consider as important and how pleased they are with the application inside their organizations.

The second step is about the design of the questions. The questions should be designed in simple language and not use any abbreviations (University of Wisconsin Office of Quality Improvement, 2010). The questions of both surveys will be closed questions, which are questions with provided answers. The answers will be rated answers like very unimportant to very important in five steps. The order of the questions will follow the research model and go from general to more specific. All questions will be formulated in English and German language, in order to increase the number of respondents, by providing, at least for the German respondents, the questions and answers in their mother tongue.

The test and train step aims to validate that the surveys are free of mistakes and clear to understand (University of Wisconsin Office of Quality Improvement, 2010). To assure the quality of the surveys both of them will be given to small sample groups. This will be repeated until the sample groups for both surveys confirm that the surveys are free of mistakes and clear to understand.

Collecting data is about assuring a response rate as high as possible (University of Wisconsin Office of Quality Improvement, 2010). The suggested time window for the surveys is seven to ten days and afterwards sending a reminder. The surveys will be provided online in order to give the employees the possibility to choose where and when they want to participate.

The last step focusses on how to analyze the collected data. Important questions are how to handle incomplete surveys and whether questions are weighted or not (University of Wisconsin Office of Quality Improvement, 2010). In both surveys the scaled answers will be converted into numerical values for an easier and more efficient analysis. All answer will have the same weight. Incomplete surveys will be ignored to keep the answers comparable.

## **4 RESEARCH FINDINGS AND DISCUSSIONS**

In this chapter the results of the empirical research will be analyzed. In order to reach the objectives of this thesis the results of the two surveys (appendix 1 and appendix 2) will be evaluated. Based on the results of this evaluations, a guideline for SMEs for applying project management methods and tools will be presented. This guideline should help SMEs to decide which methods and tools they want to apply in order to improve their project management and to have a more standardized project management approach.

### **4.1 Research findings**

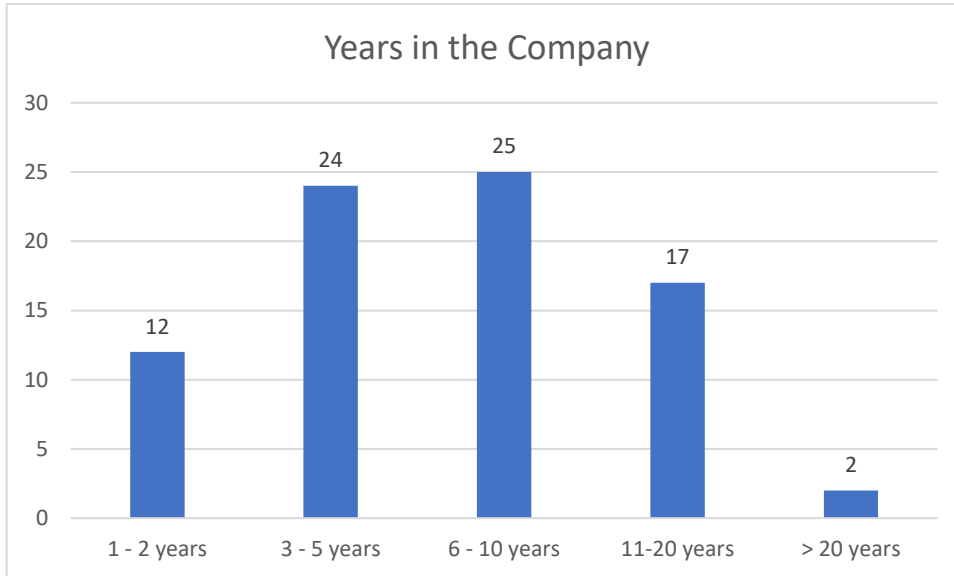
The empirical research was conducted in a German and a Lithuanian IT company. The amount of responses on the survey for team members was 54 which was higher than expected. Additionally, 26 project managers filled the survey designed for them, which exceeded the expectations as well. Unfortunately, there were only one response on the survey for team members and two responses on the survey for project managers from Lithuania. Therefore, the results of the surveys are clearly dominated by the German participants. The share of German answers for the survey for team members is with 98.1% even higher than the share of 92.3% for the survey for project managers. For this reason, the following analysis of the results will focus on the combined results only. The results for the single countries will be also displayed but not compared, because the amount of replies from Lithuania are too less to be representative.

#### **4.1.1 Shared Questions**

As the first step of the analysis, the shared questions of both surveys are analyzed. The result is composed of 80 responses. As previously mentioned, 77 out of the 80 responses are from Germany and there are only three responses from Lithuania. Therefore, the results are dominated by the employees of the German company. The surveys were distributed to all seventeen branches of the German company. The branches are located in Germany (13), Austria (3), and Switzerland (1). The single branches are relatively autonomous in the way how they run projects. The fact that there is no strict project management model makes the results more representative.

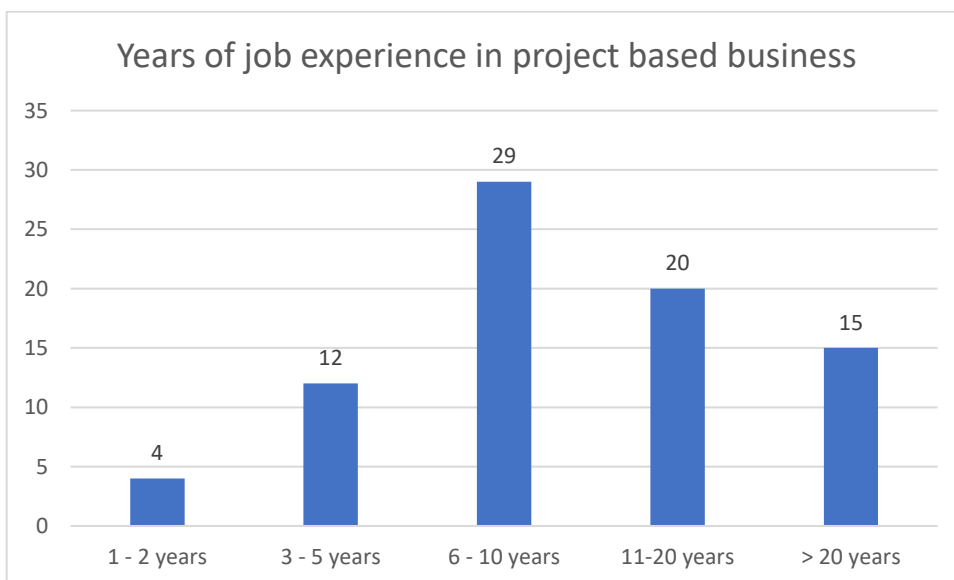
Figure 16 shows how many years the respondents are working in their current company. Most of the respondents work between three and twenty years for their current company. They are familiar with the project management inside the company and able to judge the performance.





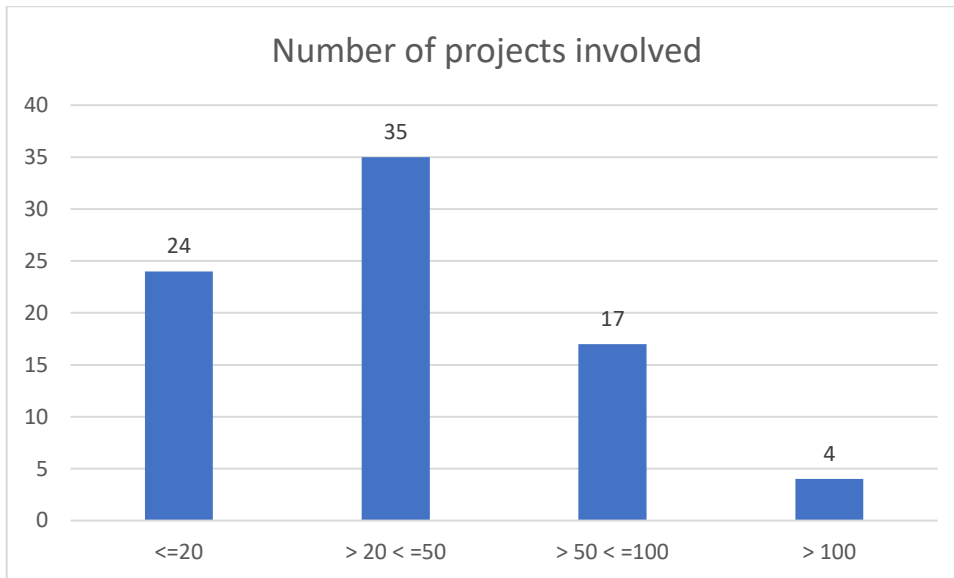
**Figure 16 Years in the company of total respondents**

Figure 17 underlines the experience of the respondents as well. Most of them are working for at least six years in the project based business. The fact that the respondents work in average more years in the project based business than in their current companies proofs that they worked in other project based businesses before and are able to judge the performance of their current company as well as the importance of project management in general.



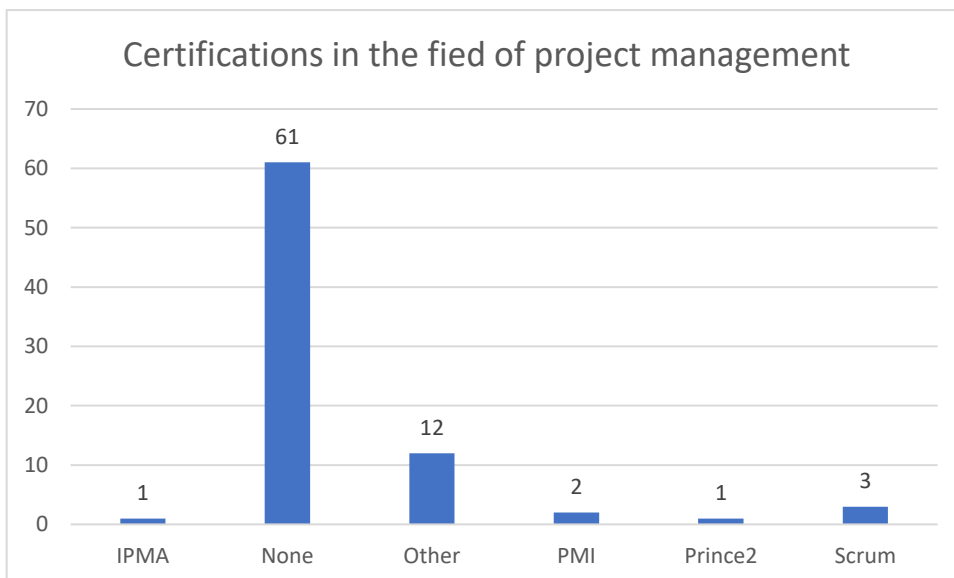
**Figure 17 Years of experience in project based business of total respondents**

The number of projects in which the respondents has been involved, which is shown in figure 18, shows the experience of the respondents as well. Most of the respondents were in at least 20 projects involved and 21 respondents has been involved even in over 50 projects during their job experience.



