An Investigation of the Process and Characteristics used by Project Managers in IT Consulting in the Selection of Project Management Software

Eike Meyer

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Declaration

I declare that this Doctorate of Business Administration thesis is my own work and that all sources literary and electronic have been properly acknowledged as and when they occur in the body of the text.

Eike Meyer

Date: 25th October 2017

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Abstract

As project management (PM) and information technology (IT) evolved over the last decades, an increasing number of project management software products have emerged. Project managers in IT consulting can improve the success of projects through the utilization of such software. However, the diversity of software available cannot sensibly be grasped by a single individual.

Based on this context, the study aims to examine the key considerations in the selection of project management software in IT consulting from the project managers' perspective. A literature review identifies key aspects of IT consulting projects that may be relevant to the software selection. No evidence was found that provided a view on the process of the selection of PM software in IT consulting itself. The review also unveils the lack of common terminology in regard to PM software.

The study addresses these gaps by utilizing interpretative phenomenological analysis (IPA) to understand the experiences made by project managers. To gather data, 17 semi-structured interviews were conducted with experienced project managers. Thematic analysis was used to develop an understanding of the process employed by project managers in the software selection and the considerations they make along the way. The findings were synthesized to create a process guide, supported by a checklist and the working definition of key terminology.

This study adds a broader perspective to the field of PM software through the application of qualitative methodology in an otherwise quantitatively dominated field

of research. It addresses the lack of existing knowledge on the perspective of the project manager in the selection process through the generation of a 6-staged process guide. The detailed considerations of project managers were compiled into a checklist of selection criteria. These two also contribute to practice by providing a structured approach to PM selection for practitioners. The third output is a working definition of project management software as used in practice, which simplifies an exchange of knowledge between theory and practice.

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Chapter 1: Introduction

The aim of this study is to examine the key considerations in the selection of project management software in IT consulting from the project managers' perspective in order to develop guidance to support practitioners in software selection and enhance the academic understanding of this phenomenon.

1.1 Research Rationale

Project management software has been found to contribute to the success of projects. So, it is no surprise, that it is utilized in many projects today. Also, there is a variety of software on the market to meet this demand. With this multitude of project management software available and the challenges of IT projects, how can project managers in IT consulting select the right software for their project? Some studies have investigated and compared features of software (Besner & Hobbs, 2012; Pellerin, Perrier, Guillot, & Léger, 2013). Other research has reviewed the application of a single product (Borštnar Mirjana & Pucihar, 2014; Riņģis & Bērziša, 2016). From a practical standpoint however, it may be sensible to not just try to see what a product can or cannot do. Instead one should evaluate the selection from the perspective of those that want to utilize it in projects. The project manager is the person leading the project. Based on his role he is also responsible for the overall project success. Thus, he has a key interest in the benefits derived from project management software. From an academic perspective, little is known about the process of software selection and the considerations taken throughout this process, especially in regard to the project managers role. Hence investigating this key roles' perspective is part of the aim of this study.

IT consultancies predominantly deliver their services in the form of projects. This is also reflected in the way that consulting organizations are set up in project- and client-oriented structures. Thus, consultants and especially project managers in IT consultancies have often gained rich experience with projects. This experience likely also extends to project management software. As the intention of a DBA is to not only to contribute to theory, but also have a strong link to practice, it was a conscious decision to locate this study in the sector of IT consulting. This emphasizes the practical focus and increases the chance of generating practically relevant results. It is also sensible from an academic perspective, as one should be mindful that project management is applied differently depending on the sector (Besner & Hobbs, 2012). Following this thought, the focus on a single sector promotes the chances to distil findings of greater depth and relevance. Limiting the research to IT consulting, which is the authors' field of practice, would also allow to utilize one's own expertise and provide easier access to practitioners and thus data.

1.1.1 The Author as a Researcher

I have been a practitioner in IT consulting for over 9 years. During this time, I have worked in different roles as a methods and tools consultant, project manager and head of a department of IT consultants. Working as a consultant means conducting project work for different client organizations in varying sectors. All projects I have seen within this time used some form of project management software, ranging from self-made MS Excel sheets to complex integrated software stacks. I observed that the software products chosen were utilized to varying degrees of success. In some projects, the users regularly complained about the complexity of the software. In others, only very few

people would actually use it, and again in others, there would be different products used by different teams within the same project. What seemed to be the result is that projects were struggling to benefit from the project management software they used. On the other hand, I have also come across projects which were successfully using project management software within their project for years. Thus, understanding what project managers do to select a such software and understand their considerations became a central idea for this research. I assume that identifying the drivers and barriers in this process and the decisions that project managers make, will likely benefit other projects. The observation of this phenomenon in practice was the starting point for this thesis. Through the DBA programme it was possible to investigate it from an academic perspective.

1.1.2 Scope of the Study

As the author of this study is a project manager within the field of IT consulting, it was deemed beneficial to locate the research in the same field. This defined the scope of this research, which became the basis for the title of the study:

Title: An Investigation of the Process and Characteristics used by Project Managers in IT Consulting in the Selection of Project Management Software

Building on the problem as observed in practice, a review of existing literature provided further insights on the phenomenon from an academic perspective. As previously mentioned, the process and characteristics used by project managers in the selection of project management software should be investigated in the sector of IT consulting. The investigation into the literature brought no such studies to light. Thus, this research utilizes the works of other authors on related topics to create an understanding of the

academic context as a basis for investigating the phenomenon of project management software selection in IT consulting.

Turner, Anbari and Bredillet (2013) mention the increasing standardization of project management, which is specifically supported through the implementation of organizations such as the Project Management Institute (PMI), UK's Association for Project Management (APM), the Australian Institute of Project Management (AIPM), and the International Project Management Association (IPMA). Their standards and a lot of project management literature available are often business- oriented rather than of academic origin. This means, that any claims made based on such sources should be reviewed critically in light of academic research.

An initial review of literature on project management software showed, that few studies are available, many of which are over a decade old and thus limited in their applicability today. Those that exist often deviate in their approach to central terminology. The terms of project management software (Ali, Anbari, & Money, 2008), tools (Chadli et al., 2016) and information systems (Caniëls & Bakens, 2011) were found to be used sometimes interchangeably and at times also with deviating meanings in the context of project management software. As there is no consensus in the literature on the terminology, it led to the question on the view of practitioners. Investigating the terminology would allow to clarify the definitions based on practical application and thus promote the future interlock between academia and practice.

While no academic literature was found on software selection in the context of IT consulting, there are publications on project management software and its usage. A central dependency that Raymond and Bergeron (2008) identified was the positive impact of project management software on project success. According to them, this is however depending on the actual usage of the software. When reflecting this, it becomes clear that factors influencing and promoting usage of project management software would thus likely be relevant for the success of the project. The findings of this thesis promote the concept of usage as a key consideration also from project managers' perspective, which will be elaborated in the later chapters.

Authors have investigated project management software based on its' features and functionalities (Besner & Hobbs, 2012; Pellerin et al., 2013). These may also be of potential relevance to project managers in the selection process. But are they actually key considerations when project managers decide which software to use? And are they of relevance in the context of IT consulting? As previously mentioned the context of IT consulting also likely influences the selection process. IT consulting is related to IT in general, it is reasonable to also review the specifics of IT projects. These have been found to pose certain restrictions on project management and its application (Stepanek, 2005), which in turn could influence software selection. As no research was found to have investigated project management in the context of IT consulting, this study tries to provide some insights into this field. Additionally, the project managers' way of working within this context in regard to the software selection will be of interest and how it relates to their perceptions and considerations.

The areas uncovered through the literature research are used to evaluate the research aim and objectives and inform the empirical research process by developing research questions. The relation of empirical findings and existing theory is also part of the discussion that later evaluates the overall research project and provides a synthesis of the information uncovered.

1.2 Aim and Objectives

This study was initiated based on challenges related to the selection of project management software by project managers in IT consulting. It aims to incur an understanding of this practical phenomenon through academic research. As the project managers are the key actors within this process, it seems sensible to focus primarily on their perspective. Thus, developing an understanding of his or her considerations seems to be the appropriate aim to be able to create guidance that both, explains the theory behind the process, but also shows the practical benefits of a deeper understanding. Thus, the aim of this study is:

Aim: Examine the key considerations in the selection of project management software in IT consulting from the project managers' perspective.

This leads to the underlying objectives, that detail the aim of this research project further. They focus on the aspects that the research needs to cover to achieve its' aim. Following the outcomes as described in the previous section, at first an overview of the relevant academic literature needs to be attained. This will acknowledge and critically review existing works in relation to the aim. It will also help to shape the research questions that the empiric part of this study needs to answer. Thus, the first objective will be:

Objective 1: Provide an overview of the literature relevant to the field of project management software selection in IT consulting.

Secondly, there is the overarching phenomenon of project management software selection from the project managers' perspective that this research wants to understand. This also translates into an objective, as it will need to tie into the research questions and the results of this study:

Objective 2: Gain an understanding of the phenomenon of project management software selection in practice from the perspective of project managers.

Based on this frame, the further details were specified. What is exactly relevant within the process? Which aspects could drive or hinder the process? And what are the considerations in these regards from the perspective of practitioners? This also links to the criteria that project managers apply in practice and how this potentially ties into existing functionalities of software as investigated by other researchers.

Objective 3: Examine the key considerations for project managers in the software selection process.

A DBA thesis is both, a contribution to practice and knowledge. Based on the understanding that is generated through the pursuit of the objectives one to three, an academic contribution can be made. Thus, it should then be the next consequential step to also ensure a practical contribution, which would build on the information gained. Thus, the final objective is:

Objective 4: Develop guidance for project managers in IT consulting around key considerations in the selection process of project management software.

The research questions that evolve from the objectives are developed through the literature review in chapter two. These questions will then be the basis for the empiric study, which in turn provides the data for the discussion of the findings in chapter five.

1.3 Research Context

1.3.1 Methodology

As previously outlined the aim of this study is to examine the considerations of project managers. Since no evidence was found of authors investigating this phenomenon from a similar perspective, it seemed sensible to take a qualitative approach and try to come to a general understanding of what is occurring in practice. This section will outline the key methodological elements of this research, which is further explained in chapter three: methodology.

One initial consideration to be taken is that of research philosophy. According to Bryman and Bell (2015), the epistemological view portrays the view on what can be considered as acceptable knowledge. This implies which methods can be acknowledged as reasonable. While the underlying belief of this study is that scientific measureable and generalizable approaches from non-social fields can provide insights into phenomena occurring in a social environment, they can only gain limited understanding of the context of these as they limit themselves to quantifiably measureable data. From this perspective on knowledge, the decision was made to employ a qualitative approach to understand the wider perspective and underlying considerations in the software selection that could potentially go beyond measurable criteria. This is in line with the philosophical approach of interpretivism (Burrell & Morgan, 1979; Williams, 2000).

Thus, the qualitative approach taken is supported by the research philosophy that this study follows.

Building on this, this research employs a qualitative research design utilizing interpretivist phenomenology, as the intention of this study is to understand the process and considerations of project managers based on their practical experience. Thus, this study is utilizing information gathered from experienced project managers in an IT consulting organization. It was decided to focus on a single organization to improve the depth of data that could be attained due to the trusted relationship among peers. The research is conducted in line with the ethical considerations advisable in social research (L. Smith, 1992). The data gathered from practitioners will be analysed and the emerging patterns the patterns will be clustered into relevant themes. These are laid out further in the findings chapter.

Based on these findings, the results of this study will be refined through the discussion. The intention is to create a process guide, which provides an understanding of the phenomenon of project management software selection from an academic perspective and allows practitioners to utilize it to make informed decisions throughout the selection process. This research also aims to develop an understanding of the considerations and condense these into relevant criteria. Furthermore, the research will look for the working definition of project management software as used by practitioners, to foster a common understanding of terminology.

1.3.2 Structure of the Thesis

To provide an understanding of the steps taken, an overview was created that relates the chapters within the thesis structure and their individual contribution to the research.

The thesis contains six main chapters. This introduction provides a general overview of the research project. It develops the research context and rationale and develops the aim and objectives. In chapter two, the literature in relation to this study will be critically discussed and the research questions will be developed. Chapter three then defines the methodology used for the empirical research and gives the rationale for the decisions made. In the findings chapter, the data relevant to the aim of this research will be presented, and chapter five provides the discussion where the empirical and theoretical data will be interpreted and aligned to the key results of this study. The conclusion in chapter six summarizes the research and its' results, outlines the limitations of this study and shows the implications on practice and future research.

The following summary of the outcomes at different stages of the study shows the progress of the research across the chapters of this research. Based on the overall research idea, an aim for the research was refined. This is supported by the objectives of this research, which are part of the initial definition of the research project. These are then grounded in academic theory through the research questions. After the conducted study and analysis, these are then answered by the results of this study. The relation between the outcomes in each chapter and overall research progress is shown in the diagram below:

Figure 1-1: Outcomes and Chapters

This structure is used to develop and summarize the aim, objectives, research questions and results throughout the thesis to allow a traceability across the research process. The aim and objectives can now be added to the research structure as they were previously defined. This leads to the following view, which will be completed over the course of this study.

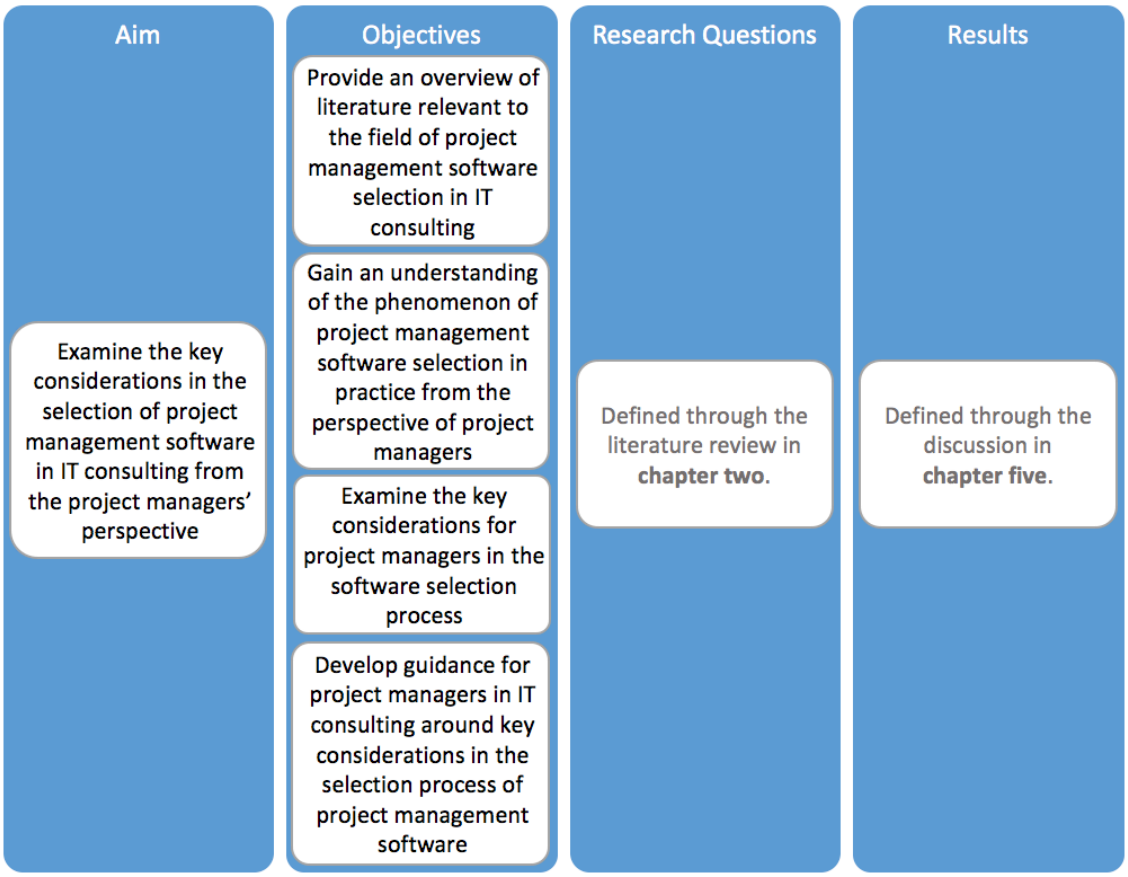

Figure 1-2: Research Structure

1.4 Summary

In practice, project managers in IT consulting often need to decide which PM software should be used in a project. An initial investigation showed that the process of project

management software selection has not been investigated through academic research. It also showed a variation in how terminology was applied. This supported the idea of investigating the phenomenon of project management selection as it occurs in IT consulting. This lead to the development of the overall aim and objectives:

Aim: Examine the key considerations in the selection of project management software in IT consulting from the project managers' perspective.
Objective 1: Provide an overview of the literature relevant to the field of project management software selection in IT consulting.
Objective 2: Gain an understanding of the phenomenon of project management software selection in practice from the perspective of project managers.
Objective 3: Examine the key considerations for project managers in the software selection process.
Objective 4: Develop guidance for project managers in IT consulting around key considerations in the selection process of project management software.

Figure 1-3: Aim & Objectives

The next chapter describes the literature review and the information that academic literature contributed to the course of this study. It also gives an insight into the background of the fields that are underlying this study.

Chapter 2: Literature Review

2.1 Introduction

There is a variety of more than 300 project management software solutions available (Schwalbe, 2015). As the person responsible for the project, project managers need to take the decision, which software they want to employ. To understand this process, it is an objective of this research to examine the key considerations in selection of project management software in IT consulting from the project managers' perspective. This review will aim to show the gap in academic knowledge, that the empirical part of this study will need to address. Additionally, the implications of recent research and its relevance to the study at hand are discussed. More information on how this was achieved will be given in the next section, which gives a structure of the literature review process to provide an understanding of this and the subsequent sections (Starbuck, 1999).

2.1.1 The Literature Review Process

According to Webster and Watson (2002) as a first step the overall process of the literature review should be defined and described. This is detailed in the following diagram, and discussed in the subsequent paragraphs.

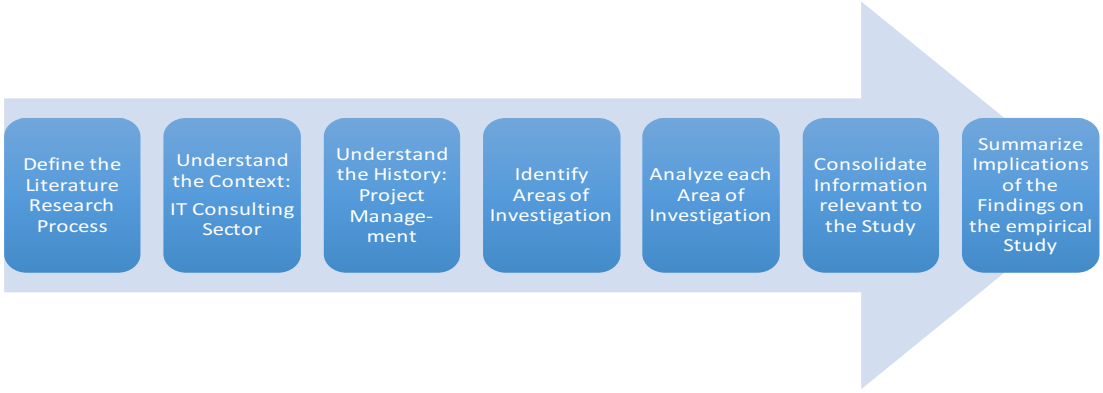

Figure 2-1: Literature Review Process

The research investigates a phenomenon within the sector of IT consulting. This is a key aspect of this research project as it has been found that the sector has a strong impact on the adoption of project management (Shenhar, 2001). Thus, an overview of the context will be given, as it influences the decisions made along the research process. In addition, it is essential to gain an understanding of project management software and project management. This general understanding is attained through an investigation into the background and history of project management. Such an approach also helps to gain insight into the recent developments within his field of study.

Based on the areas of investigation that were identified, the works and concepts of authors within each area were critically analysed in regard to their relevance to the current study. These concepts were consolidated to refine the scope of this research and later be able to link the empirical data to the existing theory.

2.1.2 Identifying relevant Literature

To identify relevant areas, the author first sought and categorized topics found in practice. Following the suggestions of McCambridge, McAlaney and Rowe (2011) the next step was to identify their relevance in academic literature through a search using key search terms, followed by forward and backward searches using bibliographies and citation indices. Through this investigation, connected elements and aspects related to this study emerged, which then informed future search cycles. This approach is aligned with the recommendations proposed by authors such as Webster & Watson (2002) and Levy & Ellis (2006) and their emphasis on the iterative nature of a literature review. The starting points for these searches were both academic journals such as the International

Journal of Project Management and library databases such as the Napier university library search or the ABI/INFORM database. The next sections will discuss the key topics found in relation to this research starting with an outline of the sector of IT consulting.

2.2 The IT Consulting Sector

2.2.1 What is IT Consulting?

The definitions of IT consulting commonly found among the literature can be categorized into two types. One is presented by Djavanshir and Agresti (2007), who describe the IT consultants' role as working in areas such as idea generation, design and project management support in IT. It is aligned with the view from Gartner (2013) defining IT consulting services as advisory services focused on helping clients with the assessment and alignment of technology strategies. This definition emphasizes the advisory aspects of the role without involvement in the technical delivery of projects.

This approach is contrasted by a second one, which shows a perspective going beyond advisory activities. As Joshi, Kuhn, & Niederman (2010) point out, IT consulting encompasses providing services across the entire scope of managerial and IT tasks, covering also the implementation of new IT systems and applications and the processes supported by them. Thus it often expands to systems development and integration (Reineke, 2007) or building, managing and operating and maintaining information (M. Boehm, Stolze, Breitschwerdt, Zarvic, & Thomas, 2011; Valacich, Schneider, & Jessup, 2012). When looking at these services, examples would be security, data analysis and systems integration which are presented as key services within the field of IT consulting (Consultancy.uk, 2017b). This is visualized in the figure 2-2 below.

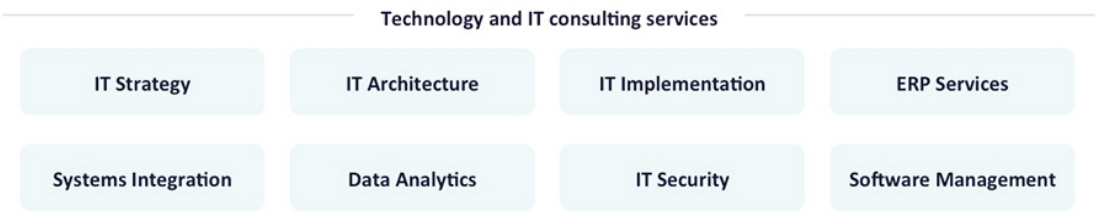

Figure 2-2: Technology and IT Consulting Services (Consultancy.uk, 2017b)

The range of these definitions from mainly advisory to strongly delivery oriented demonstrate that there is no unanimous position in academia. This may be due to the limited amount of academic literature on consulting in the field of IT. The following table summarizes these distinctly different definitions:

Scope of IT Consulting	**Authors**
Advisory services focused on IT strategy	Djavanshir & Agresti (2007) Gartner (2013)
Advisory, implementation and operations services across all IT activities	Boehm et al. (2011) Joshi, Kuhn, & Niederman (2010) Reineke (2007) Valacich, Schneider, & Jessup (2012)

Table 2-1: Definitions of IT Consulting

Without further inquiry, all the aforementioned fields could be deemed relevant to the role of the project manager in IT consulting. In relation to this study, a broader definition will support the explorative nature of this research. Thus, IT consulting will be assumed to encompass advisory, implementation and operations services across all IT activities.

2.2.2 History of IT Consulting

Today IT consulting is an important aspect of the consulting industry (Nissen, 2007). The first consulting services are said to have emerged in the late nineteenth century in the form of individuals providing advisory services around engineering, accounting and advertising (Kipping, 1999). McKenna (1995) claims that the first consulting firm was

founded in 1890 by Arthur D. Little. As he states, it provided advisory services on technical research and management engineering. In 1914 the first management consultancy by the name Booz Allen Hamilton was founded, as McKenna (1995) points out. This is said to have been the blueprint for pure management consulting firms like McKinsey which arose soon after and shaped the development in the sector (O'Mahoney, 2010). According to McKenna (1995), after the economy was hit by the regression in the 1920s, the Glass-Steagall Banking Act in 1933 enforced the separation of banks from any non-banking activities. He reasons this to be the cause of the steady growth of consulting activities from the 1930s onward. As stated by Ciumara (2014) this development was as a turning point that changed the focus of consulting from technical aspects and production to broader strategic and organizational approaches.

While IT consulting is sometimes associated with management consulting, its development goes back to the 1950s (Kipping & Clark, 2012). From this time where most of the first consultancies have maintained their focus on strategy consulting, the growing demand for expertise in implementation, IT and outsourcing has helped other companies to grow into the consulting business, like IBM, Deloitte, PWC and Accenture (O'Mahoney, 2010).

2.2.3 IT Consulting Today

By today the IT consulting sector has encountered a steady growth over the last 4 years and has grown beyond the size of the original strategy consulting in market size (Consultancy.uk, 2017b). Figure 2-3 shows this development in comparison to other types of consulting alongside the overall annual growth of the consulting industry of 4,1 % per year.

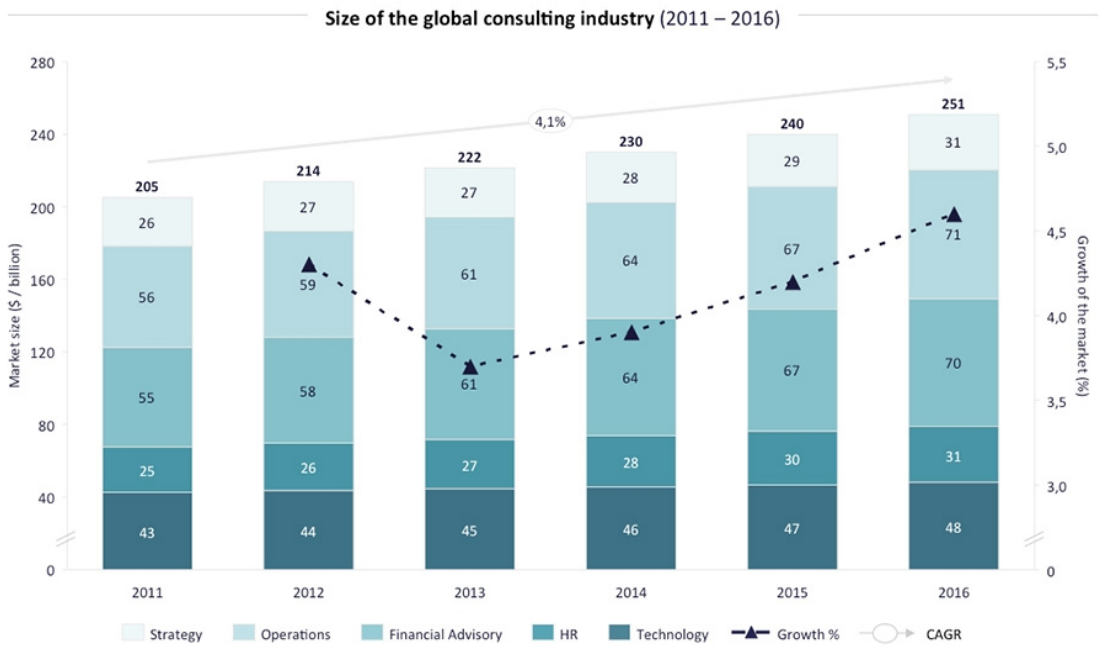

Figure 2-3: Consulting Industry Market Size (Consultancy.uk, 2017a)

The IT consulting sector is driven by the developments in information technology (Schwalbe, 2015). Recent topics and technologies such as cloud computing, mobile or social media are posing new areas of innovation and growth for companies (Rahimi, Ren, Liu, Vasilakos, & Venkatasubramanian, 2014). Following the authors thought, technologies underlying this, sometimes also referred to as the social mobile cloud, can create new business opportunities if adapted in a purposeful manner. Based on Sheltons' research (2013), to successfully formulate and implement a strategy based on the new technologies, many companies rely on IT consultancies. He sees this as one of the drivers of further growth in the IT consulting sector.

In addition, with the capabilities of information technology data is a central resource for companies (Levitin & Redman, 1998). With todays' technology, it has become increasingly easy to gather data on customers and their behaviour (Kemper, Mehanna,

& Unger, 2004). In combination with the data available from external sources and social media platforms, this poses new chances for marketing and sales (Zeng, Chen, Lusch, & Li, 2010). The technological buzzword often heard in this context is big data and how data changes the way businesses are transformed (Mayer-Schönberger & Cukier, 2013; S. J. Walker, 2014). IT companies have created different products to support this trend, but to use the products in a meaningful way and build up a strategy that benefits from the new possibilities, IT consultancies are often called in as enablers as stated by Yaqoob et al. (2016). As they mention, once the strategy is defined, the actual implementation can often result in projects of high complexity. Based on what Schwalbe (2015) said about drivers for IT consultancies, such products will likely be conducted in cooperation with an IT consultancy.

2.2.4 Key Issues and Challenges in the IT Consulting Sector

While not necessarily completely the same for IT consultancies, a report by Frederiksen (2016) on challenges for management consulting firms showed that the key challenge was to attract and develop new business. Especially in IT consulting, this is often equal to identifying the next trend early on, build up skill and expertise in these areas and establish a strong position before any competitors do.

Figure 2-4: Top 5 Business Challenges for Consulting Firms (Frederiksen, 2016)

To be able to provide services for innovative technologies, IT consultancies need to maintain a high-performance culture and employ highly skilled employees (Djavanshir & Agresti, 2007). This poses challenges to people management especially as individuals often work on client site, where it is difficult to establish and promote the consultancies working culture (James, 2015).

An additional challenge can also be attracting the younger generations as employees. According to Downing (2006) millennials, born between 1980 and 1995, are a generation many IT consulting firms have identified as ideal hires to build up skill in innovative technologies related to mobile, cloud and social media. He sees that for many at this age, technology has already been a central part of their lives. Consultancies are competing for these talents not only amongst themselves, but also with other technology companies that often offer a modern working culture adapting to the priorities of millennials (Bolshaw, 2014).

Culture and attracting talent are not the only challenges that companies must face. With the increasing emphasis on innovation and flexibility driven by IT, the traditional way of working in linear, phase-oriented projects has given way to more versatile methods (Bustard, 2012). Thus, as Bustard mentions, many companies have introduced agile methods and principles. He sees entire companies adapting agile not only as project management methods, but also as their overall culture. This, he states, is oftentimes seen as an attempt to mimic the behaviors of startups and successful IT companies such

as Google or Amazon. The trend of agile project management will be further discussed as part of the literature review on project management and IT trends in a later section.

2.2.5 Locating the Research Problem within the IT Consulting Sector

Vanden Brink (2010) has described the life of a project manager in consulting in a paper, that seems to rely primarily on his own experience as a consulting project manager. According to him, much of the work conducted by consultancies is either a project or related to a project. He mentions that the consultants are working in these project environments where they are faced with the challenge of two different organizations: the clients' organization and their own. While his paper indicates this to be an important element of consulting, it is limited in its academic applicability as it lacks data-based evidence to support this statement. In contrast to Vanden Brink (2010), this research project employs empiric research methods to investigate the area of project management in IT consulting. It also focuses on the investigation on the selection of project management software as a sub-aspect of project management in IT consulting. In regard to the sector of IT consulting, this will likely also provide further insight as academic research within this area is limited to this day.

2.3 The History of Project Management

The first step towards an investigation into project management, one should first review the definition of project itself. One of the most common definitions of a project is also promoted by the Project Management Institute (PMI) (2013), which describes the project as unique endeavour of temporary nature. The uniqueness differentiates it from continuous organizational processes. A project, in contrast to a program, also has a defined beginning and end (Project Management Institute, 2013). This is building on

Turners' (1996, p. 6) definition of project management being the "art and science of converting vision into reality". In comparison, PRINCE2, another common project management method, proposes that projects are defined by five characteristics: they drive change, include a level of uncertainly, are temporary and unique in nature, and require cross-functional teams (Bentley, 2010).

When now looking at project management, the PMI (2013) states that project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. As this definition is widely accepted in practice, it can be assumed to foster the communication with practitioners over the course of the research. For this reason, it will be taken as the core definition for all project management related discussions within the research at hand.

When now looking at this terminology, one will quickly conclude that projects according to this definition were conducted long before the term was even debated within academics. Historical endeavours like the construction of the coliseum or the pyramids for example are large construction projects by this definition and military campaigns at the time also faced a high complexity in planning and execution (Seymour & Hussein, 2014; D. H. Walker, 2008). As such, the coordination of these projects was already a form of project management (Kwak, 2005).

Early occurrences of techniques that are often related to the first steps in modern project management are for example the invention of the Gantt chart by Henry Gantt in 1917, which utilizes the visualization of network dependencies (Chiu, 2010; Morris,

1994). Interestingly, Marsh (1975) found that the elements of Gantt charts were already invented previously by the Polish engineer Karol Adamiecki as work-flow network diagrams called “harmonograms” in 1896. The Gantt chart can still be found within popular project management software such as MS Project today.

In the first half of the last century, these project management techniques were applied within the military and industrial area to steer and coordinate logistical and production projects (Hall, 2012). The term and profession of project management then became an area of interest in itself in the late 1950s, when it was introduced and expanded to utilize the program evaluation and review technique (PERT) in the US military and chemical industry (Garel, 2013; Kwak, 2005). Garel mentions that since then, project management has been developed and refined according to the fields of application. He found that through this, project management started out with a strong emphasis on holistic planning capabilities as it originated from applications on projects where outcome and the process towards achieving it could be predefined relatively well. This is what Hall (2012) calls deterministic projects, examples of which would be construction or logistics.

One major development within the field was the standardization of terminology and processes, which has been fostered since the 1980s through the implementation of organizations such as the Project Management Institute (PMI), UK’s Association for Project Management (APM), the Australian Institute of Project Management (AIPM), and the International Project Management Association (IPMA) (Turner et al., 2013). According to the Project Management Institute (2017), they are an organization, which

aims to standardize and promote project management and allows for projects managers to test and certify as professionals according to its standards. With a growth of over 1000% in memberships since 1996, there is a clear tendency of growth within the area of standardized project management (Hall, 2012).

Through the research of the project management journal, a journal publishing five to six articles on a quarterly basis, Rivard and Dupré (2009) found that from 1970 to 1986 only one article was related to information systems project management. Since 2000, the application of project management in fields like research or modern industries such as information technology also became increasingly common, which also changed the focus from concrete to more abstract project outcomes (Hall, 2012). According to Stepanek (2005), this level of abstraction is also one of the major challenges with IT projects, as it increases the likelihood of changes throughout a project. Trends like the introduction of agile project management in 2001 have tried to provide a means to working with this increasing level of change within the project by promoting a stronger focus on flexibility, earlier results and continuous improvement (Kerzner, 2015). Kerzner debates that through this, any uncertainties in planning due to the abstract nature of software and IT can be brought to light earlier in projects.

2.3.1 Project Management Research

With the development of project management in practice, the research into project management has evolved as well over the last two decades (Turner, 2010). As Turner mentions, as part of this growth, it has also matured from a purely practitioner oriented focus to an academic field of study, a statement which is supported by the work of

Rivard & Dupré (2009). He also argues that, as project management is a rather recent field of study many aspects within it have not yet been academically covered.

The emphasis of most studies has been placed on quantitative research, which provides insights into project management from a positivist perspective (Floricel, Bonneau, Aubry, & Sergi, 2014). While this suggests that most research contributes to theory in terms of measurability and applicability of results, it does not address the possibility of yet undiscovered areas within the field due to its specific focus. This focus on deterministic works implies that there is an increasing need to investigate beyond existing structures and frameworks to expand academic knowledge (Jacobsson & Söderholm, 2011; Padalkar & Gopinath, 2016). While taking existing theory into consideration, a critical perspective going beyond a functional-positive view should be maintained (Sage, Dainty, & Brookes, 2014).

Since the practice of project management is influenced by the sector it is applied in (Besner & Hobbs, 2012; Shenhar, 2001), it should also be noted that a majority of research on project management software was conducted either regardless of sector-specifics or within the construction and engineering sector (Pellerin et al., 2013). The current study will contribute to existing aspects by conducting the research within the sector of IT consulting, which has not been covered previously.

2.4 Areas of Investigation related to this Study

Based on the developments in research, asking for theory-building studies, the aim of this study will be to take an explorative approach. As such, the literature review covers two main aspects:

1) Identify literature and findings about software selection in project management itself
2) Provide a deeper understanding of the context the research is conducted in and identify potentially influential factors for software selection

Based on this decision, four key areas within the literature of project management have been identified that will be investigated. The first is project management software selection as a key topic. This is at the heart of this research project and thus needs to be covered extensively. The second topic is success factors and processes in project management to understand how these are related to the area of software selection within project management. The other two areas to investigate are related to the context the research is conducted in. These are information technology as multiple authors have talked about aspects specific of IT projects; and the sector of IT consulting, which has in part been covered in the previous section. The following diagram depicts an overview of these four areas in relation to the central element of project management.

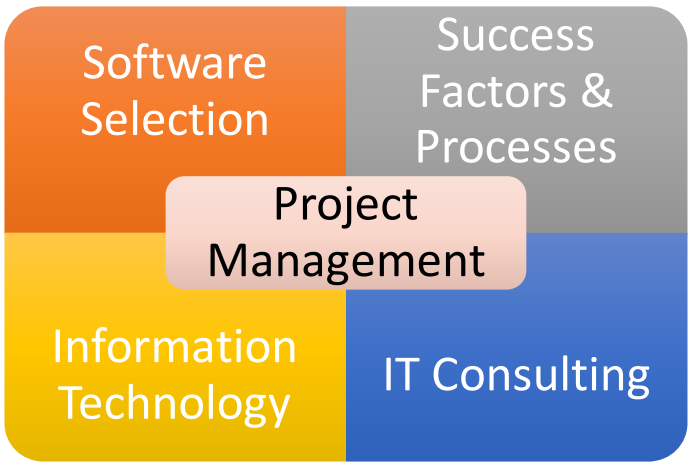

Figure 2-5: Areas of Investigation

As project management selection can also be viewed as a decision-making process, decision making theory was also considered as part of this research. As the aim of the

research was to come to an understanding about the process and its criteria from a project management perspective as opposed to the psychological perspectives on it, decision making was not made one of the main fields of inquiry. Theoretical perspectives and the rationale for not making it a focus area are discussed in the following subsection.

2.4.1 Decision Making

While research on decision making in an economic context goes back more than half a century (Cohen, March, & Olsen, 1972; Nutt & Wilson, 2010), it is also influenced by the area of psychological decision making (Kahneman, 2012). In decision making theory, one approach is to divide into normative, descriptive and prescriptive modes of analysis, which investigate the details of such processes in terms of decision models (Bell, Raiffa, & Tversky, 1988). In many economical environments the complexity of a decision quickly leads to areas of uncertainty within the decision process, an approach that is proclaimed in Simon's concept of grounded rationality (Simon, 1982). While one could evaluate the decision models in terms of applicability towards utilization in the software selection process, the research at hand aims to focus on the process from a project management perspective and which criteria from within its business context are involved.