**Figure 18 Number of projects involved of total respondents**

Figure 19 shows the certifications in the field of projects management. Only 19 respondents are certified for their project management skills. This fits to the results of chapter 1.1, that most SMEs do not employ project management experts. One interesting result is, that all three Lithuanians respondents are certified but only 16 out of the 77 German respondents. A higher number of Lithuanian responds is needed to clarify whether this is a coincidence or a trend.



**Figure 19 Certifications in the field of project management of total respondents**

The respondents were asked to rate the performance of their company for every knowledge area defined by PMBOK on a scale from 1 (very bad) to 5 (very good). They should also rate the importance of every knowledge area for the overall project success of the company on the same scale. The questions were identical in the survey for project team members and in the survey for

project managers. The first aim of these questions was to analyze whether there is a difference between the perception of project managers und project team members. The second aim was to get an impression which knowledge areas were seen as most important. Based on this result SMEs can dedicate most of their limited resources to the crucial knowledge areas. The third aim of these questions is to analyze the overall performance of the companies in every knowledge area in order to decide in which knowledge areas improvements are necessary. Table 5 presents the results of the questions regarding the company performance in every knowledge area. The results are presented for both countries as well as combined in totals. They are also presented for team members and project managers in every country as well as a combined result for team members and project managers.

Table 5 Results company performance for every knowledge areas

Knowledge Area	Germany			Lithuania			Total		
	Team Member (TM)	Project Manager (PM)	Combined (C)	TM	PM	C	TM	PM	C
<b>Integration Management</b>	3,36	3.67	3.45	4.00	3.50	3.67	3.37	3.65	3.46
<b>Scope Management</b>	3.43	3.75	3.52	3.00	4.50	4.00	3.43	3.81	3.55
<b>Time Management</b>	3.15	3.33	3.21	4.00	4.50	4.33	3.17	3.42	3.25
<b>Cost Management</b>	3.36	3.5	3.40	5.00	4.50	4.67	3.39	3.58	3.45
<b>Quality Management</b>	3.17	3.33	3.22	5.00	4.00	4.33	3.20	3.38	3.26
<b>Resource Management</b>	3.21	3.08	3.17	4.00	3.50	3.67	3.22	3.12	3.19
<b>Communication Management</b>	3.21	3.29	3.23	5.00	4.00	4.33	3.24	3.37	3.28
<b>Risk Management</b>	3.06	2.86	3.00	5.00	3.50	4.00	3.09	2.92	3.04
<b>Procurement Management</b>	3.45	3.38	3.43	3.00	3.50	3.33	3.44	3.38	3.43
<b>Stakeholder Management</b>	3.36	3.21	3.31	4.00	4.50	4.33	3.37	3.31	3.35

According to the respondents, their companies perform the best in the knowledge areas Scope Management (3.55), Integration Management (3.46), and Cost Management (3.45). The knowledge areas with the worst performance are Risk Management (3.04), Resource Management (3.19), and Time Management (3.25). One interesting result is, that the two top knowledge areas are also the two knowledge areas with the biggest difference in the perception of project managers and team members. Project Managers rate the performance in the field of Scope Management with 3.81 meanwhile the team members rate it with just 3.43. The difference in Integration Management where

project managers rate 3.65 and team members rate 3.37 and Time Management where the score of project managers is 3.42 and the score for team members is only 3.17.

There are also four knowledge areas where the team members see their companies performing better than the project managers. The difference for Procurement Management and Stakeholder Management (both 0.06 difference) and Resource Management (0.10 difference) is just minimal. Only for Risk Management (0.17 difference) the team members see the company performing clearly better than the project managers. In general, it can be said, that both sides rate the performance of knowledge areas better where they are not so strong affected by. For example, team members are more affected in their daily work by poor performance in Scope Management or Time Management than by a poor performance in Stakeholder Management.

Table 6 presents the results for the question regarding the importance of every knowledge for the overall project success. The structure is identical to the structure of table 5. It shows the results separated for both countries as well as for the groups of team members and project managers.

Table 6 Results regarding importance of every knowledge area for overall project success

Knowledge Area	Germany			Lithuania			Total		
	Team Member (TM)	Project Manager (PM)	Combined (C)	TM	PM	C	TM	PM	C
<b>Integration Management</b>	3.87	4.08	3.94	5.00	4.00	4.33	3.89	4.08	3.95
<b>Scope Management</b>	4.22	4.625	4.35	4.00	5.00	4.67	4.22	4.65	4.36
<b>Time Management</b>	3.83	4.42	4.01	5.00	5.00	5.00	3.85	4.46	4.05
<b>Cost Management</b>	3.91	4.42	4.07	5.00	4.00	4.33	3.93	4.38	4.08
<b>Quality Management</b>	4.42	4.67	4.49	5.00	4.50	4.67	4.43	4.65	4.50
<b>Resource Management</b>	4.08	3.96	4.04	4.00	5.00	4.67	4.07	4.04	4.06
<b>Communication Management</b>	4.08	4.48	4.19	5.00	5.00	5.00	4.09	4.50	4.23
<b>Risk Management</b>	3.96	4.08	4.00	5.00	4.00	4.33	3.98	4.08	4.01
<b>Procurement Management</b>	3.42	3.54	3.45	3.00	4.00	3.67	3.41	3.58	3.46
<b>Stakeholder Management</b>	3.47	4.17	4.20	4.00	4.50	4.33	3.48	4.20	3.71

The respondents rated Quality Management (4.50), Scope Management (4.36), and Communication Management (4.23) as the most important knowledge areas for the project success. With Scope Management and Quality Management, there are two out of the four typical aspects of the so called “iron triangle” of project management on the first two spots rated. The other aspects Time Management and Cost Management are rated as fourth and sixth important knowledge area for the project success. The three less important rated knowledge areas are Procurement Management (3.46), Stakeholder Management (3.71) and Integration Management (3.95). One reason for the low rating of Procurement Management might be, that all respondents come for the IT industry, where procurement in general is not as important as for example in the construction industry.

The comparison between the rating of team members and project managers shows, that for nine out of ten knowledge areas, the project managers rated the single knowledge areas more important than the team members. The only knowledge area where the team members rated the importance higher than the project managers is Resource Management. A reason for this might be again, that the team members are directly affected by the composition of the team as well as by the qualification development. The biggest difference in the perception of team members and project managers is regarding Stakeholder Management with a difference between the ratings of 0.72. Most likely the reason for this is the fact that project managers has to work and interact a lot with stakeholders during the execution of the project, while team members do not have a lot of contact with external stakeholders. There is also a big difference in the ratings for Time Management (0.61 difference), Cost Management (0.45) and Scope Management (0.43). These three knowledge areas represent, as previous mentioned. the “iron triangle” and represent in the end the metrics with whom the performance of project managers is measured.

Table 7 compares the combined ratings of team members and project managers for every knowledge area regarding the current performance of their companies and regarding the importance for the project success.

There is no knowledge area which has the same rating for both questions. This indicates that the companies should analyze the current performances and the effort they invest in it. They might consider reducing some effort in fields which are not seen as important as others, in order to improve areas, which are rated as important for the project success but with a bad performance in the moment. This is especially important taking into account the limited resource situation of SMEs.

Table 7 Comparison between the ratings for the current company performance and the importance for project success

<b>Rating</b>	<b>Current performance of the company</b>	<b>Importance for project success</b>
<b>1.</b>	Scope Management	Quality Management
<b>2.</b>	Integration Management	Scope Management
<b>3.</b>	Cost Management	Communication Management
<b>4.</b>	Procurement Management	Cost Management
<b>5.</b>	Stakeholder Management	Resource Management
<b>6.</b>	Communication Management	Time Management
<b>7.</b>	Quality Management	Risk Management
<b>8.</b>	Time Management	Integration Management
<b>9.</b>	Resource Management	Stakeholder Management
<b>10.</b>	Risk Management	Procurement Management

The most critical knowledge area for these results is Quality Management. It was ranked by the respondents as the most important knowledge area for the project success but it is only ranked as seventh best performing knowledge area. The companies need to analyze what they are doing in the field of quality management and consider new methods and tools in order to improve their performance. The situation is similar for Communication Management and Resource Management. As well as for Quality Management, the companies need to consider new ways in order to improve their performance and to increase the success rate of their projects. One positive result is the rating for Scope Management. The combined results of project managers and team member rate Scope Management as the knowledge area where the companies perform the best and rate it as the second most important knowledge area for the project success. The companies do not need to put any extra effort here. They can only try to improve the things they are doing already to perform even better than before. The same applies for Integration Management and Procurement Management. Both are rated as not so important for the project success and the current performance is already good.

The results are also important for the further analysis of the results of the survey for project managers. For knowledge areas where the performance is rated good, it will be analyzed which, methods and tools are applied there as well as for knowledge areas where the performance is rated bad, which tools might be applied here, in order to improve the company performance.