2.5 Project Management Software Selection

2.5.1 Terminology

When investigating project management software, it seems sensible to first clarify the underlying terminology. Two important terms in this context are the tools and software.

For this research project, it is important to come to a clearly outlined definition, as it impacts the scope of this research and the applicability of any outcomes generated.

The different terms found in academic literature for this topic range from project management software (Ali et al., 2008), to project management tools and toolsets with software as a subset (Besner & Hobbs, 2012), tools as a term used interchangeably with software (Chadli et al., 2016; Gurjar, 2016; Margea & Margea, 2011), to the term tools in the sense of non-technical tools (Patanakul, Iewwongcharoen, & Milosevic, 2010), to the term of project management information systems (PMIS; (Borštnar Mirjana & Pucihar, 2014; Caniëls & Bakens, 2011). This shows the lack of a commonly accepted definition among authors using these terms in the context of project management. Also, no evidence was found that this lack of clarity had yet been addressed.

For the current study, it is important to recognize these terms as being used in their different meaning to be able to understand the different contributions made in this field of research. However, it is not sufficient to merely understand the works of other authors. In order to allow for a clearer understanding of the terminology used throughout this thesis, a definition was adapted from one of the aforementioned authors.

Definition of Project Management Tool: A tool is any form of asset utilized by project managers, including physical and virtual tools such as software.
Definition of Project Management Software: Software as a subset of tools, so project management software is a virtual tool applied in the context of project management.

Figure 2-6: Definition of Tools and Software based on Besner and Hobbs' (2012) Interpretation

As the author of this thesis has not encountered the term Project Management Information System (PMIS) in practice, this term will not be referred to over the course

of this study. It should also be mentioned that the research at hand aims to only investigate the software selection as per the definition chosen above, not tools in their broader definition. Based on the different definitions in the literature it will be a research question of this study to gain an understanding of how the terms are used in practice. This will hopefully contribute to a more conscious use of these terms in future research and simplify the exchange of information between theory and practice.

Aim: Provide clarity regarding terminology in the context of project management as used in practice.

2.5.2 What is Project Management Software?

While some research has been conducted on project management software, little time is spent on defining which software falls into this category. A general definition is given by Caniëls and Bakens (2011) who state that these systems should provide project managers with decision making support for planning, organizing and controlling projects. Besner & Hobbs (2012) link software in project management to practices and process groups based on the PM Body of Knowledge (PMBOK) from PMI. Through this they apply a more specific definition, which is however more prone to change as it depends on the PMBOK which is regularly updated (Project Management Institute, 2013).

This criticism could be made of most definitions though, as due to the rapid developments of software products and the evolution of project management itself, any definitions given today may cause them to be outdated or at least inaccurate in the future. Thus, these should always be reviewed critically in the light of their time. Since the question on what exactly is project management software is not unanimously

answered through the literature, it will be part of this study to identify definitions as used by practitioners.

Aim: Provide clarity on the scope of project management software from practitioners' perspectives.

2.5.3 The Usage of Project Management Software

While a positive impact of the use of project management software on project success was found (Ali et al., 2008; Raymond & Bergeron, 2008) it has also been shown that this influence is depending on other factors. Two dependencies identified are that of data quality within the software as well as the level of usage (Raymond & Bergeron, 2008). Thus, it is sensible to investigate project managers concern with the level of PM software usage. It was also found by Raymond and Bergeron that the potential usage of project management software is related to project budget, so it is also a key aspect that is considered in the study and the interviews. As Raymond and Bergeron based their study on a questionnaire with a relatively small sample size, it is limited in its generalizability and is restricted to parameters identified for the questions. In addition, their study was conducted in a cross-sector environment and does not take into account sector-specific implications. Thus, the current study will take these findings into consideration, but will need to explore them in the process of PM software selection and within the context of IT consulting.

Aim: Develop an understanding of the importance of
1. data quality
2. software usage
3. project budget

in the software selection process.

Another question resulting from the importance of software usage is how it can be maximized? While no literature was found investigating the view of project managers when it comes to leveraging software, some authors have conducted research on capabilities of software by investigating the availability of products or features. An example of this is the discussion by Margea and Margea (2011), who compare different PM open source products available on the market based on the features provided by each product. The focus on functionalities leaves the question of whether the identified criteria are sensible in light of practical application. This is a question that should likely be asked to project managers and users of such software. In a similar approach, Besner and Hobbs (2012) compared different software products, by identifying which of the PMBOK practices and processes are covered by them through quantitative research. Based on the approach this also does not provide further insight on the project managers perspective. Thus, an investigation into the details of the selection of software from the practitioners' view seems necessary.

Aim: Develop an understanding of project management software selection from the practitioners' perspective.

In contrast to the authors above, White and Fortune (2002) found through a quantitative study that project managers perceived project management software to be inadequate for the management of complex projects. As the study was conducted more than ten years back however, this result should be seen with caution due to the continuous development of both project management and PM software. However, project complexity is still found to be a general challenge in relation to project success, thus it could still be relevant in regard to PM software selection (de Carvalho, Patah, & de Souza Bido, 2015).

2.5.4 Functionalities of Project Management Software

As elaborated, no evidence was found on research investigating PM software from the perspective of the user. However, some research has been conducted on functionalities and features. This is not the same as selection criteria from the users' perspective. However, it gives an insight into features, which software vendors perceive to be of relevance to the software users. Thus, these features could also be of relevance for project managers when selecting software. Consequently, it is valuable to take a look at the functionalities other researchers have investigated in more detail. An overview of such features and functionalities is given by Besner and Hobbs (2012) as detailed in table 2-2. The basic functionalities detailed are classic areas of project management supporting processes found in most project environments, whereas the advanced functionalities are more tailored towards specific organizational needs.

Basic PM Software Functionality	**Advanced PM Software Functionality**
Gantt chart	PM software for multi-project resource management
PM software for task scheduling	PM software for Internet access
PM software for monitoring of schedule	PM software for issue management
PM software for resource scheduling	PM software for project portfolio analysis
PM software for monitoring of cost	PM software linked with Enterprise Resource Planning
PM software for resource levelling	PM software for scenario analysis
PM software for multi-project scheduling	

Table 2-2: PM software functionalities based on Besner and Hobbs (2012)

Pellerin et al. (2013) also investigated the utilization of software packages and their correlation with project success in engineering projects. Their approach was to gather data on the utilization based on subsystems they defined for the software. These provide an insight into their definition of functionalities:

Subsystem	Function
Project definition	Define project parameters (employees, classification codes, etc.) and project characteristics (person in charge, dates, contract type, etc.)
Activity planning	Schedule project activities via a specific professional software
Environment management	Manage environmental plans, preventions, training and follow-up actions on inspections and accidents
Health and safety management	Manage health and safety plans, preventive measures, education, preventions, inspections and follow-up actions on accidents and incidents
Estimating process management	Establish detailed estimate of project (project work breakdown structure, work packages, etc.)
Working hours management	Achieve follow-up on working hours provided by the firm according to the contract type defining the project
Document control	Control documents (internal and external) generated during the execution of the project
Document management	Manage processes related to the documents and archive documents
Engineering process management	Carry out recording, follow-up on equipment and materials resulting from engineering, allow purchase requisitions and give an interface with engineering tools
Procurement management	Manage procurement processes related to the project (purchasing, training, contract administration, logistics, procurement follow-up and inspection, material management on site)
Cost management	Carry out follow-up on the project budget, invoicing and payments
Construction activities management	Manage construction contracts, do a follow-up on the construction progress and manage implementation activities

Table 2-3: Subsystems and functions based on Pellerin et al. (2013)

Most of the features mentioned are commonly found in literature and project management software descriptions. To gain an understanding of the utilization of software, the overview of functionalities will later be compared to the applications that project managers see for software in practice. For the sake of comparison, some functions, like the construction specific activities, have been excluded, as they pose no relevance for this study.

2.6 Project Success and Processes

Projects are conducted to achieve a goal. But when is a project successful? This section will investigate the aspects behind success in a project, as well as the means to conduct a project from a methodological perspective. Many studies have investigated project success and to investigate project success in its entirety would be a research project of its own. As the aim of this research is specifically focused on PM software selection, the literature review will only provide an excerpt of this literature directly relevant to the current study. The following subsections will thus be focused on relating aspects of software selection to project success.

2.6.1 Success Factors

The aim of an investigation into success factors is to potentially find links where project management software contributes to individual success factors, which could be an indicator for selection criteria of project managers. Before looking for these specific factors, it seems sensible to first investigate into project success in the context of software selection and IT consulting. The low perceived success rate of IT projects has been a topic for research for years (Hidding & Nicholas, 2017). But what would success be defined as? The most common definition is for a project to be conducted within the so called “triple constraints” on time, to budget, to specification (White & Fortune, 2002).

However, this has often been criticized as ignoring other important factors (Howsawi, Eager, & Bagia, 2011). White & Fortune (2002) utilized surveys to gather data from more than 200 project managers, which formed the basis for their suggestion to expand success factors by adding the impact of the project on its’ organization as a key aspect.

Other frameworks go beyond these basic factors and try to describe the aspects of success in more detail, such as Pinto and Slevin (1987) with their list of ten success factors. Recent complex frameworks sometimes define project success based on over 40 success criteria, allowing for much more focused discussions (Hsu, Yen, & Chung, 2015). A critique of these is that they are still directly or indirectly related to the three core constraints. Also even these complex models still do not encompass a complete understanding of success factors, which is linked to the argument that success is not a unanimously standardized concept (Irvine & Hall, 2015).

There has also been identified a dependence of detailed frameworks and different project types (Pinto & Covin, 1989). Consequently, as no studies investigated PM success in context of IT consulting, no definite answer can be given in regard to the research at hand. Instead, to facilitate the explorative nature of this study, a broader definition encompassing a condensed list of success factors will be adopted. This will allow the investigation into the selection process of PM software to relate to project success which in term fosters the identification of positive influences in the selection process. Thus, the key factors as adapted from White & Fortune (2002) are the following:

- Realistic schedule
- Adequate funds/resources
- Clear goals/objectives
- Resulting impact on the organization

2.6.2 Terminology: Processes vs Practices

The term method is often used when talking about project management (Spiess, 2008). However, when looking at agile project management, the terms practice and process are also mentioned regularly. Conboy and Fitzgerald (2010) see methods as a set of

aligned processes and agile practices that can also be tailored to the project requirements. In this sense, a practice is similar to a process. However, while a practice can be seen as a potentially repeatable activity, to become a process it needs to be adapted within an organization or standard (Takahashi, Yates, & Herman, 2010).

2.6.3 Project Management Processes

One core element of project management are project management processes. As project management software is often implemented to support processes, it seems sensible to develop an understanding of the investigated aspects of processes in this study. There is a variety on processes, which are defined and discussed in industry standards. One of the most common ones is the standard released by the PMI in form of the "Project Management Body of Knowledge" (PMBOK; (Ahlemann, Teuteberg, & Vogelsang, 2009), which gives definitions of processes as well as potential categorizations (Project Management Institute, 2013). Besides that, there are many other approaches towards categorizing project management deriving and interpreting these in very different contexts. The PMBOK, being historically influenced by traditional project management, should also be read critically as many aspects described need to be adapted to be applied in IT projects due to their unique characteristics (Stepanek, 2005), which are discussed later in this thesis. Thus, while a lot of the terminology used in this research is based on or linked to the PMBOK, it will not be part of the framework built in this chapter to use as input for a later discussion with practitioners. Instead, the framework of Chadli et al. (2016) regarding "Systems and Software Engineering - Software Lifecycle Process" based on the ISO/IEC/IEEE 12207 will be adopted. The reason for this is that it provides additional focus on software project management specifically. The adopted framework is shown in the following table:

Process	Description
Project Planning	Management of activities, tasks and plans
Assessment & Control; Decision Management, Measurement	Mechanisms around controlling and providing data as a general basis of decision making
Risk Management	Identification and mitigation of risks
Configuration Management	Maintain inputs and outputs such as software artefacts and documents

Table 2-4: Software Lifecycle Processes; adopted from Chadli et al. (2016)

2.7 Project Management in Information Technology

According to the definition of projects in general, there is a wide range of endeavours that could be assigned to that term. In the context of this study it is important to investigate IT projects, specifically those focused on software, as those are also the central aspect of IT consulting business. Many researchers pointed out that software projects are of higher complexity and diversity than those in most other sectors (Besner & Hobbs, 2013; Schwalbe, 2015; Stepanek, 2005). Thus, the specifics within software project management (SPM) could have an impact on the selection of project management and will be investigated further within this section.

Schwalbe (2015) defines IT projects through the categorization of all elements in project management into the areas of business, organization and technology. While IT would be primarily seen in the technology area, it impacts employees, the stakeholders, the users (organization) and cost and financial benefits (business). Thus, the specifics within IT need to be understood to the impact of the project and subsequently be able to effectively manage it. While it could be argued that these areas also appear in other sectors, it is the specific nature of IT that changes how the area of technology and subsequently business and organization need to be managed. This can be understood by investigating the specific characteristics of these projects.

According to Stepanek (2005), there are 12 characteristics applying specifically to IT projects. He argues that these are at the heart of barriers related to IT project management. As these characteristics have been defined through a comparison with road building projects however, they may not be distinct features of IT projects in comparison to other types of projects. Thus, one might argue that other non-IT projects might be of similar nature in regard to these characteristics. While potentially true, the characteristics show some aspects that are oftentimes hard to address with through methods established in other factors (Stepanek, 2005). An example of this could be the abstract nature of software, which makes it hard to specifically define expected result at the beginning of a project. The characteristics Stepanek identified are detailed in the following overview:

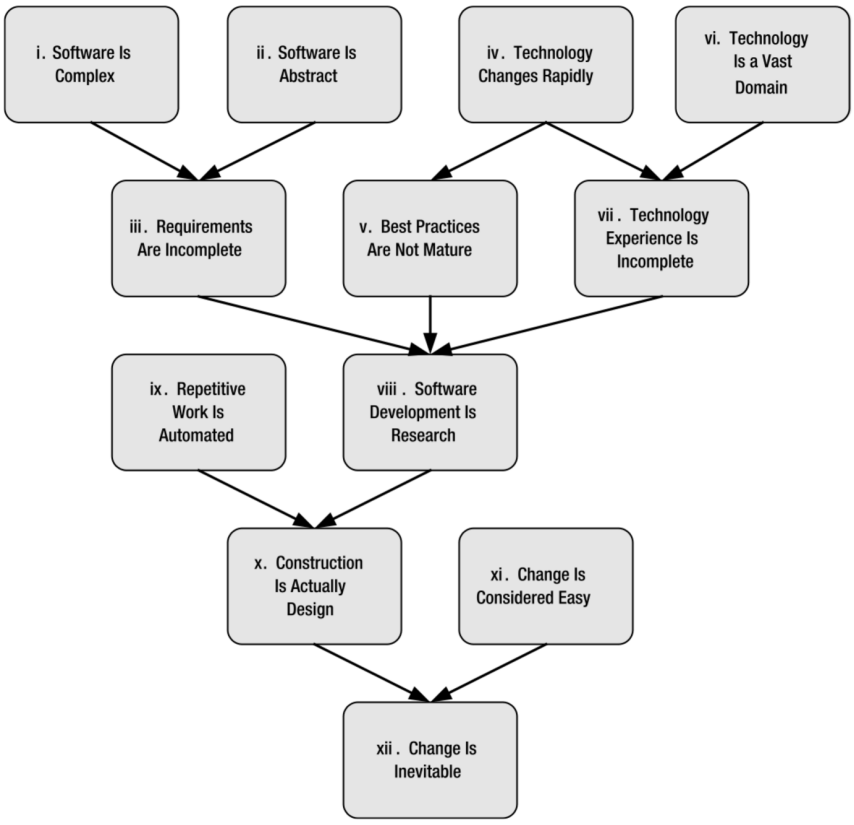

Figure 2-7: Classifications of project management characteristics (Stepanek, 2005)

In this model Stepanek (2005) shows the characteristics and their dependencies. For example, he indicates that complexity (characteristic i.) and the abstract nature of software (characteristic ii.) often cause incomplete requirements (characteristic iii.). When following these dependencies, he identifies change as an inevitable nature of IT projects.

As the basis for Stepanek's definition is a comparison to construction projects based on his experience and literature research, his findings should be seen as a theoretical underpinning rather than set standards. However, the key aspects such as the fluid nature of IT projects has also been supported by other authors such as Boehm (2006) and are likely self-evident to those with experience in IT projects. From a business perspective, many of the characteristics pointed out are better being avoided. An example would be change, which is counterproductive when looking at business processes that have often matured over many years and need to provide consistent information to satisfy legal requirements.

However, as IT companies have been seen successfully adapting to these characteristics for example through the implementation of agile methodologies, the fluctuation and uncertainty in these projects is not only seen as a challenge any more (Rashmi, Priyanka, & Naresh, 2014). They have also proven to be an opportunity to embrace the change and successfully provide services where other companies are unable due to conservative business models (Highsmith & Cockburn, 2001). Thus, it seems sensible to verify how these IT project specific aspects relate to projects in IT consulting as well.

2.7.1 Trends in IT Project Management

When looking at recent developments in IT project management, Schwalbe (2015) has identified a number of important factors to consider:

- Globalization
- Outsourcing
- Virtual Teams
- Agile project management

These four trends are likely intertwined, as globalization could be seen as a driver for outsourcing and virtual teams. It could also be critiqued that these factors have existed for more than a decade. As an example, globalization has been a trend in the global economy already in the last century (Levitt, 1993), it has a continually increasing importance in information technology. Today companies leverage IT to improve collaboration on a global level, which also causes projects to be conducted across different countries, languages, cultural and jurisdiction barriers (Narula, 2014). The

Outsourcing is a second trend commonly seen in information technology (Schwalbe, 2015). According to Tiemeyer (2015), this has also increased the need for cooperation between companies and their service providers. As he states, these diverse environments can create challenging political situation due to conflicting interests.

The development of globalization and the potential of cost reduction have led to shift towards the use of offshore teams in countries with lower wages, also in IT and software development (Niazi et al., 2016). This causes an increasing demand for the collaboration

of teams across the world through information technology (Gilson, Maynard, Jones Young, Vartiainen, & Hakonen, 2015). Schwalbe (2015) found this to be especially true for activities in software development, where tasks can often be conducted remotely in distributed teams.

The aspect of agile project management as a trend may seem surprising as it has emerged over 15 years ago. Due to its strong increase in acceptance over time, the change in its' scale of application still poses a challenge to companies today (Hanssen, Mite, & Moe, 2011). The impact and role of agile project management will be discussed in the next section in more detail.

2.7.2 Agile Project Management

Conboy and Fitzgerald (2010) describe agile project management as an iterative, adaptive and continually evolving way of managing projects by focusing on early feedback and process simplicity. At the core of this lies the idea of fostering an innovative process that continually develops (Conboy & Morgan, 2010). This is building on different agile project management methods that have originated since the beginning of this century. Two of the most common ones are SCRUM (Schwaber & Beedle, 2002) and extreme programming (XP) (Beck, 2000). At the time when Schwaber and Beedle, and Beck provided their accounts of agile project management, the efficiency of it had hardly been researched. This has changed over the course of the last decade (Solinski & Petersen, 2016). Also, though partial elements of agile may have been used in the past, the application of agile methodology in context of IT is still progressing. This seems only natural, as the process of reviewing existing knowledge in the context of technological developments can lead to new insights (Mendack, 2008).

A number of studies have been conducted on adoption of agile processes. According to Dybå and Dingsøyr (2008), each of these is following one of three central aspects: introduction and adoption, how the development process is changed and management of knowledge and projects.

2.7.3 Trust and Leadership in Agile Project Management

While the previous authors emphasized agile as a methodology, much of it is said to have originated from the values and principles of agile projects described in the agile manifesto (Beck et al., 2001; Schwaber & Beedle, 2002). This focus on the more fundamental and underlying concepts of project management such as trust have also been promoted in more recent research. An example is an explorative study by Dorairaj and Noble (2013) building on grounded theory. Though this shows the relevance of trust in agile projects, it is limited by its nature in its generalizability. Hasnain, Hall and Shepperd (2013) and Strahorn, Brewer, and Gajendran (2017) explore the elements of trust and communication as well, by employing interviews with practitioners and games as social experiments. It should be mentioned, that since this work on the social aspects of collaboration is grounded in qualitative inquiry, it again perpetuates the question of generalizability.

From a leadership perspective, trust has been found to be a crucial factor in transformational leadership (Gillespie & Mann, 2004). The value and importance of trust is also supported by research on leadership. Agile, with its focus on continuous improvement could be seen as having a long-term focus on success over simply meeting short term operational goals (Müller & Turner, 2010). This is in line to what is often called transformational leadership, where the focus lies on motivating people towards

following a common vision. Agile methodologies also proclaim the common vision of the team, which defines all further actions(Medinilla, 2012). Opposed to that, transactional leadership is more focused on the operational short-term aspects (Bass, 1990). Müller & Turner (2010) found the transformational aspect to grow in importance with increasing project complexity. Since this has not been reviewed in relation to the selection of project management software, the role and influence of such leadership styles will need to be explored further.

Wysocki (2012) points out transparency as a key element of agile project management to enable self-direction in project teams through a common level of information. While he proposes this from a methodological point of view, it needs to be further investigated on how this can be achieved. The research of Hasnain et al. (2013) proposes communication as a means for not only the exchange of information, but also in relation to building trust as a basis for better collaboration. This statement is supported by Strahorn et al. (2017), who found trust to have a general positive impact on project practices. Establishing agile practices and an open communication also increases trust within project teams, as stated by McHugh, Conboy and Lang (2012). This points to a general interdependency between agile practices, communication and trust, which can be hypothesized to accelerate positive and negative influences in relation to any of these factors. It aligns with Wysockis' (2012) concern that teams and managers coming from more traditional project management may be critical of a higher level of transparency, which is often due to the fear of being exposed to more external pressure when issues are identified. In practice this would likely hinder the implementation of practices.

As software can also be a means for communicating information in a project, it can be argued that it may also be related to trust and acceptance in the project team. Additionally, it could either foster or hinder transparency of information. If and to which degree this is related to project managers' considerations in the selection process, will be an aspect of the empirical study.

Aim: Understand consideration regarding the role of trust and transparency in project management software selection.

While in traditional project management projects base their success on monitoring, tracking and executing as well as clear roles and responsibilities, agile values follow a different approach (McHugh et al., 2012). The evolution around key values of trust, transparency and accountability throughout the entire team requires a change in mindset and behavior (Schön, Escalona, & Thomaschewski, 2015). Medinilla reviewed the role of the leader in this environment, who needs to empower the team as well as to guide them towards embracing additional responsibility (2012). This also supports the claims made by Gillespie & Mann (2004), who emphasize the role of the leader as an enabler. It will be a question to see how the leaders' behavior relates to the process of software selection, especially in agile projects. Thus, the role of leadership is one that will be investigated further during the study.

Aim: Investigate the role of leadership during software selection.

2.8 Research Questions

The aim of this research project is to understand a phenomenon occurring in practice, which is the selection of project management software by project managers. As shown

in the previous sections, research on project management software is limited to functionalities provided by such software (Besner & Hobbs, 2012) and the areas within which it is used (Pellerin et al., 2013). It does not solve the question as to how the selection of such software comes to pass. This knowledge would be an important component in being able to understand and influence the selection process and thus improving the utilization of software on projects. It is the aim of this research to fill this gap, as shown in figure 2-8.

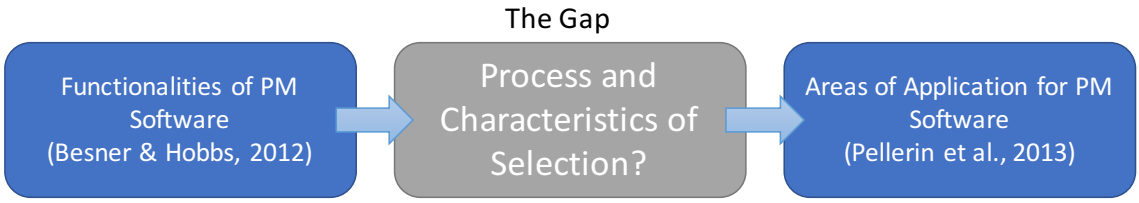

Figure 2-8: The literature gap

Based on this gap, research questions will be formulated in the following subsections. These will then define the subsequent empirical process of the thesis.

As identified by other researchers, the sector in which project management is applied influences its' way of application. Also, no works could be found that locate the application of project management in IT consulting. Thus, the current study sets itself apart through its' IT consultancy context. Through this it will help to provide an understanding not only of the phenomenon of project management software selection, but also the occurrence within this sector.

2.8.1 Research Question 1

One of the objectives of this research is to gain an understanding of the phenomenon of project management software selection in practice from the perspective of project managers. Different authors looked at the functionalities of project management software and software products. They have also investigated if project management software has an impact on project success. While this contributes to the understanding in light of the research objective, it leaves open the question of the perspective of the project manager. No research was found investigating the project managers' perspective on project management software. The current project aims to provide insight into this phenomenon and thus close the existing gap. This leads to the next research question:

RQ1: What is the process employed by project managers in IT consulting for the selection of project management software?

2.8.2 Research Question 2

While the previous research question aims to get an understanding of the process, additionally project managers will have key considerations within this process that provide specific criteria for the selection. Based on the literature research, different aspects of project management and IT consulting were identified that could be hypothesized to have an impact on the selection of project management software. Similarly, functionalities of project management software have been identified.

Raymond and Bergeron (2008) have found a positive impact of the usage of software on project success, depending on data quality and budget. In terms of the research at hand, this leaves the question as to how this is considered within the software selection process by practitioners. While Schwalbe has investigated trends in IT projects in general, specifically pointing out globalization, virtual team and agile project management, this currently can only be assumed to have an impact on the software selection as well. Pellerin et al. (2013) and Besner & Hobbs (2012) have identified project management functionalities that were found in project management software. However, they review the software products in a broader context and not the perspective of the project manager within a specific sector context (such as IT consulting).

However, without further investigation it will not be possible to understand whether these are actually considerations from a project managers' perspective. To be able to further investigate whether these play a role in the selection process, they have all been compiled into the following list of potential selection criteria. This will inform the empirical investigative process as well as the subsequent analysis of criteria found in practice.

The table 2-5 was compiled from potentially relevant aspects found in the literature based on the authors’ perspective:

Potential Criteria	Author	Description
Usage	(Raymond & Bergeron, 2008)	Usage of software in the project
Data quality	(Raymond & Bergeron, 2008)	Relation of data quality to the decision process
Budget	(Raymond & Bergeron, 2008)	Influence of budget on software selection
Trends in IT	(Schwalbe, 2015)	The role of globalization, outsourcing, virtual teams and agile project management in the selection process
Project planning	(Besner & Hobbs, 2012; Pellerin et al., 2013)	Planning and scheduling of work and activities
Document management	(Pellerin et al., 2013)	Creation and management of documents during the project
Monitoring	(Besner & Hobbs, 2012)	Creating reports to summarize and distil project information
Issue management	(Besner & Hobbs, 2012)	Report and track issues identified during the project
Resource management	(Besner & Hobbs, 2012)	Management of the project team(s) in terms of capacities
Cost management	(Besner & Hobbs, 2012)	Management of project financials
IT Processes	(Stepanek, 2005)	Handling of challenges specific to IT such as requirements, handling of change, software complexity and automation
Agile	(McHugh et al., 2012)	Support of agile values or aspects key to agile project management such as iterative planning or transparency; also DevOps as a trending topic
Consulting	No related academic literature	Specifics in relation to IT consulting
Success Factors	(White & Fortune, 2002)	Role of funds, schedule, project goals and senior management support

Table 2-5: List of potential selection criteria

In alignment with the aim of the research to develop an understanding of the view of project managers, the research question seeks to investigate their considerations. These will then be reviewed in the context of the academic aspects provided here as part of the discussion chapter.

RQ2: What are the key considerations for project managers within the process?

2.9 Summary

The literature review showed that there is a need for an understanding of project management software selection in general and specifically in the context of IT consulting. Also, there is currently little understanding of the project managers' perspective on this phenomenon. While there is information available on project management and different areas within this field in general, the defined research objectives could only partially be met through investigating existing academic literature. Thus, two research questions were defined in context of the aim and objectives of this research to highlight gaps in the academic body of knowledge that guide the further development of this study:

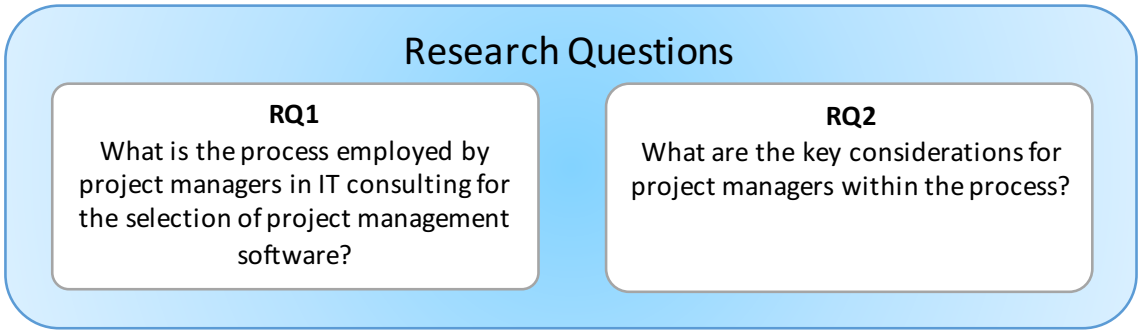

Figure 2-9: Research questions RQ1&2

These will help to gain further insights into the key considerations in the selection of project management software from project managers perspective. These questions should, however, always be seen within their context of IT consulting. An inquiry within different sectors could potentially lead to different answers. One key aspect of this research project will be to understand the selection within the IT consulting sector in depth by applying a qualitative approach. This also contrasts existing authors who researched project management software mainly through quantitative methods.

Developing the research questions based on the studies aim and objectives helped enhance the overall research structure, which was introduced in chapter 1:

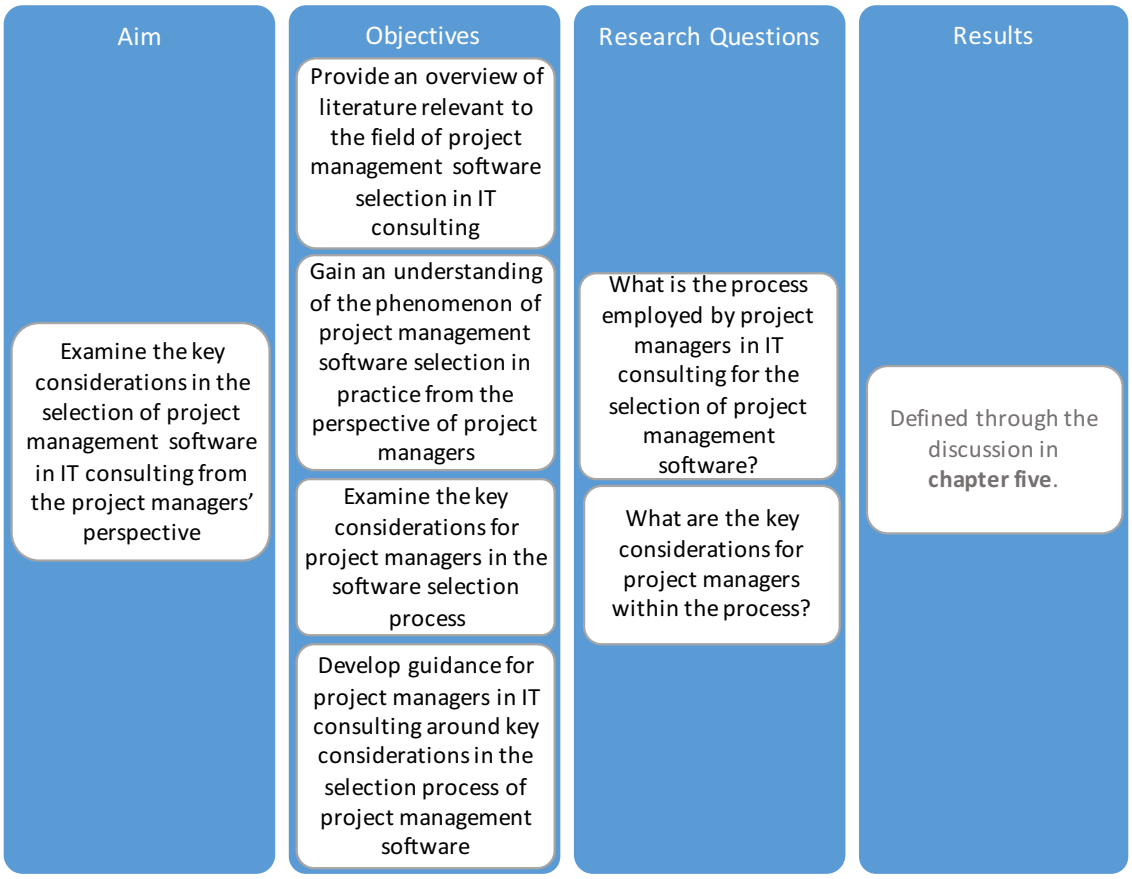

Figure 2-10: Overall Research Structure

To be able to answer these questions, the study requires data that will be gathered from practitioners. This is achieved through a phenomenological research design. The underlying methodology and the rationale behind the choices made as part of the design will be discussed in the next chapter in this thesis.

Chapter 3: Research Methodology

3.1 Introduction

This chapter outlines the methodology used within this study. It will explain the research process and the different steps within this process adapted by the researcher for the project at hand. The aim is to provide a rationale for decisions made in regard to methods and methodology.

To do this the chapter is comprised of sections detailing the approach in order of the research process. It defines the area of study as well as the aim and objectives for the research, which are the basis of any research project (Adams, Khan, & Raeside, 2014; Yin, 2014). Through the literature review, the gaps in theory that the research project addresses were identified and the research questions were specified. The research methodology now defines the approach taken from this point forward.

To ground the research, the question of the researchers view on reality and knowledge is answered in the section on research philosophy. This is done as it provides a rationale for future choices in regard to the research process. Building on this the argument on the research approach debates qualitative and quantitative alternatives towards this project followed by an elaboration of the selection made for the research design. This leads to the appropriate methods to gather the data. As the research involved talking to people and their opinions, the ethical aspects of the research were also considered. Through a pilot study, the methodology as used in this study was verified and adapted where needed. The means of data gathering are discussed in another section and the

analysis of the data will be reviewed. The findings and conclusion will be part of subsequent chapters. The process as described here is depicted in the following process flow.

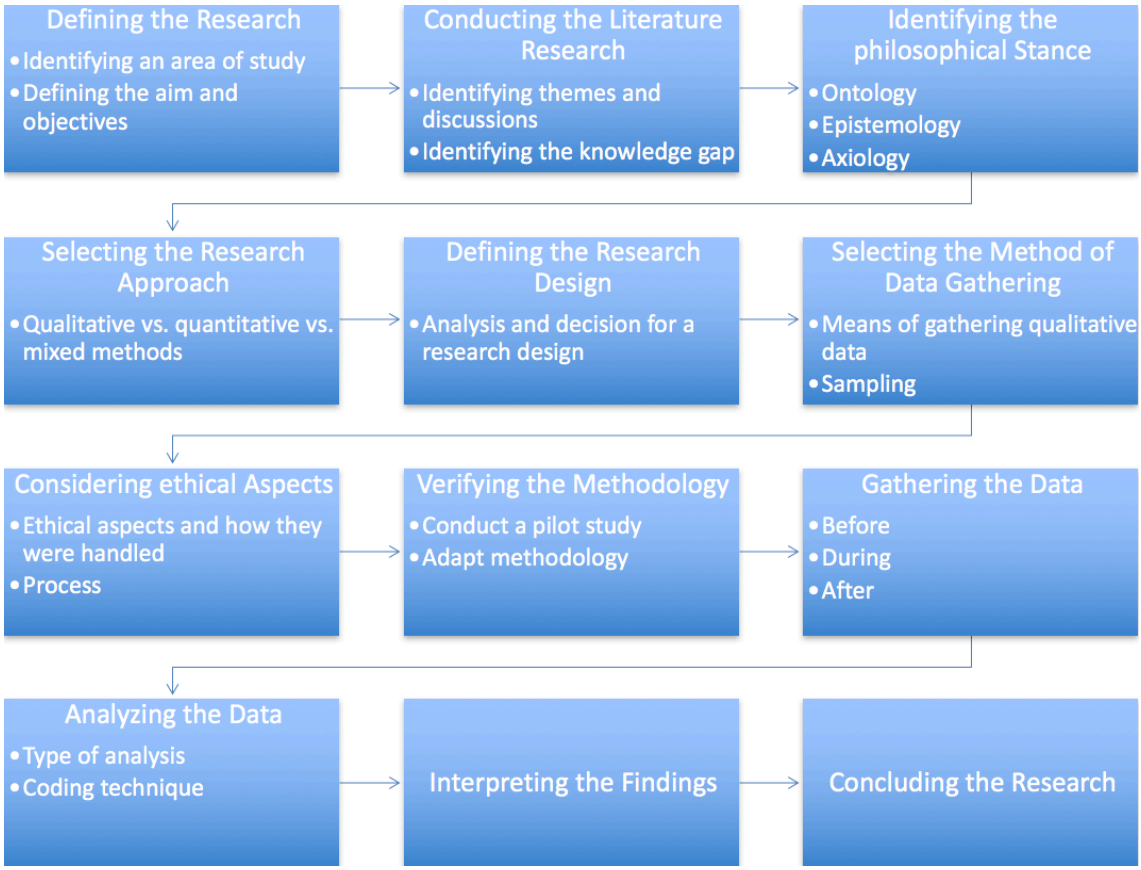

Figure 3-1: Methodological Structure

The process as depicted is a simplification of the research, as some steps are also iteratively informing each other and thus could not be conducted within a simple sequence. An example of this would be the identified gaps from the literature informing the research objective, as an increased knowledge of the academic literature allows for better precision when phrasing the research objective. This in return helps gaining further insight through more precise literature research following from this point in time. As the overall research and the literature were already part of previous chapters, the following section will discuss the underlying research philosophy for this thesis.

3.2 Research Philosophy

If writing a doctoral thesis would be compared to building a house, research philosophy could be described as the natural environment it is built in. Houses built on sandy ground near the desert will naturally be extremely different to the ones built on earthen ground or even the canals of Amsterdam which are populated by house boats. In the same way, research can be approached in very different ways leading to different outcomes, based on the research philosophy.

Thus, the first step towards methodology is the identification and evaluation of the philosophical underpinning. As each philosophical approach has different strengths and limitations, it is important to understand their implications on the overall project and their impact on the research methodology (Crossan, 2003). In order to identify an appropriate philosophy, alternative ontological and epistemological approaches were evaluated.

3.2.1 Terms & Definitions

Research philosophies are a topic that is highly debatable, as classifications found are often incoherent. A number of studies ((Lincoln, Lynham, & Guba, 2011; Ritchie & Lewis, 2014; Saunders, 2012) have used different descriptions, categorizations and classifications of research paradigms and philosophies in relation to research methods with overlapping emphasis and meanings (Mkansi & Acheampong, 2012). As a result, this section will focus on identifying commonalities in existing literature and selecting robust definitions, as these will set the basis for the following analysis.