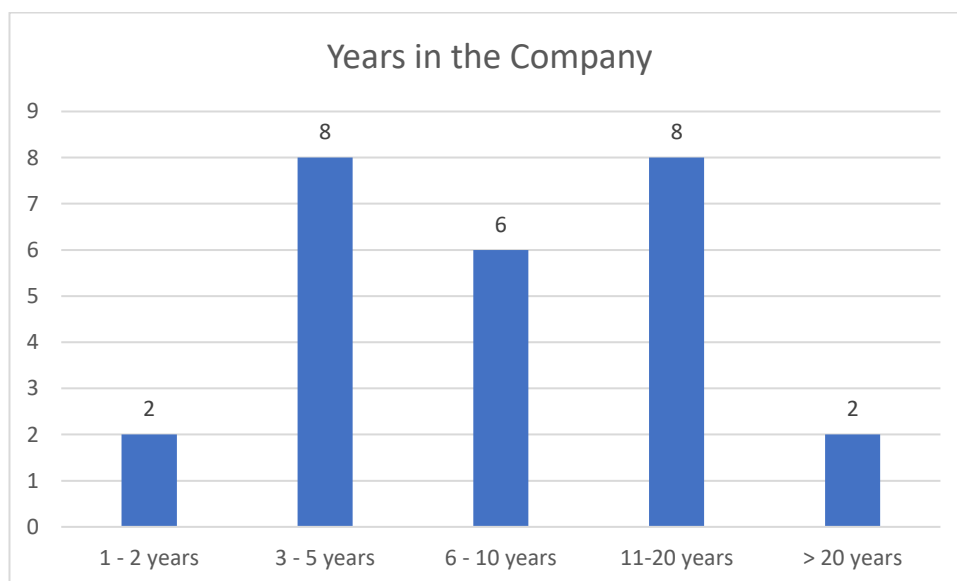
*To conclude, the combined results of both surveys showed, that there are some knowledge areas where the companies perform well already, like Scope and Cost Management, but that there are also some where is room for improvement, especially for Risk and Resource Management. Even bigger are the differences in the rating of the importance of the single knowledge areas for the overall project success. The results show that the four knowledge areas which are directly linked to the “iron triangle” plus Communication Management and Resource Management are seen as the most important ones for the project success. SMEs should invest their limited resources especially in*

*this fields of project management, in order to increase their project performances and the success rate of their projects.*

#### **4.1.2 Project Manager survey**

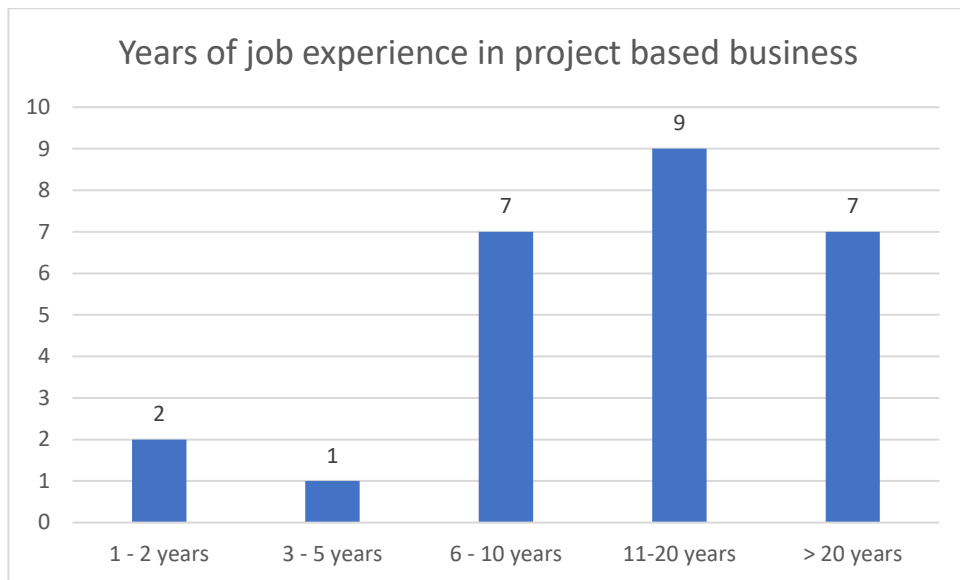
Beside the shared questions, which has been analyzed in the previous chapter, the survey for project managers included also questions whether they prefer an agile or a traditional approach for each knowledge area. Furthermore, the project managers where asked to rate the usefulness of all 74 methods and tools, which are listed in the research model, and to state whether they use the methods and tools or not. As previous mentioned, 26 project managers replied on the survey. Only two respondents are from Lithuania, what leads again to the fact, that the results are dominated by the respondents from Germany. Because the number of respondents from Lithuania is too small for a comparison between both countries, only the combined results are analyzed.

Figure 20 shows that most of the project managers are also working over 5 years in their companies and know exactly how projects are managed inside of the company. 10 out of 26 are even working at least 11 years in the company.



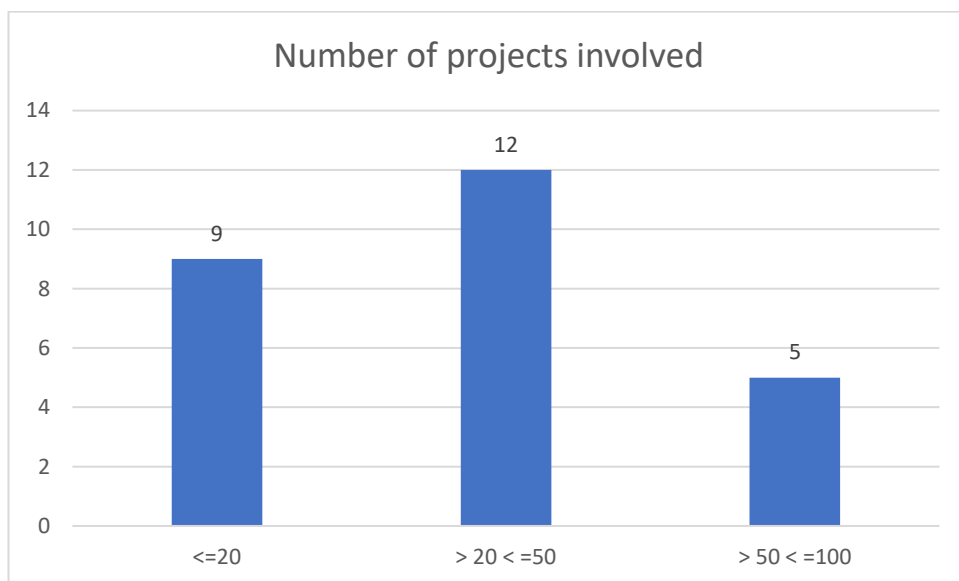
**Figure 20 Years in the company of project managers**

Figure 21 shows that, similar to the overall respondents, the projects managers work in average more years in project based business than in the current company. Therefore, the project managers might have collected experiences as well with methods and tools which are not applied in their current company.



**Figure 21 Years of job experience in project based business of project managers**

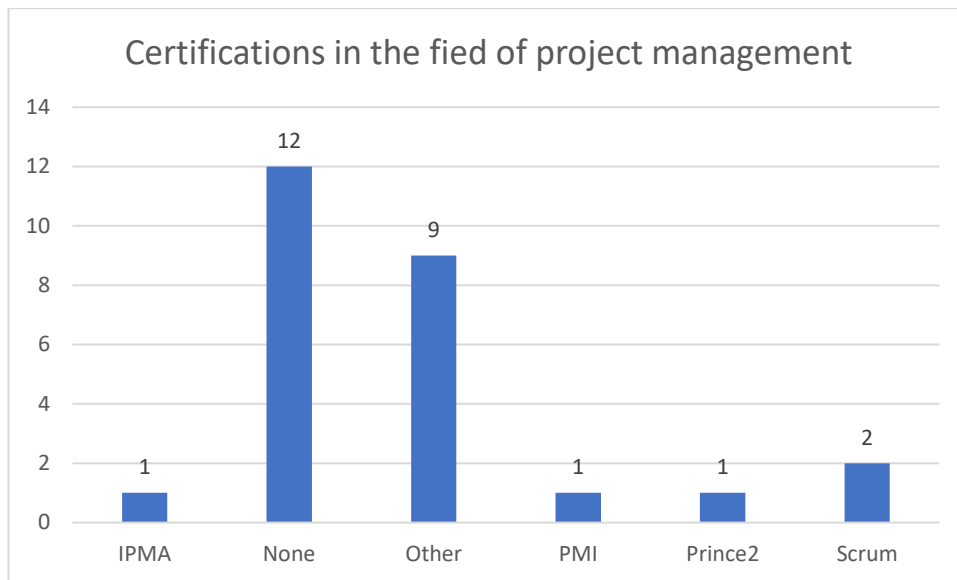
This experience is also expressed in Figure 22, 17 out of 26 project managers were at least in 20 projects involved. As projects are by definition unique, they were able to gather experience with different requirements and to handle projects in different environments.



**Figure 22 Number of involved projects of project managers**

Figure 23 compares the certifications in the field of project management of the project managers. Even for the project managers, most of the respondents stated that they have no certificate in the field of projects management.

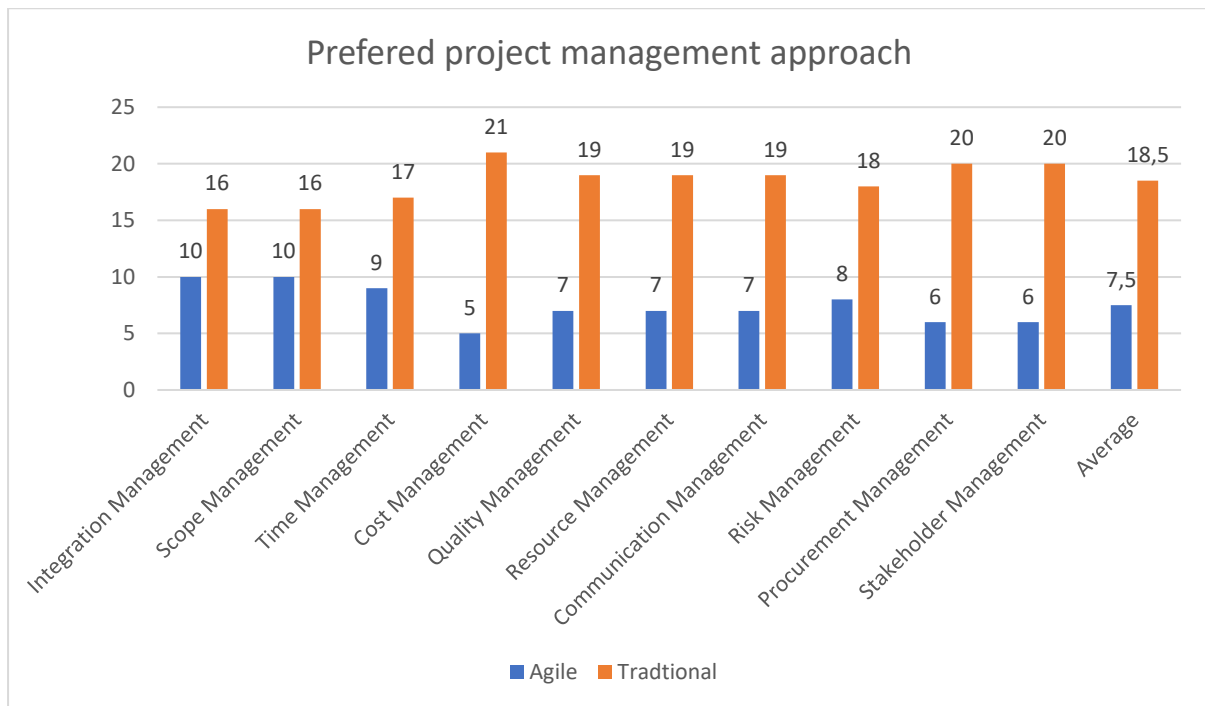




**Figure 23 Certifications in the field of project management of project managers**

As second most popular answer, 9 out of 26 project managers stated that they have a certificate that was not listed. Only three project managers have certificates from the big institution for traditional project management (IPMA, PMI, and PRINCE2). One reason for this might be, that the certificates are costly and are maybe not seen beneficial for the daily business. Additionally, two project managers have a Scrum certificate. It was not possible to select more than one answer. Therefore, it is possible, that one of the certified project managers has more than one certificate.