The fundamental aspects to take into consideration from a research perspective are ontology (reality) and the epistemology (knowledge) (Lynch, 2004). Additionally, for the area of qualitative research, axiology (values) are also of importance as they influence the outcome of the research.

3.2.1.1 Ontology

When talking about research philosophy, one should first be clear about some key concepts. At the center of an individuals' thoughts and opinions stands the view of reality. This is called the ontology. The ontological perspective focuses on the question of what can be assumed to exist. For example, real, measurable objects, conceptual systems, or causal relations (Mingers, 2003). Reality could be regarded as the one single truth, which is called an objective ontology. In contrast to this, there is the belief that reality is just a subjective image, which is called a constructivist perspective (Benton, 2011).

3.2.1.2 Epistemology

Once we have an understanding on the ontological perspective, the next step is to take a step towards defining acceptable knowledge within the research project (Grix, 2010). What is knowledge, can it be identified and described or is it merely an individuals' interpretation of the world? This is the epistemological perspective, which defines what is regarded as acceptable knowledge in a discipline (Bryman, 2011). Consequently, a researcher will likely try to gather knowledge through means that support his philosophical view. The personal perspective can therefore significantly influence the researcher in regards to his preferred approach towards a research problem (Saunders, 2012).

3.2.1.3 *Axiology*

Axiology in research philosophy is the identification of values and their potential impact on the research (Gorman, 2014). While researchers may try to assume the stance of viewing their research through an objective lens, coming from a constructivist this is by definition not possible. Instead it is important to assess the researcher bias to be able to understand any statements made within their context. (Creswell, 2013). In case of the thesis at hand, it has been written by a practitioner with ten years of experience as a consultant for processes and software as well as a project manager. The authors motivation towards the DBA programme originated from the belief, that an individual should constantly seek new challenges to grow ones' abilities and that of others. This is achieved by generating an outcome of relevance to both, research and practice.

3.2.2 Overview of different Philosophies

When investigating the research paradigms, different research philosophies were evaluated. An overview of some research philosophies is depicted in the following table. It also shows the resulting implications in regard to methods, example methods of data gathering and the interpretation of results. As there are many different philosophies, this is only a partial view.

Ontology	Episte-mology	Impact on Approach	Adequate Methods	Impact on Interpretation
Objectivist	Positivism	Quantitative	Survey	Tested hypotheses, "yes" or "no" answer
Obj./Const.	Critical Realism	Mixed Methods	Survey, focus groups, interviews, case study	Result and interpretation in relation to the context
Const.	Rationalism	Mixed Methods/ Qualitative	Survey, focus groups, interviews, case study	Strong focus on limitations of own research
Const.	Feminism	Qualitative	Focus groups, interviews, case study	Focus on interpretation of data in regard to equality
Const.	Interpreti-vist	Qualitative	Focus groups, interviews, case study	Focus on the individual and personalities

Table 3-1: Research Philosophies

3.2.3 Defining the philosophical Stance

Every human is limited in his interpretation by his own experience, his feelings towards certain aspects of life and of course the limit of his own biological senses. He is only capable of viewing the truth from his own perspective. This means every single human will never be able to see more than a blurred image of the truth, which is unique to him. That, which is reality to human beings is shaped by the experiences made in life and as such is socially constructed (Easton, 2010). This is similar to the reasoning adapted by Fenwick and McMillan (2010), that research cannot always provide a single answer, but a multitude, based on context, ontologies and techniques. Because of this the perspective may be similar to that of other people, but likely never identical. Nonetheless it is worthwhile investigating into reality in order to get closer to the truth and identify commonalities, even though the final goal of one truth can never be reached, as reality consists of the things that can and sometimes are experienced as well as things that can't be experienced directly (Houston, 2001).

Thus in case of the current thesis, reality is seen as being derived from the thoughts of individuals (Saunders, 2012). This implies a constructivist ontology. If one now takes the next step on this journey and puts up the question as to how truth within this reality can be uncovered, the limitations of an individuals' perspective and senses will significantly impact the outcome (Houston, 2001). From this perspective, the underlying paradigm for this study is interpretivism, which accepts the natural boundaries of the human being and different possible interpretations and views of individuals (Walsham, 1995). The sector of IT consulting will be of importance in this perspective, as it shapes the individuals view of reality and defines the context of the research aim.

In regard to axiology, the researcher in this current study is a practitioner within his field of study. Based on ones' own experiences, certain opinions and values around the research have formed. One is that of continuous improvement, which means that the researcher and subsequently any aspect of the research and also the topic investigated could and should always be improved. This should then lead to increased efficiency benefitting the organizational development. Both of these aspects are made explicit as part of the axiology as they may subconsciously have an impact on the way the research was approached.

Figure 3-2: Philosophical Stance

3.3 Research Approach

Building on the research philosophy, the question of the overall approach to research needs to be discussed. The research approach focuses on the decision between qualitative, quantitative or mixed methods. According to Bryman and Bell (2015) the differences between those approaches can be seen as ambiguous as there are aspects pertaining to both approaches. Coming from the philosophical stance however, the research objective should define which approach is more suitable.

As the name states, quantitative research is more concerned with quantification of data to gain insight into reality. This very much ties into a binary definition when making the distinction between true or false regarding reality. Qualitative research in comparison is

more interested in words and their meaning and their context. Thus the data is likely more explorative and may later be basis for hypotheses tested through quantitative research (Gray, 2011).

The current thesis is investigating the experience and opinions of project managers in IT consulting. Thus, the context of the opinions voiced by them matters and needs to be taken into consideration. Also, the research aims to identify potential recommendations based on practitioners' knowledge. Thus, a mere evaluation based on numbers would likely miss crucial facts that could not be derived from literature and as such disqualifies a purely quantitative approach. Instead the qualitative approach offers an opportunity to collect and explore rich data (Denzin & Lincoln, 2000), which is suitable in case of the research at hand. This is especially helpful, as the context of IT consulting has not been explored in regard to project management selection. Consequently, a qualitative approach was chosen.

The second question that needs to be answered in context of the research approach is how the knowledge will be generated and where it connects with the existing body of knowledge. There are generally two ways of approaching this aspect. The first is using the existing literature to then design the research so it can expand the existing knowledge. This is called deductive research. The second would be the inductive approach, which means to gather data and then analyse it to subsequently add to the literature (Creswell, 2014). As project management is an area that has been researched in the past and a lot of literature provides information that could be of value for the

actual research process, a deductive approach seemed sensible for the task at hand. This will also be discussed in more detail in the following section about the research design.

3.4 Research Design

As the research is conducted based on a qualitative approach, the next step is the selection of a suitable research design. The research design will give more detailed information on how the research is framed and which specific aspects will be of importance when it later comes to the selection of methods (Creswell, 2013). Two main research designs were evaluated, as they seemed suitable for the current research: grounded theory and phenomenology.

3.4.1 Grounded Theory

Grounded theory provides a structured means to investigate a subject from its own perspective, allowing it to form its own theory based on the data without prior influence. It aims to generate theory by an iterative cycle of gathering data based on which some insight is gained, which then influences the next cycle of data gathering and so forth. This approach is self-enforcing and inductive (Charmaz, 2014; A. Strauss & Corbin, 1998).

As the aim of the research project at hand is to investigate into phenomena within the field of project management. As there is a lot of theoretical knowledge available within this field, it seemed advantageous to utilize the existing theory to enforce the means of data gathering. This however is opposing the inductive approach of grounded theory. Following this thought, while being a potential candidate for the research design, grounded theory was not selected. In the following section, phenomenology as an alternative will be discussed.

Phenomenology

Phenomenology is said to have originated from the works of Husserl and Heidegger. But while Husserl (2012) promoted the idea of isolating perception to avoid assumptions about existence through bracketing, Heidegger concluded that one is always part of reality, thus being thrown into it means inevitably being induced with an individual position of understanding based on ones experiences (LeVasseur, 2003). These stances can also show the origin of phenomenology in philosophy, whereas it has also been applied as a means to approach qualitative research. The development as such has been diverse and the current discussions on its development show that there is no unilateral definition of phenomenology and its underlying trends.

In many debates, there are two main approaches of phenomenology which are assumed to be of relevance: interpretivist and descriptive. Both of which have different underlying viewpoints. The following paragraph seeks to investigate these differences and then argue the choice taken as means of data analysis for the research at hand. To do so, it will follow the different perspectives taken by philosophers and researchers as well as propose a definition for the further course of the study.

3.4.1.1 Descriptive Phenomenology

Descriptive phenomenology is strongly focused on investigating common concepts through enquiry. Thus the investigation through interviews would very much be focused on concepts and leave interpretation to the individual as opposed to the researcher (Lopez & Willis, 2004). While this approach highlights the data as gathered from the participants and their own categorization, it maintains a distance towards the individuals' perceptions and neglects the acquisition of knowledge through context-

based analysis of the interviewees' description of their experiences by the researcher. It focuses on what is explicitly voiced by the interviewee. Its origins can be found in the works of Husserl, who stated that prior experience should be separated from perception to allow an unobstructed perception of truth (Husserl, 2012). While the approach seeks to maintain a very neutral stance of the researcher, which may lead to a more neutral position, it also avoids the discussion of the researcher being part of his own research, thus inevitably shaping and bringing in his own structures and thoughts thus the alternative chosen for the current research is interpretivist phenomenology, which is described in the next section.

3.4.1.2 Interpretivist Phenomenology

Heidegger (1996) in contrast emphasized the inevitable link between the individual and its experiences. This can be seen as the basis of what is called interpretivist phenomenology and finds its application as a research design. The approach towards knowledge focuses on the experience of the individuals (Merleau-Ponty, 1962), which are part of the research. But as this is contextualized and related by the researcher to existing theoretical themes, it is not merely abiding the descriptive approach as aspired by Husserl. Instead the aim is to relate the practical insight of experienced practitioners to existing theory to enhance the existing body of knowledge.

This also means, that any conclusions taken need to be reflected in their prospective context, thus showing that information researched is based on experiences of practical experts, not formed on quantitative verification. Thus, the aim is not to provide generalizable rules, but instead to gain an insight into reality as perceived by practitioners.

3.4.1.3 Interpretive Phenomenological Analysis (IPA)

In practice, the design itself is often called interpretive phenomenological analysis (IPA), which means applying the interpretivist stance of seeking truth in the individuals experience to qualitative analysis (Tuohy, Cooney, Dowling, Murphy, & Sixsmith, 2013). This then allows the researcher to develop an understanding of his own perceptions and take them into account when looking at the data, while still being mindful of its impact in his conclusions.

The relation between perceptions and experience is thus seen as natural and beneficial as opposed to obstructing, which would be the case following a descriptive approach (Conroy, 2003; Lopez & Willis, 2004). The current research, as it investigates into project management, seeks to identify and understand experiences of project managers, as they are the ones defining how the field is applied. As research towards a doctor of business administration requires practical contributions to be made, recommendations based on experiences of successful practitioners are likely to be relevant for other practitioners. Thus, the research at hand seeks to identify and incorporate practitioners' experiences.

As for the current research, there are influences that make the study explicitly interpretivist at its core. One example is the researcher being part of the organization in which the research is conducted. Thus, he has prior knowledge of the organization, its behaviour and also individuals within the organization. The researchers' knowledge of the given organization cannot be removed from the research project at hand, as what the researcher has learned in the past cannot be unlearned. It can even be seen as advantageous in regard to understanding and analysing the data gathered within this

organization. So instead of trying to put aside any knowledge, which according to interpretivist phenomenology is likely to be impossible, this thesis contextualizes the knowledge and experiences of the author and takes it as a helpful basis for framing the research (Holloway & Todres, 2003).

As part of a phenomenological design, bracketing was also evaluated. It seeks to maintain contextual and individuals' interpretation from the data to provide a neutral unfiltered perspective. This means, that all prior knowledge of the researcher as well as his perceptions of the matter are seen as obstructive to the research itself(LeVasseur, 2003). Instead the researchers' knowledge and experience can instead also be seen as being of value to the interpretation. Under this view, bracketing can be seen as contradictive to an interpretivist approach to phenomenology (Chan, Fung, & Chien, 2013). So, for the research at hand the context and potential influences will be stated to provide readers with a contextual view.

3.5 Data Collection Technique

This section will discuss different qualitative methods at the researchers' disposal and provide a rationale for the selection of semi-structured interviews. It will also provide information on the application of the method and how this was done in the project at hand.

3.5.1 Overview of qualitative Methods

The following are different methods that were investigated and considered for this research.

3.5.1.1 Focus Groups

This method is a form of group interview. Instead of just one interviewee there are multiple participants part of the discussion at the same time. Focus groups allow for participants to communicate primarily amongst themselves. The researcher is taking part mainly in a facilitative role (Kitzinger, 1995; Morgan, 1996). This provides further insights into the interaction between participants. As each focus group contains multiple participants, it is also likely to be less time consuming for the researcher than interviews with each individual (Carson, 2001).

3.5.1.2 Action Research

There are multiple types of action research. A broad definition is given by Eden & Huxham (1996) who say that it results from involvement with members of an organization over a matter of genuine concern to them. Action research is therefore a means of trying to understand a subject of study in-depth by direct interaction of the researcher with the subject of the research. It is a means of bridging the gap between researchers and practitioners (Kemmis & McTaggart, 2005; Whyte, 1991).

3.5.1.3 Interviews

A definition of interviews is given by Creswell (2014), who states that in interviews participants are asked open-ended questions to get their views and opinions on a certain topic. Interviews are likely to provide detailed descriptions, integrate multiple perspectives, uncover previously unknown aspects and, by putting together the reports from multiple people, develop a holistic description (Weiss, 1995). Interviews gather a lot of data from different interviewees by having discussions. According to Bryman and Bell (2015) interviews can be divided into three types:

- Structured: These interviews have a clearly defined set of questions. They aim to get greater generality and focus less on the individuals and their opinions beyond these questions. As structured interviews are part of quantitative methods. Thus, they will not be considered further as this project is based on qualitative means.
- Semi-structured: This approach also is organized around a set of key questions, which will likely be used in all interviews. Based on the need to investigate further throughout the interview based on the interviewees' replies, it also allows for additional questions, which allows to gain a deeper understanding of the interviewees perspective.
- Unstructured: This is the most flexible form of interview. There is no set of predefined questions in the interview process. The researcher will ask follow-up questions based on the respondents' previous answers.

3.5.1.4 Summary and Selection of Methods

To support the thought process in selecting the appropriate qualitative method, the following overview was produced.

Data Collection Method	Advantages	Disadvantages
Semi-structured Interviews	Easy to structure Individuals thinking can be explored High level of confidentiality	Time intensive
Unstructured Interviews	Individuals thinking can be explored in the most flexible way High level of confidentiality	Time intensive Could miss information due to missing structure
Focus Groups	Interactions between participants can be investigated	Easy to get sidetracked Confidentiality can be difficult
Action Research	In depth data can be gathered through interaction with the researched phenomenon	Strongly influenced by researchers own senses and opinions

Table 3-2: Data Collection Methods

Semi-structured have been chosen as the method to approach the research at hand. They will allow the use of prepared questions to investigate all necessary, while still enabling the researcher to follow up on aspects of the provided answers from interviewees depending on the situation. This is also aligned with interviews as being a consistent method of research where you can find meaning through language (Seidman, 2013). The interviews can thus be expected to provide lots of information, rich data and many different views. Through this it is likely to get a broader picture and uncover otherwise missed information and aspects. This again could lead to further points of investigation for future research.

As a weakness of interviews, similar as with any kind of qualitative research, the results are very limited regarding generalization, depending on the sample group. This goes together with the fact that interviews are time-consuming, which means that one should aim for a realistic number of interviews to be conducted (Saunders, 2012).

3.6 Sampling

After selecting semi-structured interviews as the method for this research project, this section will now discuss sampling to provide the rationale and also show the limitations associated with it. According to Mason (2002) the process of sampling is a central element of the qualitative research process as it will impact the outcome of the project. In consequence, it seems sensible to select the sample based on the researches objective, which in this case lead to purposive sampling as the method of choice, as opposed to convenience or random sampling.

Robinson (2014) suggests a stepwise approach to identify a meaningful sample, which was the process that was followed in the research at hand. It is depicted in the following overview.

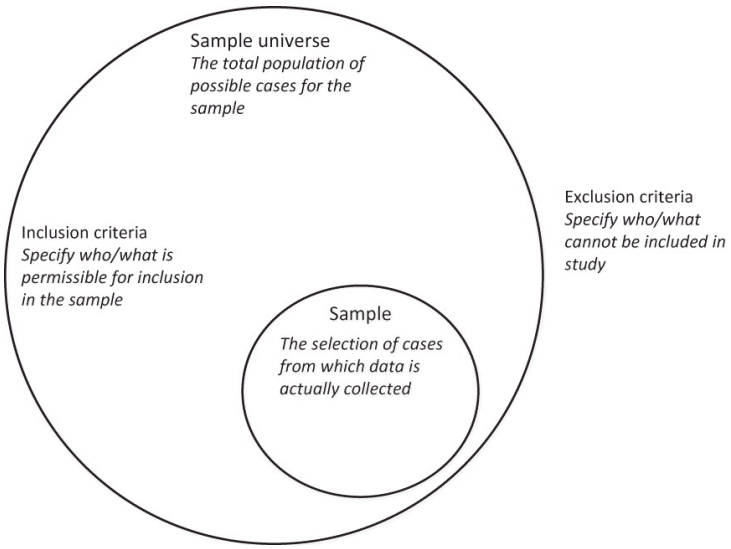

Figure 3-3: Sample, inclusion/exclusion criteria (Robinson, 2014)

According to the model, the sample universe is the population of potential participants. In case of the current research, these are project managers in IT consulting. This is because they are likely the person deciding on the selection of project management software. The interviews allowed the researcher to get a view of their thought process. The advantage of this is, that from a business perspective any recommendations or insights gained from this study are likely to be of help to the group mentioned before. The disadvantage is, that insights from other roles involved in the process being researched will not be covered. As the research objective is aimed at the view of project managers only, the disadvantage is assumed to have little impact on the study.

Looking at inclusion and exclusion criteria, there were three main aspects to consider:

1. Trust: To gain a deeper insight into the thoughts and opinions of participants, it was essential to be able to communicate openly. This is only possible if a high level of trust can be established.
2. Experience: At least three years of experience within the area of project management by the participants so the data collected would be based on practical experience and not solely theoretical knowledge and assumptions.
3. Culture: The research project does not aim to investigate into dependencies on cultural influences, as this would likely be a separate project in itself.

Concerning the sample selection, this had the following implications:

1. Trust: As participants from competitors' organizations would likely be unwilling to disclose sensitive information, only participants of the researchers own organization were chosen. The strong commitment of the individuals' commitment to an organizational identity as described by Smith (2016) was utilized to quickly establish a level of trust and allowed for very open discussions.
2. Experience: Project management experience was a criterion to select the participants. While the aim was to get a lot of experienced project managers as participants, two more junior participants were also interviewed to potentially see different views and opinions.
3. Culture: To minimize cultural influences and keep the sample within a reasonable range, the interviewees were all from Germany or the Netherlands.

The total number of participants interviewed was 17, which is a rather large number for a study applying IPA, where the focus is on in-depth analysis (J. A. Smith, 2009). As the field of IT consulting is rather broad, it seemed reasonable to look for candidates with varying industry and technical background to be able to gain an insight into possible contextual factors in the selection process.

3.7 Ethical Considerations

In social research, ethics is an important factor to consider throughout the entire project and needs to be handled appropriately by the researcher (Ritchie & Lewis, 2014). For this the project was conducted following the universities code of practice on research integrity (Edinburgh Napier University, 2013). It adheres to its imperatives of do no harm (non-maleficence) and do good (beneficence) represented by its underlying five key principles:

- Honesty
- Rigor
- Transparency and open communication
- Care and respect
- Accountability

In the current research, the individuals to gather data from were the project managers in the company IBM. The researcher is a project manager in the same company as well. As a result, the sharing of sensitive or personal information was especially critical as it could expose individuals' weaknesses or perceived failures in the workplace potentially causing repercussions. Thus, in order to avoid any harm to the individuals participating in this study any misuse of information needed to be prevented by ensuring

confidentiality and secure handling of the data. To address this, the study followed the principal of confidentiality and anonymisation.

To provide transparency to the participants, the intention of the interview and an overview of the research were communicated to them before the date of the interview. Before an interview was conducted, the participant was informed about the risks of the study and the measures taken to prevent it. The interviewer also discussed any questions or concerns interviewees might have.

To avoid any form of coercion or even unintentional pressure on participants, it was made clear that participation was entirely voluntarily and that participation in the study could be withdrawn at any time, even throughout or after the interview, in case of which none of the data gathered would be used. While this option was clearly stated and offered, none of the participants made use of it. The ethical and political issues and the measures taken by the researcher and the option of withdrawing from the study documented on a form of informed consent. This was part of the discussion prior to the interview and signed by interviewees after clarification of all questions as acknowledgement. Only then was the recording started and the interview itself was conducted.

The data gathered was handled as sensitive personal information, which was transferred to the laptop of the researcher after the interview and any copies were deleted. The data on the laptop was protected through systems and hard drive passwords and

encrypted using Symantec Encryption Desktop. None of the data was used for purposes other than this research.

3.8 The Pilot Study

To ensure the applicability of the methodology as defined by the researcher, it is encouraged to test it with a small sample before applying it for the overall research project (Reiter, Stewart, & Bruce, 2011). For the project at hand, this step was conducted using two participants. The results of the pilot study proved that the overall methodology could be applied, but also showed some aspects that needed to be altered. The researcher has documented this process in more detail in the reflective diary, which details the journey and learnings from the work on this thesis.

3.9 Process of conducting the Study

The interviews will aim to be conducted face-to-face where possible. The reason behind this is to make it easier to establish credibility and rapport. It makes it also easier to keep a high level of motivation throughout the interview. Where a face-to-face interview is not possible, interviews via phone will be conducted. According to Wilson (2014) interviews will be following multiple stages:

Stage	Description
1	Pre-interview planning
2	Day of the interview
3	Arrival
4	Start of the interview
5	During the interview
6	End of the interview

Table 3-3: Stages of a face-to-face Interview (Wilson, 2014)

Although these stages provide some insights, the description as well as the number of phases could be more detailed. Elements that might be added would be scheduling the

interview, as well as transcribing the interview afterwards. For the current study the model was adapted to the following stages:

Stage	Activity
1	Schedule the interview
2	Prepare notes for the interview (Print template with questions, rehearse questions)
3	Start interview (make a good first impression (Burtt, 2001), build trust, introduction)
4	Conduct semi-structured interview (key questions, explore on possibly interesting data)
5	Finish the interview (Closing questions, re-ensure trust)
6	Transcribe the interview

Table 3-4: Stages of the planned Interviews (Wilson, 2014)

3.9.1 Before the Interview

Before the interview the researcher needs to organize the logistics of the interview. One aspect of this is the location where the interview should be conducted. Criteria that may influence this decision could be the confidentiality of the surroundings, potential interruptions due to phone calls in the interviewees' office and the general wellbeing of the interviewee and interviewer to foster the conversation (Bryman & Bell, 2015). For the interviews at hand, a meeting room in a company building was chosen as the preferred location and reserved for the duration of the interview. Also, a set of questions was printed for the interviewer to be able to refer back to during the interview process, as well as a form of informed consent for the interviewee.

3.9.2 During the Interview

The interviews started off with some small-talk to build a relationship with the participant and create a positive atmosphere, as also suggested by Bryman and Bell (2015). After that a short introduction of the circumstances was given as well as an introduction of the thesis topic. Following on that the form of informed consent was shown, discussed and signed by the participant. Only then did the recording start to

gather the data based on the questions asked. During the interview, questioning techniques as described in the section on interview questions were applied. The duration of the interviews varied between 45 and 120 minutes.

At the end of the interview, the interviewees were given the opportunity to ask questions themselves and told about what would happen with the information they gave. They were also informed that they would be able to get the transcription to verify the information given by them. After this, the interview ended.

3.9.3 Transcription

To prepare the analysis of the data, the recordings needed to be transcribed. As the overall number of words transcribed was over 90,000, this was done in two steps for each interview to minimize mistakes:

1. Initial transcription
2. Review and correction

The advantage of this process was that the researcher was already familiarizing himself with the data, while limiting mistakes resulting from a decrease in attention throughout the repetitive tasks of listening and typing. The written data was captured into NVivo for further analysis.

3.10 Analysis

Following the transcription, the researcher will likely look at coding as the first step towards analysing the data. For this, the first step will be to look at the type of analysis to be conducted to then identify the specific coding techniques that will be applied.

3.10.1 Thematic Analysis

A thematic analysis seeks to identify, analyse and structure the data of the research and thus aid the researcher in showing patterns within (Braun & Clarke, 2006). This means looking for existing patterns in regard to the selection process as described by the project managers.

As a first step, the term of theme needs to be investigated and defined accordingly as it is a precondition to effectively code. To do so it should also be considered what relevance and presence within the data are necessary requirements for a theme to be defined as such. Themes can be rather abstract and are hard to define clearly (Ryan & Bernard, 2000). They are identified and defined by the researcher before, during, and after the analysis of the data.

3.10.2 Inductive versus Theoretical Thematic Analysis

There is a decision to be taken, which way the data should be approached with thematic analysis. To identify themes or patterns, one could go ahead and analyse the data without prior definition of themes. This would be the inductive approach, which is trying to avoid analysis based on pre-existing coding frameworks. They would emerge from the data throughout the analysis, though of course they would still be influenced by the researchers' knowledge and understanding as he cannot work outside any epistemological perspective (Patton, 2015).

An alternate approach would be to use theoretical thematic analysis, which approaches the analysis with a framework of themes in mind. The coding would then have a clear link to the initial research questions formulated by the researcher.

When comparing the two approaches, the inductive approach is likely to provide richer data, whereas the theoretical approach is more narrow and likely to unveil deeper insights (Braun & Clarke, 2006). For the research at hand, the interviews were conducted with specific research questions in mind to strengthen insights based on existing theory. However, since little research has been conducted on the topic of software selection, there were emerging themes from the data not directly covered by frameworks and ideas in the literature. Thus, it seemed sensible to approach the analysis of the data with both, a theoretical aspect and an inductive identification of themes from the data itself. For this reason, both approaches were adapted into an approach that was sensible concerning the search for themes as posed by the research questions.

3.10.3 Different Stages of Thematic Analysis

In the beginning, the analyst starts to search for aspects relevant to the research question and other meaningful patterns. The researcher then documents the identified data along with the codes, analyses and discusses it in regards to the meaning of the identified patterns and then returns to the search of further patterns (Braun & Clarke, 2006). This is a continuous iterative process until the researcher moves on to produce the final report. Braun and Clarke defined this process in greater detail as the six stages of thematic analysis as shown in the following table.

Phase		Description of the Process
1	Familiarizing yourself with your data	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2	Generating initial codes	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3	Searching for themes	Collating codes into potential themes, gathering all data relevant to each potential theme.
4	Reviewing themes	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic map of the analysis.
5	Defining and naming themes	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6	Producing the report	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Table 3-5: Phases of thematic Analysis (Braun & Clarke, 2006)

Other researchers like Miles & Huberman (2014) and Creswell (2013) have described similar frameworks using similar stages of construction.

3.11 Coding

When looking at coding, the researcher aims to assign attributes to parts of his data to capture its' primary content and essence in context of his research (Saldaña, 2016). As previously stated, the aim is to identify patterns. These are reoccurring or distinctive elements within the data. Looking for patterns should, however, not be the only aim when coding, as it may narrow oneself in ones' perspective towards the data (Alvesson & Karreman, 2011). Following this advice, the process of coding was conducted in two

main cycles. While the first cycle was focusing on identifying meaningful attributes and passages in the data, the second cycle aimed to identify categories and patterns. According to Saldaña (2016) the first cycle of coding encompassed the following techniques:

Technique	Description
Descriptive Coding	Coding for topics within the data
Process Coding	Coding of actions and activities
Structural Coding	Coding of data related to the research question

Table 3-6: Coding Techniques

Structural coding can be seen as a very natural approach to investigating the data. However, it also seemed sensible to investigate more than just the direct relation to the research questions since not all relevant aspects are obvious during the first coding cycle. To accommodate for this, the descriptive coding was used to identify any general topics within the data. The process coding, which focuses on actions taken, was also relevant to this research project, as the research aims to investigate the process of selection. As such, activities related to the selection are of course of vital interest to the researcher.

This first round of coding was also tested against another researchers' perspective on the data to investigate similarities as well as differences and be able to take them into account for future research, a technique that Strauss (1987) refers to as member checking. The second cycle of coding was then mainly focused on patterns, subthemes and emergent themes, so that a later analysis and categorization would be possible (Miles et al., 2014). The results of this are documented in the findings chapter.

The study was done using NVivo, which helped maintaining an overview on the large number of codes, as well as making it easier to find and reuse appropriate codes across

interviews due to the search functionality. However, the coding was still done manually within the software, as the process of coding can be seen as part of the researchers journey of getting acquainted with the data (Saldaña, 2016).

3.12 Summary

This chapter has shown the methodological underpinning of this research project. Reviewing the process framework at the beginning of this chapter, the customized process including the decisions made along the path can now be seen as follows:

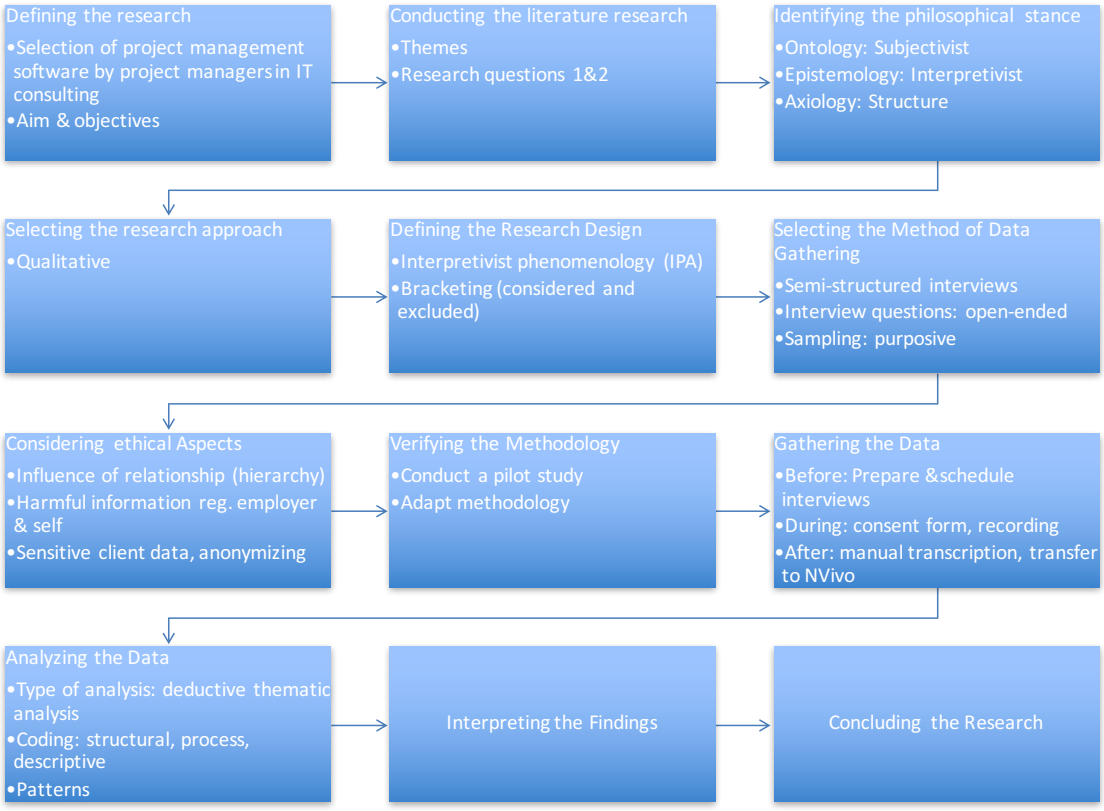

Figure 3-4: Adapted methodological Structure

This adapted process framework shows the aligned research process after identifying the individual approaches and methods needed to conduct the study at hand. It also provides the trail of thought that lead to the choice of qualitative methods. Based on

the research question, the philosophical stance of a constructivist / interpretivist was described. For the inquiry at hand, this led to the logical choice of a qualitative approach. The interpretivist phenomenological perspective led to the selection of semi-structured interviews as a choice of method. Based on purposive sampling these were conducted among project managers in an IT consultancy to gather data. The data was coded with NVivo and then analysed using thematic analysis. The results of the utilization of this methodological approach will be shown in the next chapter, which describes the individual findings.

Chapter 4: Findings

4.1 Introduction

The findings chapter provides a structured view on the data gathered though the course of this study. The sections within this chapter will provide excerpts of participants' statements made and which may be either supportive or contradicting of each other, thus providing input for further arguments (Saldaña, 2016). These arguments will be developed and finalized in the discussion in the fifth chapter. Before elaborating on the individual findings, this section will provide a review of the research questions and the potential criteria identified for the selection of project management software, as these will be the baseline for any findings. The subsequent overview of participants will give an insight into the practitioners' experience drawn upon and their background.

In chapter two, the research questions were identified through the literature review. These were:

RQ1: What is the process employed by project managers in IT consulting for the selection of project management software?

RQ2: What are the key considerations for project managers within the process?

4.2 Participant Characteristics

The participants were all working in the same global IT consulting company and had experience in project management roles. This section provides an overview of the participants experience, qualifications, technological and sector focus as well as the educational background. This allows to contextualize the findings as detailed later in this

chapter. The key criterion for selection of participants during the sampling was their experience, to ensure sufficient insight into the phenomenon investigated in this study.

4.2.1 Demographic Attributes

The following tables give an overview of demographic attributes of the sample: age, gender and nationality.

Age Group	Number of Participants
25-40	5
41-50	7
51-65	5

Table 4-1: Age Groups

In regard to age, the sample covers participants relatively early in their career, as well as senior project managers with less than five years until retirement. This is similar to the average age in Germany, which is about 43 for men and 46 for women (Bundesinstitut für Bevölkerungsforschung, 2017).

Gender	Number of Participants
Female	2
Male	15

Table 4-2: Gender Distribution

The gender distribution is similar to that commonly found in the IT industry and is in line with information provided by Statista (2015), who found that 20,5 percent of leadership roles in the IT and services industry were filled by females.

Nationality	Number of Participants
German	15
Dutch	2

Table 4-3: Nationalities

The sample was mainly focused on German participants to limit any variations due to cultural differences. Two Dutch participants were chosen as the primary criterion for considering participants was not nationality, but experience.

4.2.2 Qualifications and Experience

Throughout the sampling process, the key criterion was that of practical project management experience. Thus, the participants needed to have at least three years of practical experience in project management roles to provide practical insights about the selection of project management software. For this study, the average participant had 15,1 years of experience. The range of experience within the sample varied from 3 to 35 years. This also allowed to see potential patterns regarding the research questions in relation to participants experience.

Experience	
Average PM Experience (Years)	15,1
Minimum PM Experience (Years)	3
Maximum PM Experience (Years)	35

Table 4-4: Participants' Experience

In addition to the years of practical experience, participants were asked for their formal project management qualifications. These fall into four major categories. The first is the IBM internal certification, which has two higher levels, those for senior and executive project managers. Both require formal trainings, as well as a proven record of multiple projects over a course of a number of years. The next formal qualification was that of project management practitioner (PMP), which is awarded by the project management institute and is a standardized certification commonly found across different sectors. Another qualification found was that of scrum master, which certifies a foundational understanding of agile practices according to the scrum methodology. Then there were other qualifications given as well, which were grouped as "other".

Formal PM Qualifications	
IBM Senior PM	4
IBM Executive PM	2
PMP	7
Scrum Master	3
Other	2

Table 4-5: Formal PM Qualifications

As project management within IT depends on technological aspects of the projects conducted, it should also be reviewed. The two most commonly mentioned were application development and SAP projects as distinct technological types of projects. Additional types of projects were also mentioned like maintenance and strategy consulting, which were categorized as others.

Technological Project Focus	
Application Development & Others	7
Application Development, SAP & Others	4
Application Development	4
SAP	2

Table 4-6: Technological Focus

As previously stated, project management should be viewed within its sector. While the project managers interviewed were all part of an IT consultancy, the sector that their clients work in could also be of relevance. Seven project managers focussed mainly on one sector, while the ten were working across sectors. The educational background gave an insight into the field of study as well as the degree that lead up to the practitioners taking on their roles. All interviewees completed a university degree, ranging from bachelor to MBA and PhD. The most common qualification among project managers was the 4-year diploma or master degree.

Highest Educational Qualification	
Bachelor	2
Master, Diploma or similar	10
MBA	2
PhD	3

Table 4-7: Educational Qualifications

Most participants did their degree in IT or business IT, which seems logical as it is directly related to IT consulting. Other fields of education encompassed engineering and natural sciences were also common.

Field of Education	
IT / Business IT	8
Engineering / Business & Engineering	4
Natural Sciences	4
Other	1

Table 4-8: Field of Education

To understand the types of projects that the interviewed project managers drew their experience from, it also seemed sensible to investigate some aspects that other authors also described as relevant factors influencing project management in general. Thus, participants were asked to provide information on their experience with distributed teams, agile projects and international projects. While most practitioners had worked with distributed teams and in an international environment, five had not yet worked on agile projects.

Experience with			
	Distributed Teams	**Agile Projects**	**International Projects**
Yes	16	12	15
No	1	5	2

Table 4-9: Experience with distributed / agile / international Projects

4.2.3 Seniority of Participants

Experience is a key qualification when it comes to project management, which can be supported by formal qualifications (Peterson, Hartmann, Fruchter, & Fischer, 2011). Thus, the participants will be grouped into seniority groups for the purpose of this study. This will help placing the statements made by them without revealing the individuals through exposure of too much information. The following seniority groups have been created:

Seniority Groups	
Experienced Project Manager	3-9 years of PM experience
Senior Project Manager	10-19 years of PM experience or IBM Senior PM certification
Expert Project Manager	20+ experience or IBM Executive PM certification

Table 4-10: Seniority Groups

This classification leads to the following list of participants:

Seniority Group	Number of Interviewees
Experienced Project Manager	4
Senior Project Manager	6
Expert Project Manager	7

Table 4-11: Distribution amongst seniority Groups

To identify interviewees in relation to their statements, they have been assigned a number from 1 to 17 and will be referenced in combination with their seniority to give some context. All mentions of participants will not be specific to their gender, as due to the small number of women that participated in the study this could pose a threat to their anonymity.

4.3 Overview of Findings Categories

After the interviews were transcribed and coded, patterns began to emerge. This section shows snapshots of the steps through which the categories were identified from the data. It also gives an overview of the categories the data was clustered into through the analysis and gives a description of each of them and the rationale behind this separation. The subsequent sections will then give a more detailed insight into the categories presented.

As the aim of this research project was to understand the data in its context, the data needed to be structured through coding and then clustering of ideas and patterns. Thus, the next step was to go through multiple coding cycles. An excerpt from one of the stages is given through the following hierarchy chart, which provides an overview of the structure of the data at the time.