Figure 24 displays the first specific questions only for project managers. For every knowledge area they were asked to state weather they prefer in general an agile or a traditional approach for managing this knowledge area. For every knowledge area the project managers prefer in general a traditional approach. One main reason for this might be, that the German company runs their projects in general with a traditional approach. Some of the project managers might do not really know how agile project management works and which advantages it offers. In average 7.5 out of the 26 projects managers chose the agile approach, which shows that agile is at least for some project managers familiar and that they prefer it even though the company usually runs projects with a traditional approach.



**Figure 24 Prefer project management approach for each knowledge area**

The most popular knowledge areas for applying agile techniques are Integration Management and Scope Management. For both knowledge areas, ten project managers stated that they would prefer generally an agile approach. Additionally, Time Management reached a score over average for the application of an agile approach. These three knowledge areas are typically linked to the advantages to agile approaches like easy integration of the different project aspects and a flexible handling of scope and time. It is a bit surprising, that Communication Management and Stakeholder Management did not reach similar scores, as they are also typical strength of agile approaches. Stakeholder Management is even one of the three lowest rated knowledge areas for an agile approach. The other two are Cost Management and Procurement Management, which are in general not typical fields of agile approaches. In these fields at least 80% percent of the project managers rely on traditional approaches where things are planned before. As well for Quality Management, which was ranked as to most important knowledge area for project success, around 75% percent of the project managers prefer in general a traditional approach.

*Summarized, it can be said, that the project managers prefer to use traditional approaches to run their projects. But there are projects managers who prefer agile approaches as well. Additionally, most of the project managers did not choose traditional or agile for all knowledge areas. Therefore, the following analysis of project management tools and methods will analyze the traditional as well as the agile methods of the research model. As there are many possibilities to combine agile and traditional tools and methods, the tools and methods will be analyzed together and not separated.*

### 4.1.3 Analysis of project management methods and tools

The project managers were asked to rate all the 74 methods and tools listed in the research model regarding their usefulness and whether they use them or not at the moment. For the question regarding the usefulness the project managers had the options to answer as follows: “Not known”, “Not useful”, “Partly useful”, and “Useful”. The possible answers for the second question regarding the usage were: “Not known”, “Not used”, “Partly used” and “In usage”.

Table 8 shows the top ten methods and tools regarding their usefulness. In order to create a ranking, the answers “Not known” was rated with zero points. For the answer “Not useful” the rating was minus two points. The answer “Partly useful” is rated with one point and the answer “useful” with two points. The number of times the answer was chosen was multiplied with the score and summed up to a final score.

Table 8 Top 10 useful methods and tools

<b>Method and Tools</b>	<b>Knowledge Area</b>
1. Work Breakdown structure	Scope Management
2. Kick-off meeting	Communication Management
3. Requirement Documentation	Scope Management
4. Change request process	Integration Management
5. Milestones	Time Management
6. Project Charter	Integration Management
7. Customer approval	Resource Management
8. Resource calendar	Quality Management
9. Project organization chart	Resource Management
10. Test and inspection planning	Quality Management

With work breakdown structure and requirement documentation, two of the top three methods and tools are part of Scope Management. In general, the top five methods and tools, beside the change request process, are all simple and basic methods and tools of project management. This is in line with the previous research findings, that SMEs need especially methods and tools which are easy to apply and do not need a large effort. The top ten methods and tools are part of six different knowledge areas. Only from the knowledge areas Scope Management, Integration Management, Quality Management and Resource Management, two methods and tools were selected. With Scope Management and Quality Management the two knowledge areas, which are considered to be most important for project success, are represented by two methods and tools. This underlines the importance of these knowledge areas for the project success.

Table 9 shows the ten methods and tools with the lowest score regarding their usefulness. The Monte Carlo simulation was rated as the most useless tool. It was named in all three different fields

of application. As the Monte Carlo simulation requires a lot of effort, it fits to research findings that project managers of SMEs see this kind of methods and tools critical.

Table 9 Top 10 useless methods and tools

<b>Method and Tools</b>	<b>Knowledge Area</b>
1. Planning games	Time Management
2. Monte Carlo simulation	Cost Management
3. Spike	Time Management
4. PERT	Time Management
5. Monte Carlo simulation	Time Management
6. Monte Carlo simulation	Risk Management
7. Resource Histogram	Resource Management
8. Quality Register	Quality Management
9. Agile Earned Value Management	Cost Management
10. Trend analysis	Time Management

Other tools that require a relatively high effort to apply them, like PERT or Agile Earned Value Management, were ranked on the last places regarding their usefulness as well. In terms of the knowledge areas the result for the most useless methods and tools is more significant than for the most useful methods and tools. Five out of the last ten methods and tools are part of Time Management, a knowledge area which was rated as not very important for the project success.

Table 10 displays the top ten methods and tools with the highest score for usage. The score was calculated similar to the score regarding the usefulness of the methods and tools. The answers “Not known” was rated with zero points. For the answer “Not used” the rating was minus two points. The answer “Partly used” was rated with one point and the answer “In usage” with two points. The number of times the answer was chosen was multiplied with the score and summed up to a final score.

Table 10 Top 10 used methods and tools

<b>Method and Tools</b>	<b>Knowledge Area</b>
Change request process	Integration Management
Work Breakdown structure	Scope Management
Project Charter	Integration Management
Kick-off meeting	Communication Management
Resource calendar	Resource Management
Requirement Documentation	Scope Management
Milestones	Time Management
Project organization chart	Resource Management
Customer approval	Quality Management
Test and inspection planning	Communication Management

All of the ten chosen methods and tools are as well in the top ten list regarding their usefulness, just in a slightly different order. This shows, that there is a clear connection between the two answers. One possible reason is that the project managers apply particularly the methods and tools, they consider to be the most useful methods and tools, in order to use their given time as efficient as possible. Another possible reason is that the project managers rated the methods and tools as useful, which they already use and they are not really aware of possible benefits of other methods and tools, which they do not use at the moment.

Table 11 shows the ten methods and tools which are used the least. Here are only three tools similar to the ones in the list of the most useless tools. One reason for this might be that five of the ten methods and tools are from agile approaches. As most of the respondents work with the traditional approach, it is unlikely that they use a lot of agile tools in combination with their traditional approach. Another reason for the differences is that sometimes respondents selected for the methods and tools, that they don't know whether they are useful or not, but selected that they do not use them.

Table 11 Top 10 least used methods and tools

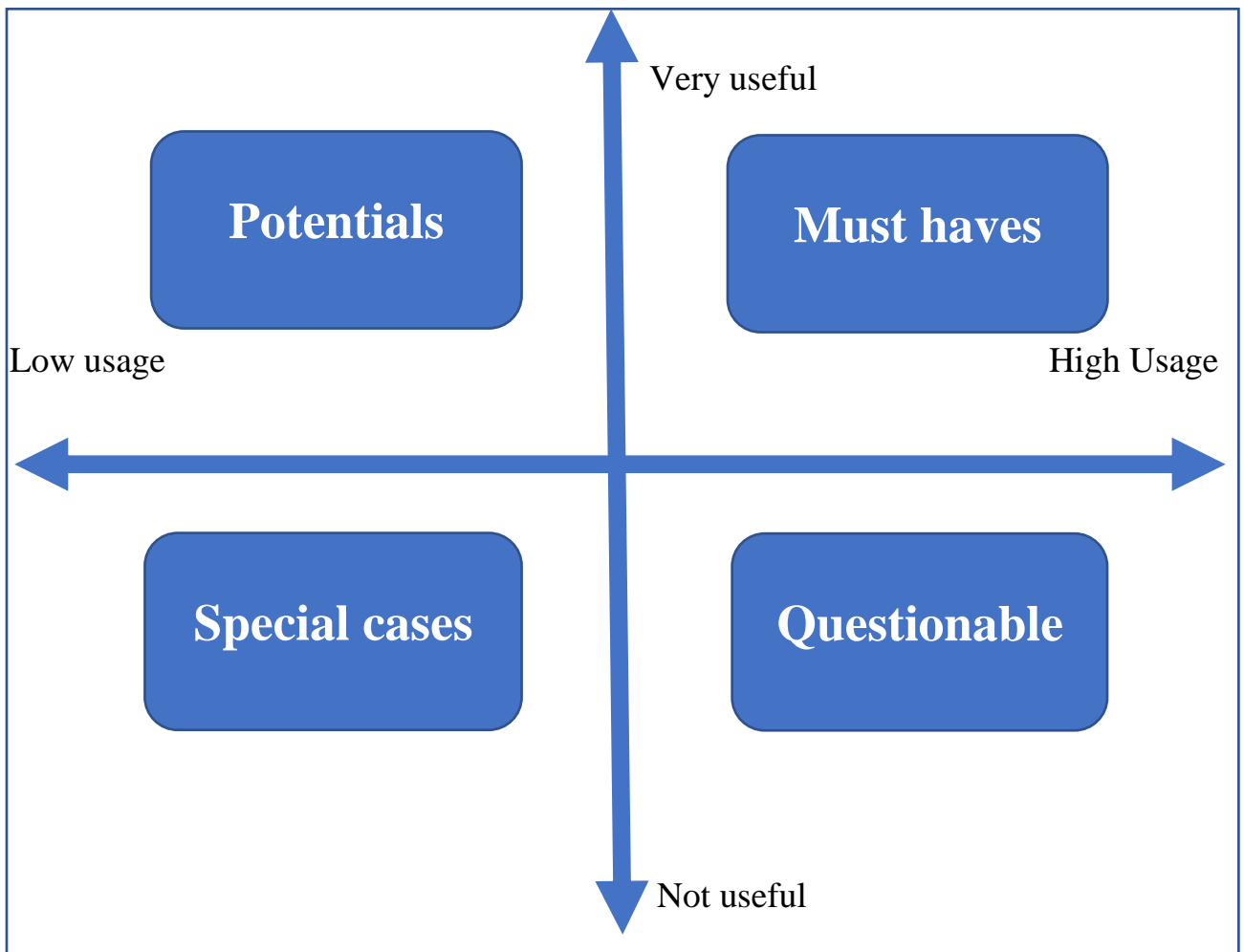
<b>Method and Tools</b>	<b>Knowledge Area</b>
Planning games	Risk Management
Agile Earned Value Management	Time Management
Risk database	Risk Management
Earned Value Management	Time Management
Cost per sprint	Cost Management
Planning games	Time Management
Risk burndown chart	Risk Management
Team velocity	Resource Management
Monte Carlo simulation	Cost Management
Simple Risk Register	Risk Management

*All in all, there is a strong connection between the tools and methods which the project managers consider as the most useful ones and the methods and tool which the project managers apply the most. The exact reason for this connection needs to elaborate in further research. Furthermore, it needs to be stated, that there are around twenty tools which at least 10 of the 26 project managers did not know. This leads to the fact, that these tools cannot really be judged.*

#### **4.1.4 Classification of project management tools and methods**

In order to provide guidance for project managers of SMEs, the following model which is illustrated in Figure 25, was developed. The model is inspired by the “BCG-matrix”, which is a tool to analyze market shares. The aim of the model is to classify the methods and tools in four different categories based on their scores regarding their usage and regarding their usefulness. The model is as

well very similar to the one provided by H. Wells (2012). The difference is that the empiric research was conducted only in SMEs and not in all kind of companies.