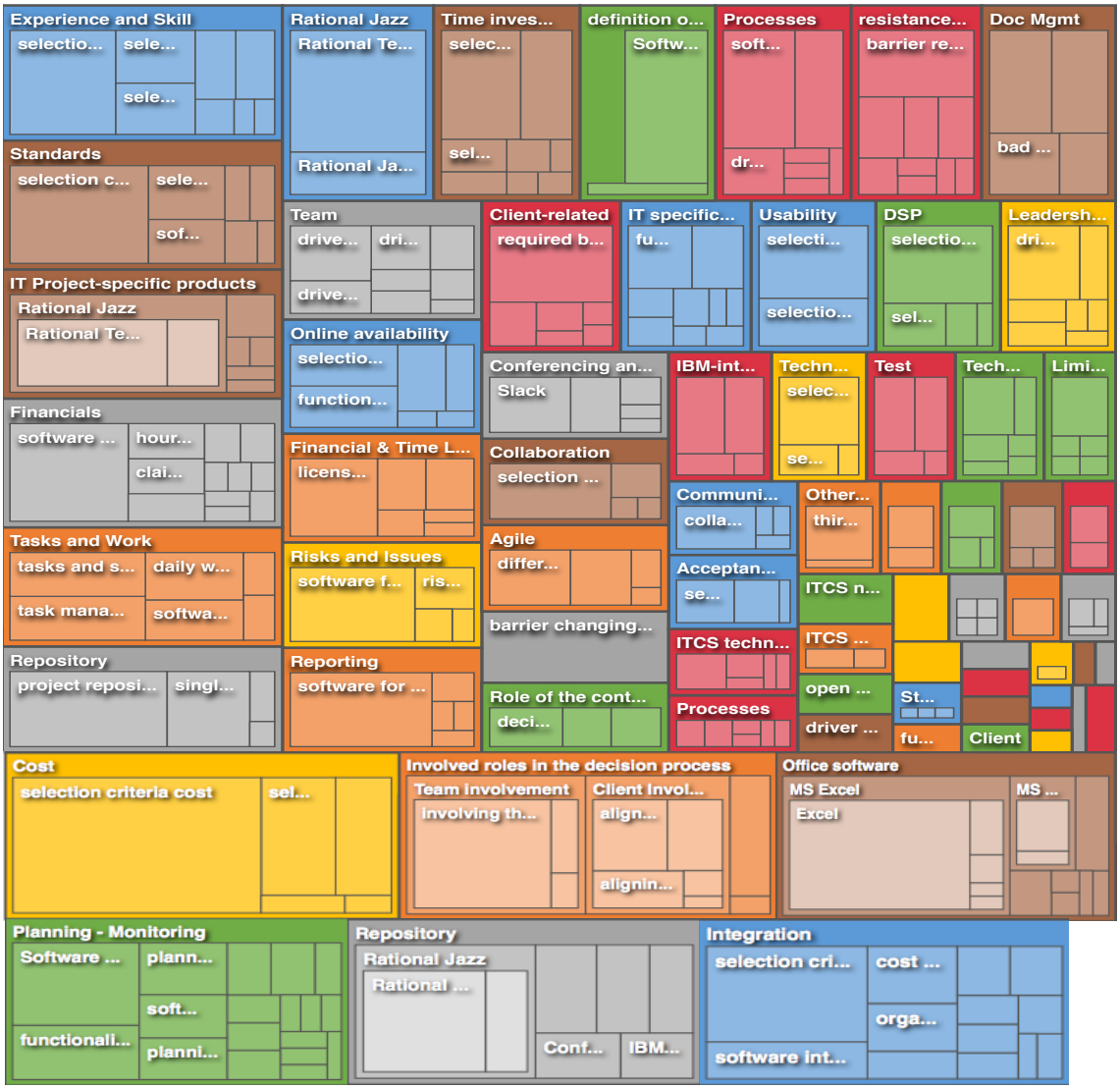

Figure 4-1: Excerpt from the NVivo Hierarchy Chart

Through further refinement, the patterns were condensed to a list of categories, which represent the findings in their context. These categories are the basis for the structure

of this chapter. The following table represents the synthesized and refined version of these findings:

Findings Category	Description	Link to Research
Terminology	Information related to the terminology and definition used in practice.	What are the key definitions and understandings used by project managers in IT consulting on project management software?
Selection Process	Descriptions of the software selection process itself.	**RQ1:** What is the process employed by project managers in IT consulting for the selection of project management software?
Drivers	Positive influences on the software selection process.	**RQ1:** What is the process employed by project managers in IT consulting for the selection of project management software?
Barriers	Negative influences on the software selection process.	**RQ1:** How do project managers in IT consulting select project management software?
IT Consulting	Specifics about PM software in IT consulting.	Additional information regarding the sector context
Selection Criteria	Different selection criteria for PM software.	**RQ2:** What are the key considerations for project managers within the process?
Functionalities	Selection criteria that are functionalities / areas of application for software.	**RQ2:** What are the key considerations for project managers within the process?
Software Products	Specific products mentioned.	Additional information, can be found in the appendix
Importance of PM Software Selection	View of project managers on the importance of the process	Relevance of this study

Table 4-12: Findings Categories

These findings provide the following key areas that need to be addressed:

1. The findings on the selection process, along with the drivers and barriers occurring in practice.
2. Selection criteria and functionalities as seen in practice in comparison to the potential categories drawn from the literature
3. IT Consulting specific elements about the PM software and its selection
4. Relevance of the selection process and other findings.

Thus, the categories will be discussed in individual sections, where an overview of the patterns identified within each category is provided. These are then elaborated on in greater detail accompanied by extracts from the interviews.

4.4 Terminology

As already discussed in the literature review, there is no consensus in the literature as to which of the terms is accurately describing project management software. Most of the authors in academic literature seemed to implicitly define tool differently than the word software in the context of project management. To get an impression of the understanding in practice, the differentiation was investigated.

One answer was the following: *"I see it [the terms tools and software] as the same thing. Project management tools for me are always software." (Participant 9, Senior Project Manager).* As another project manager stated, *"The two terms [tools and software] are used pretty much interchangeably." (Participant 1, Expert Project Manager).*

When asked directly about the difference, 15 out of 17 participants mentioned that they would not see a practical difference between the two terms when it came to project management software / tools. Though two participants mentioned they would see a difference in the practical use of this terminology, even they used the term project management tool interchangeably with software at least at some point during the interview.

4.5 The Selection Process

This section discusses the findings relating to the descriptions of the software selection process itself and thus relates directly to the research objective of the thesis. While

project management software itself has been researched in the past, the process of selecting project management software as a project manager in IT consulting has not yet been described in the literature. Thus, the data gathered from the interviews gives a first insight on this process.

4.5.1 Involved Roles in the Selection Process

During the interviews when talking about the selection process of project management software, interviewees often related to the roles that were involved and how they were part of the decision.

4.5.1.1 Involving the Team

For most participants, the project team was a group that should be involved in the decision process. One interviewee voiced an opinion that is representative for what thirteen others said about team involvement:

> *There is not one answer, but my principle is that I involve everybody who needs to work with the tool. So, I don't like to confront people with decisions that have an impact on their way of working, unless they are mandatory. But if you have a choice in tools, I always like to involve all the team members that are impacted. Either directly or if it is big team then I would involve the team leads or representatives of those teams. I like to get consensus that this is the way forward. They don't have to agree, but at least they have the feeling that they have been involved in the decision, which can lead to better decisions, but also even if they don't agree they know where it is coming from and it will probably help them in accepting the decision. Because a tool is only as good as how it is*

being used, so if people don't use the tool you have nothing. (Participant 10, Senior Project Manager)

As the interviewee points out, the benefit of software is limited by the amount it is used. The aim of involving the team as described by this project manager is to raise acceptance and through that drive the usage of the software. He mentions two limiting factors in relation to the team involvement:

- Actual users of the software – as the interview participant describes, he involves those team members who would use the software, not everyone.
- Prioritization on team leads in large project teams – in case of large projects, where team involvement would likely be more difficult, he focuses on team leads.

This is supported by what other interviewees described:

I think in a smaller project you could really manage to have everybody involved in the selection. If you have a larger project you would typically involve the team leads and the team leads will need to ensure that the teams will use the tool as was agreed. (Participant 7, Expert Project Manager)

Yes, that is also one of the agile principles where the team decides what they can work best with. (Participant 11, Expert Project Manager)

In other cases, there was a focus on the leaders within the project driving the decisions and then informing the team:

> *Therefore, you need to have on a top level, on the leadership team, a clear view on what you want to establish, what is important and you need to drive this top down. You need to explain why you are taking this or this or that decision and how you are helping the team to get used to that common platform, to common standards, to run this harmonization and then over time people also buy into that. The emotional part needs to be addressed at the very beginning and the leadership team needs to take lead. (Participant 17, Expert Project Manager)*

What can be seen here, is that though the degree to which the team is involved (being focused on informing, not involving in the decision) is different, the aim of it is still to gain acceptance from the team.

In two instances, project managers mentioned they would take the decision on their own, as stated by Participant 9, Senior Project Manager: *"I decide on my own experience and up until now I did not have the impression that the team would like to change it"* and Participant 1, Expert Project Manager: *"I do not involve the team, as project management is primarily the project managers' responsibility."*

However, also in these cases the interviewees were mindful of resistance as they mentioned the teams' impression. As one later elaborated on that point and the importance of team acceptance: *"[…] but the team members have to work with these*

tools and they have to support it, so it is good to have a common understanding of the tools and an agreement." (Participant 9, Senior Project Manager).

In summary, all project managers interviewed emphasized the importance of the team in their role as users of the software. Thus, no project manager mentioned to involve the team beyond the users of the software. The means of increasing their acceptance through involvement varied. While most interviewees aimed to involve at least parts of the team in the decision making, some focused on communicating the outcome and explaining the rationale. There was no interviewee, who considered team acceptance and related communication with the team not an important element of software selection.

	All Users	**Leads only**	**Nobody**
Involve	Evidence	Evidence	Evidence
Inform & Explain	Evidence	No evidence	No evidence

Table 4-13: Team-involvement in decision-making

4.5.1.2 Involving the Client

When it comes to client involvement, the participants of the study provided different views. Two respondents reported they never involved the client in the selection process: *"The client normally does not prescribe the IT consultant to use a specific tool. The client normally would say: I am interested in the deliverables." (Participant 7, Expert Project Manager).* The respondents that mentioned they would not involve the client mainly mentioned a lack of interest from the client side in the software decision as the key reason. Some respondents said that in order to get the client to use the tool, they would always include the client in the decision process.

First, we have asked whether the client has a suggestion which tool they want to use. When this was not the case we have presented the tool to the client and asked for confirmation from the client. This was then given and documented in the minutes. […] Because the client should also use the tool. It will only be of real value to the project if the client uses it as well. (Participant 15, Senior Project Manager)

This again comes back to the theme of software usage. Other interviewees differentiated their approach based on the level of collaboration they expect to have with the client.

That depends strongly on the type of contract. If it is a fixed price contract where we work in a black box and only have to provide a deliverable, then I would normally not involve the client. If it is a very collaborative project where we work closely together with the client, then the client of course needs to be involved in the selection as he is also affected by it. (Participant 6, Expert Project Manager)

This is an aspect that the majority of interviewees mentioned, especially project managers which were more experienced:

You have your in-house software, reporting and processes. This is also aligned across projects. This is not the case when working with clients. There some things are available, but we often need to align our and their methodology and software. (Participant 8, Expert Project Manager).

Or as another respondent stated:

> *But also from client side there can be restrictions to what they already have or what tools you need to integrate with or interface with. Also on the client side it is much more dynamic. You can find any tool at a client [sic]. It will take a lot more time to find the correct tools because you need to adjust to the client situation. (Participant 10, Senior Project Manager).*

Thus, two arguments could be seen in interviews:

Approach	**Reasoning**
Clients should not be involved…	…because there is no need to.
Clients be involved…	…so the client is also willing to use the software. …because the software to be selected for the project needs to be integrated or interface with the clients' companies' software and methodology.

Table 4-14: Client Involvement

4.5.1.3 Leadership Roles

Most respondents focused on the role of the project manager when discussing leadership in the context of software selection:

> *[…]as a project lead, it is to a certain extend my job to provide the environment for the project, meaning that I have to set the boundaries and the scope and I don't want to burden the project members with the definition of the project management tools. It is the responsibility and the role of the project manager to provide that for the project teams. (Participant 4, Experienced Project Manager)*

This is one example of a respondent seeing the project manager as the driving force behind selecting project management software, which is in contrast to the often cited perspective of agile leadership that emphasizes the teams' involvement (Medinilla, 2012). Among most participants, this or the aforementioned position to involve the team as much as possible were the preferred approaches. It shows that there is no unanimously accepted approach. A slightly different view was given by another participant who specifically mentioned the role of the leadership team in the selection of project management software process:

> *I would suggest and recommend to the project manager as he is the overall responsible, to make sure to address the tooling aspect very seriously and to really take lead on that, because it is essentially his management system. The project manager is responsible and accountable for setting up a management system. […] And therefore, this is a leadership item. A senior leadership subject. Because if a program starts working on a distributed non-integrated, non-transparent, non-traceable, non-collaborative environment and runs into issues, to repair that, to turn around that is massive. Because you have all the project or program history and to bring all that into one integrated environment is almost undoable. And then the leadership team has to live with the consequences and the costs associated with that. And so, they should be part of the decision at the beginning so they can consciously face the consequences later on. (Participant 17, Expert Project Manager)*

When asked for the definition of senior leadership, he explained:

The senior leadership team is the project manager, it is the lead architect, it is the profit and loss owner. The leadership team includes also the test manager, sometimes the lead developer and the person who is responsible for the infrastructure. (Participant 17, Expert Project Manager).

In this the interviewee specifically mentioned the leadership the project manager reports to as a critical role to involve in the selection process, as they are also impacted and need to take the budget decision. The other parties mentioned were technical roles, such as the lead IT architect, the lead developer and the infrastructure responsible. This ties into what was identified previously as team leads being part of the decision process.

Most interviewees specifically mentioned the project manager to be the leading role to drive project management selection and there was no interviewee who argued differently. Five mentioned other leadership roles and one specifically mentioned the profit and loss owner.

Involved leading Roles	**Reasoning**
Project Manager	…as he is the one responsible for project management. …because he is accountable for setting up a management system.
Profit & Loss Owner…	…because he is affected by the decision.
Lead Architect, lead developer, infrastructure responsible, test manager, …	…as they are part of the leadership team.

Table 4-15: Involved leadership Roles 1

4.5.2 Role of the Contract

One might hypothesize from these suggestions, that the contract defines the degree to which the client is involved in the project. This then drives a potential need to involve

him in the selection process. Thus, the contract influences the need for client involvement in the selection process.

4.5.2.1 Proposal Phase as the Decision Point

The proposal phase is the time that interviewees referred to as the time when a proposal was created and before a contract for an IT consulting project is signed. Some interviewees mentioned this as the time the selection of the software happened.

> *It [the software selection] was mostly in the proposal phase. So sometimes, even before when you have the first contact with the customer doing some proof of concept work and you convince them to use this kind of technology, whatever the set is of the tools and technology you would like. But then during the proposal phase, it was decided which to use, and especially which software and which tool to use for the project management. (Participant 12, Experienced Project Manager)*

So, in many cases, even before the IT consultancy has been contracted and the project is started the project management software is selected. This brings up the question of how the decision is taken at that time. One respondent stated the following:

> *If even the most rudimentary collaboration results in substantial cost for the client, you try to avoid these extra costs because it is a competitive disadvantage for yourself. So that means you try to get around that question or you utilize open source tooling which is free of charge, accepting all the other problems. Because proposing an integrated tooling is often an extra sales pitch to the client and it*

usually puts you at a disadvantage to make the deal. (Participant 17, Expert Project Manager)

So, the decision point in the proposal phase seems to put an emphasis on a short term commercially oriented decision. Other project managers confirmed that the allocation of planned expenses for project management software is often underestimated.

Time and Material vs. Fixed Price

Eight participants brought up the contract type as a relevant factor in the decision process on project management software. Most of them distinguished between two types of contract and their impact on the selection of the software:

We used to have at my current project a time and material contract, so we were more willing to cooperate with the client and the other stakeholders to use their reporting and their systems, but recently we have moved to a fixed price and then it is getting more important to deliver and it is different, as the emphasis is on different things in fixed price projects. (Participant 5, Senior Project Manager)

This shows the differentiation depending on what is contracted. If only work hours are contracted to the client, then anything else is the responsible entity. As stated, in this case the client would be leading the selection process for project management software. Only in the instance of a fixed price contract is the consultancy in the lead. The interviewee also elaborates a bit on the consequence of fixed price contracts and the relation to software selection:

If it's fixed price then IBM is responsible so then IBM is freer to select whatever they think is necessary also in regard to tooling. So that is what you need to do, so we need to use the tools that we think are best for the project. And if that impacts the client then there could be even statements about this in the contract, so what tools we use and how they impact the client. […] And in fixed price IBM is normally in the lead for the selection. I would say sometimes some projects are very nicely separated between the work that IBM needs to do and the work that the client needs to do and you can just hand over the deliverables and the other party continues somewhere. So, in that sense the collaboration is very easy and strict. (Participant 10, Senior Project Manager)

Participant 10 points out that the selection of software depends on the responsibilities resulting from the type of contract. However, he also mentions that depending on involvement and client collaboration, this should also be aligned with the client and as he states fixed in the contract.

Contract Type	Party responsible for Project Management Software
Fixed Price	IT Consultancy
Time & Material	IT Consultancy and/or Client

Table 4-16: Contract Type and Responsibility

4.5.3 Aligning Processes and Software

Eight project managers, when interviewed about project management software, spoke not only about software but directly linked it to project management processes and methodology. An example of this has been quoted in a previous section:

I didn't even realize before that we were only talking about processes. I think the two go hand in hand, so I think what I said [about the need to align processes] should be true for tools as well. (Participant 13, Experienced Project Manager)

This shows the link between software and processes. Another participant also supported this as "*[…] it is not about the tool itself, but what is more important information is to what degree is the tool used and in how many use cases." (Participant 7, Expert Project Manager)*. Another statement gives an example based on agile methods:

"So they wanted to switch from the waterfall to the scaled agile framework in the whole division and Jira has a scaled agile framework plugin, but that depends on which release of the scaled agile framework you implement. This was another selection criteria at that point I guess." (Participant 11, Expert Project Manager).

This shows, that the selection also depends on the processes used within the project and the implementation of them in the software. A third respondent gave the recommendation to develop an understanding of the projects' requirements before selecting the software: *"Be clear on what you need and what you want, must haves and nice to haves and then start looking out for a tool that fits most of your requirements." (Participant 14, Senior Project Manager).*

4.5.4 Gathering Advice

One recommendation six project managers gave on how to approach the topic of software selection was to gather experience from other projects and project managers:

> *And then also looking at other projects how they have implemented software and are using it, so it can be used in ones own projects as well. So, learning from others and doing it ahead of the critical project phases, so not just those three days before the team but really developing an understanding of how it works. (Participant 3, Senior Project Manager)*

This leads to the conclusion that the selection itself is not a simple task that can be accomplished without any further insight into project management and experience from different projects.

4.6 Drivers in the Selection Process

As part of the interviews, project managers were asked about positive influences on the project management selection process. This section summarizes the findings related to these drivers and their subsequent themes.

4.6.1 Team

The most common theme when looking for drivers in the selection process was that of the role of the team and the people that were involved within the team. Different aspects that interviewees brought up were the role of experts, team acceptance, training and the willingness to change.