**Figure 25 Classification matrix for project management methods and tools**

The four categories are defined as follows:

**Must haves:** Methods and tools that are categorized as “Must haves” are tools and methods with the highest combined score of the usage score and the usefulness score. These tools should be used by every project manager in SMEs. There should be very strong arguments for not using one of these tools. Table 12 illustrates the ten methods and tools with the highest combined score.

Table 12 "Must have" methods and tools

<b>“Must have” methods and tools</b>
Work Breakdown structure
Change request process
Kick-off meeting
Project charter
Requirement Documentation
Milestones
Resource calendar
Project organization chart
Customer approval
Test and inspection planning

Obviously the ten tools, which are classified as “Must have” are the ten tools which were also listed as the most useful and the most used tools. As previously stated, all these tools are easy to apply and offer a lot of benefits without demanding a high effort. They are the basis for project management and should be applied also in every SME even when they are fresh start ups.

#### **Potentials:**

The second category are the “Potentials” methods and tools. These tools have a high score for their usefulness but in comparison a low score for their usage. These tools have a potential value to increase the performance of projects. Project managers of SMEs, who do not apply these methods and tools, should at least analyze, whether the methods and tools fit to their projects, and try to incorporate them into the current way of executing projects. Table 13 shows the methods and tools which are classified as “Potentials” for SMEs.

Table 13 "Potentials" methods and tools

<b>“Potentials” methods and tools</b>
Sprint / Project retrospective
User stories
Stakeholder matrix
Risk response plan
Business case
Critical path methods
Stakeholder register
Risk register
Earned Value Management
Statement of work

The two tools with the biggest difference in their score are both agile tools. This suits to the previous findings that some of the project managers would like to apply agile tools as well, especially in the fields of Integration Management and Scope Management. Methods and tools like the

stakeholder and risk register or the critical path method require a higher effort by the project manager but in return they provide more detailed information about the project status and the project environment. Furthermore, they extend the scope of project management in general. While the “must have” methods and tools focus mainly on integration, time and scope, these tools add aspects like risks and stakeholders as well.

**Questionable:**

Methods and tools which are classified as “Questionable” are methods and tools with a high score regarding their usage but a relatively low score regarding their usefulness. These are mainly methods and tools which are used by most of the project managers at the moment. Project managers of SMEs who apply these methods and tools should analyze the benefits and decide whether these benefits pay back the effort or not. The methods and tools listed in table 14 are the tools with largest difference between both scores.

Table 14 "Questionable" methods and tools

<b>“Questionable” methods and tools</b>
Bar/Gantt Chart
Software for task scheduling
Test driven development
Communication plan
Resource Histogram
Cross functional teams
Team charter
Daily meetings
Procurement plan
Cause-effect diagram

Most of these methods and tools are useful in special situation but not in general, especially for SMEs. For example, the resource histogram or a team charter are useful in medium sized enterprises with a bigger amount of resources who work in changing project teams, but not for a startup where every project is run by the same five employees. Tools like the cause-effect diagram or the Gantt chart are useful for bigger projects which have a difficult environment or have a large scope but for example not for smaller internal projects.

**Special cases:**

The fourth category are the “special cases”. These are methods and tools with low score for their usefulness and a low score for their usage. Project managers of SMEs should avoid these methods and tools and only use them in special cases when they are required and there are no other methods and tools that could be applied.



Table 15 "Special cases" methods and tools

<b>“Special cases” methods and tools</b>
Planning games (Time)
Monte Carlo simulation (Cost)
Agile Earned Value Management
Planning games (Risk)
Risk database
Spike
PERT
Cost per Sprint
Trend analysis
Risk burndown chart

Most of these methods and tools are listed as well as the most useless methods and tools and as the least used methods and tools. The implementation of a risk database or agile earned value management requires a lot of effort by the project manager and the project team. Additionally, they cause a high effort for the maintenance as well. The risk is high that SMEs would use too much of their limited resources to cover this effort and disregard more important aspects of the project.

**Unknowns:**

Beside the four categories of the model there is basically a fifth category, the “unknown” methods and tools. Table 16 shows methods and tools where project managers stated, as well for their usefulness as for their usage, that they do not know this tool. These tools need to be considered as well, because their results are not as representative as the others because only parts of the project managers were able to judge them. If all project managers would be familiar with these methods and tools, the final result might differ.

Table 16 "Unknowns" methods and tools

<b>“Unknowns“ methods and tools</b>
Monte Carlo simulation (Time)
Monte Carlo simulation (Risk)
PERT
Spike
Monte Carlo simulation (Cost)
RACI/RASCI Matrix
FMEA
Risk burndown chart
Three Point Estimation
Simple Risk Register

Some of the unknown methods and tools like the Monte Carlo simulation or PERT are also listed as tools only for “special cases”. Further research is needed to control, whether these results change, when all project managers are familiar with all methods and tools.

Beside the tools that are listed in the five categories, there are also some methods and tools in the middle without a clear result, that are not shown in the results of this thesis. For these methods and tools, a further research with more respondents for different companies is needed to create a clear picture in order to classify them.

*In conclusion, based on the survey results regarding the usage and the usefulness of the methods and tools, a model was created with the goal to classify the different methods and tools. The aim of this classification is to provide guidance for project managers of SMEs which tools they should use in any case, which tools are options to improve the current situation, which of the current used tools should be checked regarding their benefits and which tools should only be used in special cases, when they are needed. For some tools was no clear classification possible, because they were unknown, or the results were not significant enough for an exact classification.*

## 5 CONCLUSIONS AND RECOMONDATIONS

1. The literature research showed that SMEs have specific characteristics which lead to special challenges in applying project management. Most of the SMEs have only limited resources. They do not have the money for introducing an official project management standard including all needed certifications. Furthermore, most SMEs cannot employ resources which are specialized in project management. The tasks of project management are done by leading employees besides their daily jobs. Another challenge is, that many owners and CEOs of SMEs do not know the benefits of project management. They see project management as organizational overhead and try to minimize the effort for it. For these reasons, SMEs need a specific project management approach which considers these challenge of SMEs, because project management is crucial for SMEs as well as for the world economy.

2. The list of project management standards was developed on the bases of literature analysis. These standards can be divided into traditional and agile project management. Examples for traditional standards are the process based PMBOK and Prince2 and the competence based ICB. Typical for these standards are comprehensive plans for every aspect of the project and formalized methods and tools like work break down structure or Gantt chart. Well know represents of the agile approach are Scrum, Extreme Programming and Scrumban. The standards are characterized by iterative approaches. Work is not planned upfront but decomposed in smaller parts which are executed in several iterations. Well recognized methods and tools are user stories and burn down charts.

3. Based on the results of literature research, a research model for empiric research was created. The model has three dimensions. As the first dimension the ten knowledge areas were chosen, in order to analyze which are the most important ones for project success. The second dimension is agile versus traditional management. As third dimension, the single tools and techniques of agile and traditional project management, which were found during the literature research, were selected. The

4. In order to get an impression of the biggest needs of SMEs, two surveys were conducted. One among project managers and one among project team members. In total eighty respondents from Germany and Lithuania answered the questions. The results of the empiric research among project managers and team members showed, that they have different perceptions regarding the company performance and the importance of single knowledge areas for the overall project success. Furthermore, there is a difference between the company performance and the importance of knowledge areas, which means that SMEs should consider focusing their limited resources especially on the knowledge areas which employees see as crucial. These are the four knowledge areas in

connection to the “iron triangle” (time, cost, scope, quality) plus resource and communication management.

5. The survey with project managers only showed, that most of them prefer a traditional approach for managing their projects, but they are open also for agile approaches, especially in the fields of time, integration and scope management. The results regarding the usage and the usefulness of the methods and tools of the research model lead to the final model of this thesis. The model classifies the methods and tools in four categories. Methods and tools that every project manager in SMEs should use, methods and tools with a high potential to bring benefits when they are not already used, methods and tools that should be checked when they are in usage whether the relation between efforts and outcomes is beneficial, and methods and tools that should only be used if they are required and there are no other options.

Some methods and tools could not be classified because they were unknown to most of the project managers or the results were not explicit enough. For these reasons, the author recommends further research in this field. Especially because the proportion between answers from Germany and Lithuania were clearly unbalanced in this research, it is important to do further research in more companies particular in Lithuania but also in Germany to collect results from more than one company, in order to get more representative result and to validate the results of this thesis.

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## APPENDIXES

### APPENDIX 1 SURVEY PROJECT TEAM MEMBERS

#### Survey among project team members of small and medium-sized enterprises regarding the application of project management inside their enterprises / Umfrage unter Projektteammitgliedern von kleinen und mittelständischen Unternehmen über die Anwendung von Projektmanagement in Ihren Unternehmen

Please note: The survey is part of my master Thesis "Application of project management standards in small and medium-sized enterprises". All data is only used for my personal research. The questions are organized according to the 10 knowledge areas of the latest version of the PMBOK.

Hinweis: Diese Umfrage ist Teil meiner Masterarbeit "Application of project management standards in small and medium-sized enterprises". Alle gewonnenen Daten werden nur im Rahmen der Arbeit verwendet. Die Fragen sind nach den 10 Wissensbereichen der neusten Version des PMBOK geordnet.

\*Required

#### General information / Allgemeine Informationen

Please note: The following information are not used to identify single respondents. They are only used for the analysis and classification of the answers.

Hinweis: Die folgenden Informationen werden nicht genutzt um einzelne Umfrageteilnehmer zu ermitteln, sondern nur zur detaillierten Auswertung der Antworten.

Home country of your company /  
Heimatland Ihres Unternehmens \*

Mark only one oval.

- Germany / Deutschland
- Lithuania / Litauen

Age / Alter \* Mark only one oval.

- <=25
- >25 <= 35
- > 35 <= 45
- > 45 <= 55
- > 55 <= 65
- > 65



Sex / Geschlecht \* Mark only one oval.

- Male / Männlich
- Female / Weiblich
- Other / Sonstiges

4 Years in the Company / Jahre im Unternehmen \* Mark only one oval.

- 1 - 2 years / Jahre
- 3 - 5 years / Jahre
- 6 - 10 years /Jahre
- 11-20 years / Jahre
- > 20 years / Jahre

Years of job experience in project based business / Jahre an Erfahrung im projektbezogenen Geschäft \* Mark only one oval.

- 1 - 2 years / Jahre
- 3 - 5 years / Jahre
- 6 - 10 years /Jahre
- 11-20 years / Jahre
- > 20 years / Jahre

Certifications in the field of project management / Zertifikate im Bereich Projektmanagement \* Mark only one oval.

- IPMA
- PMI
- Prince2
- Scrum
- Other / Sonstige
- None / Keine

Number of projects involved / Anzahl der Projekte in denen Sie involviert waren \* Mark only one oval.

- <=20
- > 20 <=50
- > 50 <=100
- > 100

## Introduction / Einleitung

Hereafter, you will see questions which are ordered by the ten knowledge areas of project management according to the PMBOK (one of the most important books in the field of project management). Each knowledge area will be briefly described. You are asked to rate the overall performance of your company in this field of project management and to rate the importance of this field of project company for the project success.

Im Folgenden erhalten Sie Fragen, die nach den zehn Wissensbereichen des PMBOK (eines der wichtigsten Büchern im Bereich des Projektmanagements) angeordnet sind. Jeder Wissensbereich wird kurz beschrieben. Sie werden gebeten die Leistung Ihres Unternehmens in diesem Bereich des Projektmanagements zu bewerten. Des Weiteren werden Sie gebeten, zu bewerten, wie wichtig dieser Bereich des Projektmanagements für den Erfolg von Projekten ist.

### Integration management / Integrationsmanagement

This knowledge area contains the tasks that hold the overall project together and integrate it into a unified whole. This includes the over all project mangement plan and setting up the general project documents like a project charter.

Dieser Wissensbereich beinhaltet alle übergreifende Aktivitäten im Projekt und die Integration aller einzel Aktivitäten in das Gesamtprojekt. Unter anderem der Gesamtprojektplan und allgemeine Projektdokumente wie der Projektvertrag.

How would you rate the performance of your company in the field of integration management?  
/ Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Integrationsmanagements?  
\* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of integration management for the success of projects of your company ? / Wie bewerten Sie die Bedeutung von Integrationsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary/ Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

#### 10. Remarks / Anmerkungen

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## Scope management / Inhalts- und Anforderungsmanagement

This knowledge area involves the project scope, that is, the work that is included within the project. This includes also the management of scope changes. The main tool is the work break down structure.

Dieser Wissensbereich behandelt den gesamt Umfang des Projektes. Auch der Umgang mit Anforderungsänderungen fällt in diesen Wissensbereich. Das Hauptwerkzeug ist ein klar definierter Projektstrukturplan.

11. How would you rate the performance of your company in the field of scope management ?

/ Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Inhalts- und Anforderungsmanagements ? \* Mark only one oval.

1 2 3 4 5  
Very bad / Sehr schlecht      Very good / Sehr gut

12 How would you rate the importance of scope management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Inhalts- und

Anforderungsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

1 2 3 4 5  
Not necessary/ Nicht      Very important / Sehr   
notwendig wichtig

13. Remarks / Anmerkungen

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## Time management / Terminmanagement

The project manager must create a schedule (start and finish dates for each task) for each planned task during the planning phase. Also updates of the schedule after changes are included.

Die Wissensbereich beschreibt das Erstellen eines klaren Zeitplans mit Start- und Enddaten für jede geplante Aufgabe. Ebenso beschreibt er der Umgang mit Änderungen im Zeitplan.

How would you rate the performance of your company in the field of time management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Terminmanagements ?

\*

Mark only one oval.

1 2 3 4 5

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Very bad / Sehr schlecht      Very good / Sehr gut

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How would you rate the importance of time management for the success of projects of your company ? / Wie bewerten Sie die Bedeutung von Terminmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

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1 2 3 4 5

Not necessary/ Nicht notwendig      Very important / Sehr wichtig

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16. Remarks / Anmerkungen

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### Cost mangement / Kostenmanagement

This knowledege area is about allocating the budget for the whole project as well as for the single tasks. The budgets should be established with estimating techniques.

Dieser Wissensbereich behandelt die Berechnung eines Gesamtbudgets für das Projekt, sowie Budgets für alle Aufgaben. Die Errechnung der Budgets sollten auf fundierten Methoden zur Schätzung beruhen.

How would you rate the performance of your company in the field of cost management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Kostenmanagements ?

\*

Mark only one oval.

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1 2 3 4 5

Very bad / Sehr schlecht      Very good / Sehr gut

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How would you rate the importance of cost management management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Kostenmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

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1 2 3 4 5

Not necessary/ Nicht notwendig      Very important / Sehr wichtig

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## 19. Remarks / Anmerkungen

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### **Quality management / Qualitätsmanagement**

This knowledge area deals with all aspects of quality during the project. It includes specifying the desired quality before starting the project, setting up a plan to reach this quality, controlling the quality status and planning counter actions in case of quality deviation.

Dieser Wissensbereich beinhaltet alle Aspekte des Qualitätsmanagement von der Spezifizierung der gewünschten Qualität vor Projektstart, über die Planung zur Erreichung dieser Ziele und der Kontrolle während des Projektes, bis zur Planung von Gegenmaßnahmen bei Qualitätsabweichung.

20. How would you rate the performance of your company in the field of quality management?

/ Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Qualitätsmanagements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

21 How would you rate the importance of quality management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Qualitätsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary/ Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

## 22 Remarks / Anmerkungen

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### **Human resource management / Personalmanagement**

This knowledge area is concerned with acquiring the right team, development of skills, ensuring their satisfaction, and tracking their performance.

Dieser Wissensbereich behandelt die Zusammenstellung des richtigen Teams, die Entwicklung von notwendigen Qualifikationen, die Zufriedenstellung aller Teammitglieder und die Überwachung der Teamleistung.

How would you rate the performance of your company in the field of human resource management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Personalmanagements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of human resource management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Personalmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary/ Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

25. Remarks / Anmerkungen

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### **Communicaton management / Kommunikationsmanagement**

This knowledgese area describes the planning and execution of communication with all stakeholders. This includes a clear plan when and how stakeholders are informed about the project status.

Dieser Wissensbereich beschreibt die Planung und Durchführung der Kommunikation mit allen Projektbeteiligten. Das beinhaltet einen Plan, wann und wie Projektbeteiligte (Stakeholder) über den Projektstatus informiert werden.

How would you rate the performance of your company in the field of communication management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Kommunikationsmanagements? \*

Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of communication management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von

Kommunikationsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary/ Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

## 28. Remarks / Anmerkungen

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### **Risk management / Risikomanagement**

This knowledge area is about identifying and analysing all major risks for the project. This also includes a plan how to handle the risks and to plan counter actions in case that the risk occurs.

Dieser Wissensbereich beschreibt die Identifizierung und Analyse von allen großen Risiken für das Projekt. Das beinhaltet das Erstellen eines Plans, wie mit den Risiken umgegangen werden soll und welche Gegenmaßnahmen eingeleitet werden müssen, wenn ein Risiko eintritt.

29. How would you rate the performance of your company in the field of risk management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Risikomanagements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

30 How would you rate the importance of risk management for the success of the project of your company? / Wie bewerten Sie die Bedeutung von Risikomanagements für den Erfolg von Projekte Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary/ Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

## 31. Remarks / Anmerkungen

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### **Procurement Management / Beschaffungsmanagement**

This knowledge area includes all procurement for a project. This might be parts, hardware or software but also external workforces or consulting.

Dieser Wissensbereich beschreibt alle Beschaffungen die für ein Projekt notwendig sind. Das können Einzelteile, Hardware oder Software sein, aber auch externe Arbeits- oder Beratungsleistungen.

How would you rate the performance of your company in the field of procurement management? / Wie bewerten Sie die Leistung Ihres Unternehmens in Bereich des Beschaffungsmanagements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of procurement management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Beschaffungsmanagement für den Erfolg der Projekte Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

### 34. Remarks / Anmerkungen

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## Stakeholder Management

This knowledge area describes the identification and management of all major stakeholders of the project.

Dieser Wissensbereich beschreibt die Identifizierung und den Umgang mit allen Stakeholdern im Projekt.

How would you rate the performance of your company in the field of stakeholder management management? / Wie bewerten Sie die Leistung Ihres Unternehmens im diesem Bereich des Stakeholder Managements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of stakeholder management for the success of your company? / Wie bewerten Sie die Bedeutung von Stakeholder Management für den Erfolg Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig



37. Remarks / Anmerkungen

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**Thank you for your cooperation / Danke für Ihre Mithilfe**

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**APPENDIX 2 SURVEY PROJECT MANAGERS**

**Survey among project managers of small and medium-sized enterprises regarding the application of project management inside their enterprises / Umfrage unter Projektleitern von kleinen und mittelständischen Unternehmen über die Anwendung von Projektmanagement in Ihren Unternehmen**

Please note: The survey is part of my master Thesis "Application of project management standards in small and medium-sized enterprises". All data is only used for my personal research. The questions are organized according to the 10 knowledge areas of the latest version of the PMBOK.

Hinweis: Diese Umfrage ist Teil meiner Masterarbeit "Application of project management standards in small and medium-sized enterprises". Alle gewonnenen Daten werden nur im Rahmen der Arbeit verwendet. Die Fragen sind nach den 10 Wissensbereichen der neusten Version des PMBOK geordnet.

\*Required

**General information / Allgemeine Informationen**

Please note: The following information are not used to identify single respondents. They are only used for the analysis and classification of the answers.

Hinweis: Die folgenden Informationen werden nicht genutzt um einzelne Umfrageteilnehmer zu ermitteln, sondern nur zur detaillierten Auswertung der Antworten.

Home country of your company /  
Heimatland Ihres Unternehmens \*

Mark only one oval.

- Germany / Deutschland
- Lithuania / Litauen

Age / Alter \* Mark only one oval.

- <=25
- >25 <= 35
- > 35 <= 45
- > 45 <= 55
- > 55 <= 65
- > 65

Sex / Geschlecht \* Mark only one oval.

- Male / Männlich
- Female / Weiblich
- Other / Sonstiges

4 Years in the Company / Jahre im Unternehmen \* Mark only one oval.

- 1 - 2 years / Jahre
- 3 - 5 years / Jahre
- 6 - 10 years /Jahre
- 11-20 years / Jahre
- > 20 years / Jahre

Years of job experience in project based business / Jahre an Erfahrung im projektbezogenen Geschäft \* Mark only one oval.

- 1 - 2 years / Jahre
- 3 - 5 years / Jahre
- 6 - 10 years /Jahre
- 11-20 years / Jahre
- > 20 years / Jahre

Certifications in the field of project management / Zertifikate im Bereich Projektmanagement \* Mark only one oval.

- IPMA
- PMI
- Prince2
- Scrum
- Other / Sonstige

None / Keine

Number of projects involved / Anzahl der Projekte in denen Sie involviert waren \*

Mark only one oval.

- $\leq 20$   
  $> 20 \leq 50$   
  $> 50 \leq 100$   
  $> 100$

### Introduction / Einleitung

Hereafter, you will see questions which are ordered by the ten knowledge areas of project management according to the PMBOK (one of the most important books in the field of project management). Each knowledge area will be briefly described in the beginning. You are asked to rate the overall performance of your company in this field of project management and to rate the importance of this field of project company for the project success. As a third part, you are asked to rate different project management methods regarding their usefulness for small and medium-sized enterprises.

Im Folgenden erhalten Sie Fragen, die nach den zehn Wissensbereichen des PMBOK (eines der wichtigsten Bücher im Bereich des Projektmanagements) angeordnet sind. Jeder Wissensbereich wird zu Beginn kurz beschrieben. Sie werden gebeten die Leistung Ihres Unternehmens in diesem Bereich des Projektmanagements zu bewerten. Des Weiteren werden Sie gebeten, zu bewerten, wie wichtig dieser Bereich des Projektmanagements für den Erfolg von Projekten ist. Als dritter Teil der Umfrage werden Sie gebeten verschiedene Projektmanagement Methoden, nach ihrer Nützlichkeit für kleine und mittelständische Unternehmen, zu bewerten.

### Integration management / Integrationsmanagement

This knowledge area contains the tasks that hold the overall project together and integrate it into a unified whole. This includes the overall project management plan and setting up the general project documents like a project charter.

Dieser Wissensbereich beinhaltet alle übergreifende Aktivitäten im Projekt und die Integration aller einzel Aktivitäten in das Gesamtprojekt. Unter anderem der Gesamtprojektplan und allgemeine Projektdokumente wie der Projektvertrag.

How would you rate the performance of your company in the field of integration management? /  
Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Integrationsmanagements? \*

Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of integration management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Integrationsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

In general, would you prefer an agile approach or a traditional approach for integration management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Integrationsmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil
- Traditional / Traditionell

11 Please rate the following methods of integration management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Integrationsmanagements nach ihrer Nützlichkeit. \*

Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Project Charter (traditional) / Projektvertrag (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business Case (traditional) / Kosten Nutzen-Analyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feasibility study (traditional) / Machbarkeitsstudie (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lessons Learned (traditional) / Projekt Retrospektive (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Change request process (traditional) / Change request Prozess (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuous integration (agile) / Durchgehende Integration (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sprint/Project retrospective (agile) / Sprint/Projekt Retrospektive (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
System metaphor / Project brief (agile) / System- / Projektbeschreibung (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise im Einsatz	In usage / Im Einsatz
Project Charter (traditional) / Projektvertrag (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Business Case (traditional) / Kosten Nutzen-Analyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feasibility study (traditional) / Machbarkeitsstudie (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lessons Learned (traditional) / Projekt Retrospektive (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Change request process (traditional) / Change request Prozess (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Continuous integration (agile) / Durchgehende Integration (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sprint/Project retrospective (agile) / Sprint/Projekt Retrospektive (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
System metaphor / Project brief (agile) / System- / Projektbeschreibung (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 13. Remarks / Anmerkungen

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### **Scope management / Inhalts- und Anforderungsmanagement**

This knowledge area involves the project scope, that is, the work that is included within the project. This includes also the management of scope changes. The main tool is the work break down structure.

Dieser Wissensbereich behandelt den gesamt Umfang des Projektes. Auch der Umgang mit Anforderungsänderungen fällt in diesen Wissensbereich. Das Hauptwerkzeug ist ein klar definierter Projektstrukturplan.

14 How would you rate the performance of your company in the field of scope management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Inhalts- und Anforderungsmanagements? \* Mark only one oval.

1	2	3	4	5		
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of scope management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Inhalts- und Anforderungsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

1	2	3	4	5		
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

In general, would you prefer an agile approach or a traditional approach for scope management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für das Inhalts- und Anforderungsmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil
- Traditional / Traditionell

Please rate the following methods of scope management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Anforderungsmanagements nach ihrer Nützlichkeit \*

Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Work Breakdown structure (traditional) / Projektstrukturplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stage gates (traditional) / Stage gates (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requirement Documentation (traditional) / Anforderungsdokumentation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trend analysis (traditional) / Trendanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Variance analysis (traditional) / Abweichungsanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Software for task scheduling (traditional) / Software für Terminplanung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User stories (agile) / User stories (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product Backlog (agile) / Product Backlog (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Release plan (agile) / Release plan (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scope statement (agile) / Scope statement (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
Work Breakdown structure (traditional) / Projektstrukturplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stage gates (traditional) / Stage gates (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requirement Documentation (traditional) / Anforderungsdokumentation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trend analysis (traditional) / Trendanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Variance analysis (traditional) / Abweichungsanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Software for task scheduling (traditional) / Software für Terminplanung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User stories (agile) / User stories (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Product Backlog (agile) / Product Backlog (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Release plan (agile) / Release plan (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scope statement (agile) / Scope statement (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Remarks / Anmerkungen

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**Time management / Terminmanagement**

The project manager must create a schedule (start and finish dates for each task) for each planned task during the planning phase. Also updates of the schedule after changes are included.

Die Wissensbereich beschreibt das Erstellen eines klaren Zeitplans mit Start- und Enddaten für jede geplante Aufgabe. Ebenso beschreibt er der Umgang mit Änderungen im Zeitplan.

20. How would you rate the performance of your company in the field of time management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Terminmanagements?

\*

Mark only one oval.

Very bad / Sehr schlecht      Very good / Sehr gut

1      2      3      4      5

21 How would you rate the importance of time management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Terminmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

In general, would you prefer an agile approach or a traditional approach for time management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Terminmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil
- Traditional / Traditionell

Please rate the following methods of time management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Terminmanagements nach ihrer Nützlichkeit. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Critical path method (traditional) / Kritischer Pfad (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bar/Gant chart (traditional) / Säulen Diagramme (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earned Value Management (traditional) / Leistungswertanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Milestones (traditional) / Meilensteine (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monte Carlo simulation (traditional) / Monte Carlo Simulation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PERT (traditional) / PERT (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sprints (agile) / Sprints (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning games (agile) / Planspiele (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spike(agile) / Spike(agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

24



	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
Critical path method (traditional) / Kritischer Pfad (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bar/Gant chart (traditional) / Säulen Diagramme (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Earned Value Management (traditional) / Leistungswertanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Milestones (traditional) / Meilensteine (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monte Carlo simulation (traditional) / Monte Carlo Simulation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PERT (traditional) / PERT (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sprints (agile) / Sprints (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning games (agile) / Planspiele (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Spike(agile) / Spike(agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## 25. Remarks / Anmerkungen

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## Cost mangement / Kostenmanagement

This knowledege area is about allocating the budget for the whole project as well as for the single tasks. The budgets should be established with estimating techniques.

Dieser Wissensbereich behandelt die Berechnung eines Gesamtbudgets für das Projekt, sowie Budgets für alle Aufgaben. Die Errechnung der Budgets sollten auf fundierten Methoden zur Schätzung beruhen.

26 How would you rate the performance of your company in the field of cost management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Kostenmanagements?

\*

Mark only one oval.

1    2    3    4    5

Very bad / Sehr schlecht      Very good / Sehr gut

How would you rate the importance of cost management management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Kostenmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

1 2 3 4 5  
 Not necessary/ Nicht notwendig      Very important / Sehr wichtig

In general, would you prefer an agile approach or a traditional approach for cost management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Kostenmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil  
 Traditional / Traditionell

Please rate the following methods of cost management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Kostenmanagements nach ihrer Nützlichkeit. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Earned Value Management (traditional) / Leistungswertanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Three Point Estimation (traditional) / Drei Punkt-Schätzungen (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lessons learned register (traditional) / Projekt-Retrospektiven-Übersicht (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monte Carlo simulation (traditional) / Monte Carlo Simulation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Estimation database (traditional) / Datenbank für Schätzungen (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agile Earned Value Management (agile) / Agile Leistungswertanalyse (agi)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost per Sprint (agile) / Kosten pro Sprint (agi)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please state whether the methods are used by you or not. / Bitte geben Sie an, ob die Methoden von Ihnen genutzt werden oder nicht. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
Earned Value Management (traditional) / Leistungswertanalyse (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Three Point Estimation (traditional) / Drei Punkt-Schätzungen (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lessons learned register (traditional) / Projekt-Retrospektiven-Übersicht (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monte Carlo simulation (traditional) / Monte Carlo Simulation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Estimation database (traditional) / Datenbank für Schätzungen (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Agile Earned Value Management (agile) / Agile Leistungswertanalyse (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cost per Sprint (agile) / Kosten pro Sprint (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 31. Remarks / Anmerkungen

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### Quality management / Qualitätsmanagement

This knowledge area deals with all aspects of quality during the project. It includes specifying the desired quality before starting the project, setting up a plan to reach this quality, controlling the quality status and planning counter actions in case of quality deviation.

Dieser Wissensbereich beinhaltet alle Aspekte des Qualitätsmanagement von der Spezifizierung der gewünschten Qualität vor Projektstart, über die Planung zur Erreichung dieser Ziele und der Kontrolle während des Projektes, bis zur Planung von Gegenmaßnahmen bei Qualitätsabweichung.

32 How would you rate the performance of your company in the field of quality management / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Qualitätsmanagements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of quality management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Qualitätsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary/ Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

In general, would you prefer an agile approach or a traditional approach for quality management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Qualitätsmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil
- Traditional / Traditionell

Please rate the following methods of quality management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Qualitätsmanagements nach ihrer Nützlichkeit. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Quality Metrics (traditional) / Qualitätsmetriken (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Test and inspection planning (traditional) / Test- und Inspektionsplanung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cause-effect diagram (traditional) / Ursachen-Wirkungs- Diagramm (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FMEA (traditional) / FMEA (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality Register (traditional) / Qualitätsregister (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer approval (agile) / Kundenabnahme (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Automated tests (agile) / Automatisierte Tests (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Daily meeting (agile) / Tägliche Meetings (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retrospective (agile) / Retrospektive (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Test driven development (agile) / Testgetriebene Entwicklung (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please state whether the methods are used by you or not. / Bitte geben Sie an, ob die Methoden von Ihnen genutzt werden oder nicht. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
Quality Metrics (traditional) / Qualitätsmetriken (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Test and inspection planning (traditional) / Test- und Inspektionsplanung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cause-effect diagram (traditional) / Ursachen-Wirkungs- Diagramm (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FMEA (traditional) / FMEA (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality Register (traditional) / Qualitätsregister (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer approval (agile) / Kundenabnahme (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Automated tests (agile) / Automatisierte Tests (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Daily meeting (agile) / Tägliche Meetings (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retrospective (agile) / Retrospektive (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Test driven development (agile) / Testgetriebene Entwicklung (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### 37. Remarks / Anmerkungen

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## Human resource management / Personalmanagement

This knowledge area is concerned with acquiring the right team, development of skills, ensuring their satisfaction, and tracking their performance.

Dieser Wissensbereich behandelt die Zusammenstellung des richtigen Teams, die Entwicklung von notwendigen Qualifikationen, die Zufriedenstellung aller Teammitglieder und die Überwachung der Teamleistung.

38 How would you rate the performance of your company in the field of human resource management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Personalmanagements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of human resource management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von Personalmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

In general, would you prefer an agile approach or a traditional approach for human resource management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Personalmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil  
 Traditional / Traditionell

41 Please rate the following methods of human resource management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Personalmanagements nach ihrer Nützlichkeit. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
RACI/RASCI Matrix (traditional) / RACI/RASCI Matrix (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project organization chart (traditional) / Projekt Organisationsdiagramm (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team charter (traditional) / Team Vertrag (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resource calendar (traditional) / Ressourcen Kalender (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resource Histogram (traditional) / Ressourcen Histogramm (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team velocity (agile) / Teamgeschwindigkeit (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
100% dedication to one project (agile) / 100% Engagement für ein Projekt (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cross-functional teams (agile) / Funktionsübergreifende Teams (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
RACI/RASCI Matrix (traditional) / RACI/RASCI Matrix (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Project organization chart (traditional) / Projekt Organisationsdiagramm (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team charter (traditional) / Team Vertrag (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resource calendar (traditional) / Ressourcen Kalender (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Resource Histogram (traditional) / Ressourcen Histogramm (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team velocity (agile) / Teamgeschwindigkeit (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
100% dedication to one project (agile) / 100% Engagement für ein Projekt (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cross-functional teams (agile) / Funktionsübergreifende Teams (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### 43. Remarks / Anmerkungen

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### **Communicaton management / Kommunikationsmanagement**

This knowlege area describes the planning and execution of communication with all stakeholders. This includes a clear plan when and how stakeholders are informed about the project status.

Dieser Wissensbereich beschreibt die Planung und Durchführung der Kommunikation mit allen Projektbeteiligten. Das beinhaltet einen Plan, wann und wie Projektbeteiligte (Stakeholder) über den Projektstatus informiert werden.

44 How would you rate the performance of your company in the field of communication management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Kommunikationsmanagements? \*

Mark only one oval.

1    2    3    4    5

Very bad / Sehr schlecht      Very good / Sehr gut

How would you rate the importance of communication management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von

Kommunikationsmanagement für den Erfolg von Projekten Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

In general, would you prefer an agile approach or a traditional approach for communication management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Kommunikationsmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil  
 Traditional / Traditionell

Please rate the following methods of communication management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Kommunikationsmanagements nach ihrer Nützlichkeit. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Communication Plan (traditional) / Kommunikations Plan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kick-off meeting (traditional) / Projekteröffnungsbesprechung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Daily stand up (agile) / Tägliche Team Meetings (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Close allocation of the team (agile) / Enge räumliche Verteilung des Teams (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

48

Not known / Not used / Partly used / In usage /

	Nicht bekannt	Nicht genutzt	Teilweise genutzt	Im Einsatz
Communication Plan (traditional) / Kommunikations Plan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kick-off meeting (traditional) / Projekteröffnungsbesprechung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Daily stand up (agile) / tägliche Team Meetings (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Close allocation of the team (agile) / Enge räumliche Verteilung des Teams (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### 49. Remarks / Anmerkungen

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### Risk management / Risikomanagement

This knowledge area is about identifying and analysing all major risks for the project. This also includes a plan how to handle the risks and to plan counter actions in case that the risk occurs.

Dieser Wissensbereich beschreibt die Identifizierung und Analyse von allen großen Risiken für das Projekt. Das beinhaltet das Erstellen eines Plans, wie mit den Risiken umgegangen werden soll und welche Gegenmaßnahmen eingeleitet werden müssen, wenn ein Risiko eintritt.

How would you rate the performance of your company in the field of risk management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Risikomanagements? \* Mark only one oval.

	1	2	3	4	5	
Very bad / Sehr schlecht	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very good / Sehr gut

How would you rate the importance of risk management for the success of the project of your company? / Wie bewerten Sie die Bedeutung von Risikomanagements für den Erfolg von Projekte Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary/ Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

52 In general, would you prefer an agile approach or a traditional approach for risk management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Risikomanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil
- Traditional / Traditionell

53. Please rate the following methods of risk management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Risikomanagements nach ihrer Nützlichkeit. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Risk Register (traditional) / Risiko Register (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk Score (traditional) / Risiko Werte (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk Response Plan (traditional) / Risikobewältigungsplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monte Carlo Simulation (traditional) / Monte Carlo Simulation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk database (traditional) / Risiko Datenbank (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning game (agile) / Planspiele (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Simple Risk Register (agile) / Vereinfachtes Risiko Register (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk burndown chart (agile) / Risiko burndown chart (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brainstorming (agile) / Brainstorming (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

54

Very bad / Sehr schlecht      Very good / Sehr gut

	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
Risk Register (traditional) / Risiko Register (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk Score (traditional) / Risiko Werte (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk Response Plan (traditional) / Risikobewältigungsplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monte Carlo Simulation (traditional) / Monte Carlo Simulation (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk database (traditional) / Risiko Datenbank (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning game (agile) / Planspiele (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Simple Risk Register (agile) / Vereinfachtes Risiko Register (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk burndown chart (agile) / Risiko burndown chart (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brainstorming (agile) / Brainstorming (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

#### 55. Remarks / Anmerkungen

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### **Procurement Management / Beschaffungsmanagement**

This knowledge are includes all procurement for a project. This might be parts, hardware or software but also external workforces or consulting.

Dieser Wissensbereich beschreibt alle Beschaffungen die für ein Projekt notwendig sind. Das können Einzelteile, Hardware oder Software sein, aber auch externe Arbeits- oder Beratungsleistungen.

56. How would you rate the performance of your company in this field of procurement management? / Wie bewerten Sie die Leistung Ihres Unternehmens in Bereich des Beschaffungsmanagements? \* Mark only one oval.

1      2      3      4      5

57 How would you rate the importance of procurement management for the success of projects of your company? / Wie bewerten Sie die Bedeutung von

Beschaffungsmanagement für den Erfolg der Projekte Ihres Unternehmens? \* Mark only one oval.

	1	2	3	4	5	
Not necessary / Nicht notwendig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very important / Sehr wichtig

In general, would you prefer an agile approach or an traditional approach for procurement management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Beschaffungsmanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil  
 Traditional / Traditionell

Please rate the following methods of procurement management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Beschaffungsmanagements nach ihrer Nützlichkeit. \*

Mark only one oval per row.

	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Procurement Plan (traditional) / Beschaffungsplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Long and short lists (traditional) / Long List und Short List (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Statement of Work (traditional) / Leistungsbeschreibung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performance commitment (agile) / Leistungsverpflichtung (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

60 Please state whether the methods are used by you or not. / Bitte geben Sie an, ob die Methoden von Ihnen genutzt werden oder nicht. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
Procurement Plan (traditional) / Beschaffungsplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Long and short lists (traditional) / Long List und Short List (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Statement of Work (traditional) / Leistungsbeschreibung (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Performance commitment (agile) / Leistungsverpflichtung (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

61. Remarks / Anmerkungen

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This knowledge area describes the identification and management of all major stakeholders of the project.

## Stakeholder Management

Dieser Wissensbereich beschreibt die Identifizierung und den Umgang mit allen Stakeholdern / Interessengruppen im Projekt.

How would you rate the performance of your company in the field of stakeholder management? / Wie bewerten Sie die Leistung Ihres Unternehmens im Bereich des Stakeholder Managements? \* Mark only one oval.

1      2      3      4      5

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Very bad / Sehr schlecht      Very good / Sehr gut

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How would you rate the importance of stakeholder management for the success of projects in your company? / Wie bewerten Sie die Bedeutung von Stakeholder Management für den Erfolg der Projekte Ihres Unternehmens? \* Mark only one oval.

1      2      3      4      5

64 In general, would you prefer an agile approach or a traditional approach for stakeholder management in your projects? / Würden Sie generell einen agilen oder einen traditionellen Ansatz für Stakeholdermanagement in Ihren Projekten bevorzugen? \* Mark only one oval.

- Agile / Agil
- Traditional / Traditionell

65. Please rate the following methods of stakeholder management regarding their usefulness. / Bitte bewerten Sie die folgenden Methoden des Stakeholdermanagements nach ihrer Nützlichkeit. \*

Mark only one oval per row.

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Not necessary / Nicht notwendig      Very important / Sehr wichtig

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	Not known / Nicht bekannt	Not useful / Nicht sinnvoll	Partly useful / Teilweise sinnvoll	Useful / Sinnvoll
Stakeholder Register (traditional) / Stakeholder Register (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stakeholder Matrix (traditional) / Stakeholder Matrix (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stakeholder Engagement Plan (traditional) / Stakeholder Involvierungsplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stakeholder representative in side of the team (agile) / Stakeholder Vertreter im Team (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Daily stand up (agile) / Tägliche Team Meetings (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

66 Please state whether the methods are used by you or not. / Bitte geben Sie an, ob die Methoden von Ihnen genutzt werden oder nicht. \* Mark only one oval per row.

	Not known / Nicht bekannt	Not used / Nicht genutzt	Partly used / Teilweise genutzt	In usage / Im Einsatz
Stakeholder Register (traditional) / Stakeholder Register (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stakeholder Matrix (traditional) / Stakeholder Matrix (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stakeholder Engagement Plan (traditional) / Stakeholder Involvierungsplan (traditionell)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stakeholder representative in side of the team (agile) / Stakeholder Vertreter im Team (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Daily stand up (agile) / Tägliche Teammeetings (agil)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

67. Remarks / Anmerkungen

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**Thank you for your cooperation / Danke für Ihre Mithilfe**