4.6.1.1 Involving experts

An example of the importance of experts was given in by one of the interviewees, who stated *"Ask them which tools they already know. Find out if you have an expert on tools, processes and method." (Participant 14, Senior Project Manager).* This was detailed by another respondent:

> *I have talked about the project which won an award for methods and tools previously. […] We had this one expert who knew the software and was capable of helping with convincing the stakeholders. So, if you want to innovate something beyond the norm this kind of person is very helpful. […] You need the expert who can bring out its' [the project management software] value and introduce this according to the project needs. (Participant 8, Expert Project Manager)*

Another interviewee added the role of technical integrator, which is required when multiple software products need to interface: *"With all the software that you need to use for certain processes there will not be one single platform to fulfil all the needs. So, there would need to be someone to integrate the tools." (Participant 6, Expert Project Manager).* Thus, four capabilities define the skillset to be covered by one or more experts when it comes to software selection and implementation:

- As a change agent who convinces stakeholders
- As someone who knows how to translate the capabilities of the software into benefits for the project
- As the person introducing it
- To integrate the software

4.6.1.2 Teams' Acceptance of the Software

Taking into consideration the acceptance of software products by the team and their level of experience with the software products is another important aspect, that the majority of the respondents picked up.

> *So, the project manager should really take care in that the tool he decides to use for his projects is a tool that the team agrees to and the project team has skill or is willing to up skill themselves. I think this is really important for a successful project. […] For example, if you have a large project team that has virtually no experience with large tools like RTC or Jira, it is easy for the project to use excel. So, everybody can start from day one using excel. And excel, as a project management tool is very widespread because it is so easy to use. (Participant 7, Expert Project Manager)*

According to this statement, project managers need to be aware of their teams' skill and willingness to learn when it comes to project management software, to be able to select a software that the team will work with.

4.6.1.3 Training and Support

Conducting training on the software and its usage for the team and supporting the use of the software is another key element according to five participants. One example is the following: *"I asked the deployment manager to give a one hour introduction to the team on the key functionalities, in order to also give the team the chance to ask questions to the expert." (Participant 14, Senior Project Manager).* One interviewee put this in relation to the effort involved:

It [the software] was expensive; people did not know it at that time and had to be trained. I did this with different projects for clients. It was an invest which paid off manifold in the end, but we had additional effort due to it in the beginning. (Participant 8, Expert Project Manager)

From this, the ability to select the right software in conjunction with training can be seen. Though this also encompasses the commercial challenges to overcome in order to utilize this driver. Thus, investment in training on project management software improved long-term success.

4.6.2 Processes

Another area of drivers revolves around processes. This section will revisit those findings and the relation between processes and tools described in them.

4.6.2.1 Process and Software Adaption at the Beginning of the Project

The key driver in the area of processes is about adaption of software in conjunction with the processes. This has been stated by the majority of interviewees and is exemplified by the following excerpt:

Well I realized that this [process and software adaption] is quite an important part of the project setup. Normally it is done more on the side, but I just realized through the questions how important this is. So, it is relevant to the project success in regards that if you do not pay attention to it or find a good solution you will lose time later, have to do additional work or have bad quality. So, it is important to have a focus on the software selection. (Participant 6, Expert Project Manager)

In this case, the interviewee described the importance of process and software adaption during the setup phase, so at the beginning of a project. So, during selection, not only is the choice of software important but also deciding how it can and will be adapted to the processes. The participant also described the alternative of not investing the time in this step and thus losing time and suffering from bad data quality later in the project. Other project managers seconded this thought of the software supporting the process as stated in this example:

> *The process has to be correct, and then you cover it by a tool. If you don't have a tool, you have to do the process manually but you are doing the right things. If you have a tool only then you don't know what to do, there is a sentence that summarizes: a fool with a tool is still a fool. (Participant 2, Expert Project Manager)*

Thus, knowledge of the software alone seems to be insufficient for the selection, as it is the combination of process and software that provides the most value. This also aligns with the recommendation given by one of the participants to align processes and software at the beginning of a project: "*Then there is of course building a framework of processes and tools, things that need to be clear and be done in a consistent way during the project. They need to be clarified, communicated and written down upfront." (Participant 13, Experienced Project Manager).* Some interviewees argued that this should be the basis for collaboration between the client and the service provider and thus the client needs to be part of a successful selection process. According to

interviewees, this is fostered by a similar process maturity in both the client organization and the consultancy, as in this allows the usage of software at a similar complexity level.

4.6.3 Leadership

Leadership by example and the project managers' own willingness to drive the change as part of the selection was also identified as a success factor. According to interviewees, this behaviour underlines the importance of the consistent way of working and thus drives the usage of the software. This also incorporates the ability to lead and convince the client:

> *It was a huge effort to sell this [the project management software] to the client and convince people of it. […] it [the software] was always pushed and the usage was reinforced and today it has grown to this maturity level. This is also a learning point for me for future projects, that this is a good investment. (Participant 8, Expert Project Manager)*

4.7 Barriers to the Selection Process

This section describes negative influences on the software selection process.

4.7.1 Resistance to Software

The most common barrier in the selection described by project managers in this study is resistance to certain software products by either the client or the project team.

> *I admire my predecessor on my current project, who withstood the pressure on short term savings and set up the platform to work efficiently in the long run. He managed to argue that with the client. This was six years ago and even though*

people are still joking about the tooling sometimes, everyone has realized that the platform is bringing a lot of value. Even beyond our project a lot of people at the client now have access to it and use it daily. The times in the beginning were of course not easy though. Different stakeholders needed to be convinced. (Participant 8, Expert Project Manager)

As seen in this example by one of the interviewees, the barrier was the resistance from stakeholders that the project manager at that time needed to overcome. According to participants having experienced similar situations, this seems to be a common occurrence at the beginning of the project when new project management software is selected and introduced. Most interviewees, like in this example, value the positive outcome higher than the challenge to overcome the resistance.

4.7.2 Economic Limitations

Another aspect that seems to impact the selection is the limitation of budget and time. "*The biggest challenge I encountered so far was the price for the software, so how much did it cost." (Participant 11, Expert Project Manager).* Cost elements identified were the license cost of software, the cost for setup and support of software and the lack of available time to adapt and introduce software. As the majority of participants stated, these aspects are often underestimated. One reason they saw was that it was often not part of the business case for a project. As a consequence, they often saw the selection being made in favour of software already available, which initially has a very low cost for a project. This however often lead to increased effort later in the project:

If even the most rudimentary collaboration results in substantial cost for the client, you try to avoid these extra costs because it is a competitive disadvantage for yourself. So that means you try to get around that question or you utilize open source tooling which is free of charge, accepting all the other problems. Because proposing an integrated tooling is often an extra sales pitch to the client and it usually puts you at a disadvantage to make the deal. […] Because if a program starts working on a distributed non-integrated, non-transparent, non-traceable, non-collaborative environment and runs into issues, to repair that, to turn around that is massive. Because you have all the project or program history and to bring all that into one integrated environment is almost undoable. (Participant 17, Expert Project Manager)

As mentioned here the cost of migrating the data already generated in existing project management software and integrating this on a new software product would cause high additional efforts. This seems to be a limiting factor to changing software, especially for complex projects:

The issue with large complex projects is, that you build up something that will stay for a long time, as you will normally not switch tooling halfway through the project. So your decisions have long-term impact. So, you need to invest more time in the beginning to make sure you get it right. Rather think twice than implementing the wrong tool, which then causes trouble on a daily basis. (Participant 6, Expert Project Manager)

4.7.3 Technical Barriers

Technical aspects were mentioned as a negative factor by eight project managers. They limited the potential choices of software available to them or provide additional hurdles for their use.

> *The great disadvantages of Sametime [an IBM messenger software] in IBM is that in my current project I am working with people from client organizations but also IBM and also non-IBM who are more or less contractors to IBM, but who do not have an IBM laptop. So, it is hard to communicate via IBM tooling. (Participant 5, Senior Project Manager)*

The technical limitation mentioned is related to the internal environment in which the software is run and that is not accessible to clients. This limitation seems to appear specifically during the collaboration with clients. It can also be the other way around that consultants do not have any or only limited access to client resources that are needed for the project. This is similar for situations that other project managers experienced as well:

> *If you work for a client, you do not own the technical environment and cannot make your own decisions. That is different when working within your own company. At the client, you are depending on him in regard to access to the network, can you access it with your own laptop, do you have licenses and such. So currently for example there are software restrictions in having to use Internet Explorer as it is the clients company standard, whereas we normally would use*

Firefox. So, you need to switch between these depending on what you access and this can be quite annoying and takes time and effort. (Participant 8, Expert Project Manager)

In this case, license availability and compatibility of software was mentioned as a potential. Also, the efficiency is impacted as the client organization standards deviate from those of the consultancy of the project manager. Other interviewees mentioned that even though the client organization used the same software, since they were using a different version they still encountered incompatibilities and needed to change to a different version.

4.7.4 Processes

As mentioned in the section on "Processes" as drivers, it will only be mentioned briefly here. As stated by interviewees, processes can also be barriers in case they are not aligned between the client and the consultancy or in case they are not adapted to the software.

4.7.5 Data Security and Privacy

A concern with business data is that of security, which was mentioned by five project managers in their software selection. It also seemed to disqualify publicly hosted services for most purposes. An example of this was explained by the following respondent.

So that was for a project in Austria, where they refused to do surveys in a tool outside of Austria. So, they needed to follow laws that prevented them to collect

this information outside their borders. On another project, we also wanted to use our IBM box to collaborate, but the client did not want that. As there was confidential information involved he said the data would need to be onsite. (Participant 4, Experienced Project Manager)

4.8 Selection Criteria

Selection criteria are a more detailed view on the selection processes and the underlying considerations. Each criterion can be broken down into different aspects. To show the link between criteria and aspects, they are presented in the following table:

Criteria	Aspects	Evidence
Experience and Skill	Skill of the team	See chapter 4 section Drivers - Team
	Experience of the project manager	[…] *if the project manager is quite skilled and has good experience with […], he or she will tend to use these tools again in their next projects. (Participant 7, Expert Project Manager)*
Cost	Cost of licenses	*If you don't have the support or you need to pay the support for it, it might be better to look for a smaller size version that you are more able to handle. (Participant 14, Senior Project Manage)*
	Cost of support	
Standards	Clients standards	*Sometimes IBM demands tools to be used, making them mandatory. […] Sometimes you have to use the tool that they [the client] have. This could range from mailing tools to SharePoint, Jira and then you have to go along with that […]. (Participant 10, Senior Project Manager)*
	IT consultancy standards	
Project Parameters	Size	*I think the type of project should be a big selection criterion for the tools. So is it big or small, but also is it waterfall or is it agile because for a project manager running an agile project is done in a different way so that also needs to be supported by the project and also if you conduct a waterfall project. (Participant 10, Senior Project Manager)*
	Complexity	
	Methodology	
	Technology	
Data Security and Privacy Requirements	Security	*The point about line of visibility is really important. […] The client should not see all the pitfalls and all the frustrated comments the people share in the tool. (Participant 2, Expert Project Manager)*
	Visibility of confidential data	
Integration	Single platform with multiple functionalities	*So, if I have the opportunity to choose it myself, then I go for a platform, which supports me in organizational integration, in technical integration and in planning integration, which provides me with transparency and collaboration all at once. (Participant 17, Expert Project Manager)*
	Integrated w. other software	
Availability of Data	Online availability	*Other things are backup capabilities, replicability and offline capabilities. So this is something that often speaks for Lotus Notes, as you can replicate and work on the train. Can externals access it? And if it is accessible via internet, is the solution still feasible for storing sensitive information? (Participant 6, Expert Project Manager).*
	Offline availability	
	Backup	

Table 4-17: Criteria

Criteria (continued)	Aspects	Evidence
Usability	Easy to use	*Good project management software is easy to use. (Participant 1, Expert Project Manager)*
Collaboration	Working together in the project	*So, the collaboration element is important and everybody has access to all information and all data and that you can collaborate on the various tasks being performed. (Participant 17, Expert Project Manager)*
Client Requirements	Contractual and non-contractual requirements	*So, there was nothing to discuss, it was a central decision by the customer company. This will then also be a standard for any contracted parties that work for them (Participant 12, experienced PM)*
Time investment needed	Quick availability Easy to use	*So, tool you want to use need to be available quickly and people need to be able to start using them quickly because there is also not a lot of time for education. (Participant 10, Senior PM)*
Agile capabilities	Supports agile methodology	*[…] if you are going to use scrum, then get a project management tool that supports scrum and that does not have a different type of terminology. (Participant 10, Senior PM)*
Acceptance of the software by team & client	Users accept the software	*Make sure that the key persons you are dealing with in the project are also fine with using it and there needs to be a common agreement. Otherwise it is probably useless if you have highly sophisticated project management software and no one is willing to use it. (Participant 2, Expert Project Manager)*
Flexibility	Flexibility to adapt to PMs needs	*We needed it mainly for reporting purposes and because it was an Excel it was rather easy to calculate the numbers in any way you wanted. So, you were more flexible. (Participant 16, Experienced Project Manager)*
Functionality	Functionality available to cover project use-cases	See next section on functionalities

Table 4-18: Criteria (continued)

These criteria were mentioned by the interviewees as relevant for the selection of the software. The last criterion of functionality will be covered in greater detail in the next section, as there were multiple use-cases of relevance that were mentioned.

4.9 Functionalities

This section details the findings on selection criteria that are functionalities / areas of application for software. More than 30% of the functions mentioned are IT related. These are likely linked to the research context of IT consulting.

Functionality	Evidence
Traceability	*So, you could have a view on the requirements, from the other tool, how they were linked to your development activities, how they were linked to your test cases, to any defects during a test. So an integrated development environment helps a lot for knowing the status and where we are in the project. For clarity, so everybody knows what they need to work on and also for reporting. So, it is very easy to provide reports if things are very integrated and you have almost a real-time status of the project. So yes, integration can help tremendously. (Participant 10, Senior Project Manager)*
Planning & Monitoring	*You also need to control the team, the time, and the dependencies. (Participant 2, Expert Project Manager)*
Repository	*You should be able to manage your plans and tasks in it and it should especially have a document management system. This is often the biggest part of outcomes that you produce, maybe beside the code itself. And there is nothing worse than not knowing which version of a document currently is the right one or who is currently working on it. And that is also what my number one expectation of a project management tool would be, is to address this. (Participant 15, Senior PM)*
Task & Work Management	*The project management tools for me are just the tools to support you to manage the project, to track work or task or whatever is needed here, or the requirements, for example. (Participant 12, Experienced Project Manager)*
Reporting	*This is probably a slight advantage with a less sophisticated tool. So the reporting was easier to generate in any requested format. (Participant 16, Experienced Project Manager)*
Financials	*Of course, you also need a calculation basis. So, software should have a financial aspect as well. (Participant 15, Senior Project Manager)*
Risks & Issues	*Also as project manager I am in charge of the project risk. So, this should also be in the software to support me. (Participant 3, Senior Project Manager)*
Document management	*These may not be seen as classical project management tools, but you need to be good on all these Microsoft products to exchange material. (Participant 2, Expert Project Manager)*

Table 4-19: Functionality

Functionality (continued)	Evidence
Collaboration	*Also for assigning people to certain work items is easier on a centralized tool because you can enter names, you can give task descriptions, due dates, start dates, email gets sent out and all these things don't happen if you use Excel manually. (Participant 4, Experienced Project Manager)*
Change management	*Then you need tool sets for formal things like project change requests and you need to create offers as well. (Participant 2, Expert Project Manager)*
Test & Test Management	*So, if you want to do your product management, why should you do it with another tool if it's integrated on the platform as well? […] you have the development, you have build and deploy and test directly on the platform. (Participant 12, Experienced Project Manager)*
Build & Deploy	
Development	
Service Management	*What I forgot are service management tools where you put in tickets about incidents, problems, changes, releases and where you can extract reports on a monthly base to see the load, closing rate and things like that. (Participant 2, Expert PM)*
Requirements Management	*We introduced requirements management and release management not only in regard to our methodology but also in regard to our software. The client wanted us to bring in this expertise. (Participant 5, Senior Project Manager)*
Release Management	
Configuration Management	*You do your configuration management and your incident management with the tool. (Participant 13, Expert Project Manager)*

Table 4-20: Functionality (continued)

IT Consulting

This section looks into further specifics about PM software in IT consulting. As all participants of this study were project managers in IT consulting, some of the aspects may also be mentioned in the other sections of this chapter.

4.9.1 Collaboration with the Client

One aspect that was mentioned by the majority of interviewees is the need for collaboration:

> *He [the project manager] should see that he can manage tasks, risks, problems, and resources, have the right people available and be able to keep the schedule in the project management software. And this should be done together with the client in one tool. I have always had good experience to work together with the client and not against each other and so also use a tool for storing documents collaboratively. (Participant 15, Senior Project Manager)*

Thus, the software is seen as a basis for collaboration, as different project management activities can be supported by software. In this example, tasks, risks, problems and resources are mentioned. More aspects and an overview of the functionalities mentioned by other participants will be summarized in a separate section on functionalities of PM software. Another project manager made the following statement, which also gives options for collaboration through software:

> *We have very good tools to work with and the more I see us moving towards cloud it becomes even better because you can then start to share it with external clients and external co-workers. As an example, IBM box is available to everyone*

in IBM. Or Cloud Connections is something you can use with co-workers. (Participant 4, Experienced Project Manager)

He specifically mentioned cloud technology and software hosted through cloud as being an enabler for collaboration across companies. Thoughts on software that can be used in the context of client collaboration was a common theme among participants:

The great disadvantage of Sametime in IBM is that in my current project I am working with people from client organizations, but also IBM and also non-IBM who are more or less contractors to IBM, but who do not have an IBM laptop. So, it is hard to communicate via IBM tooling. Therefore, we have decided to use Slack instead, so it is possible to use this tooling and integrate into Jira or out from Jira, but also do the chatting. (Participant 5, Senior Project Manager)

4.9.2 Limited Standardization

Eleven participants mentioned the aspect of standardization.

[…] about the methodology I know, that we have an overall one, but then for the different industries we have a different adapted methodology. This is what I mean with too many tools and too many options. It would be much better with one tool for everybody, so saying this is what it is and this is how he or she uses it. They just follow it. I thought of it always as a disadvantage for us, with the large variety. (Participant 16, Experienced Project Manager)

Though the interviewee expressed his wish for a standardized way of conducting projects and using software, he realized the need for differentiation. This is also shared by other project managers interviewed:

> *Yes, as we are often restricted by the requirements that our clients have towards software, so it can be difficult following company standards, as these may not be valid to the client. So, if I would work for a non-consulting company I would assume I would work with a company standard. (Participant 3, Senior Project Manager)*

> *So, IBM tries this quite often to establish a standardized toolset, but this is normally not successful because of the diversity of projects we conduct and the many different clients we work for who are all different in some regards. (Participant 6, Expert Project Manager)*

> *Well there is one key difference that when working within one company you can define your own standards. You have your in-house software, reporting and processes. This is also aligned across projects. This is not the case when working with clients. There some things are available, but we often need to align our and their methodology and software. (Participant 8, Expert Project Manager)*

All these interviewees identified standardization as a means to simplify the selection of project management software and its application in projects. However, the necessity of

an IT consultancies to have to work with different clients and the resulting dependency on client software distinguish from the environment within a regular company.

4.9.3 Aligning Status Reporting

Eight interviewees mentioned status reporting as being different in IT consulting in contrast to working within one organization:

> *We've been in situations sometimes in SAP projects where the worst case happens where our company has one way of reporting defects and the customer has a second way of reporting defects. If those reports don't match it is a nightmare. You are suddenly discussing the differences and where they come from and each party is questioning the validity of the data of the other party. It is terrible. Unfortunately, it happens very often. (Participant 13, Experienced Project Manager)*

> *On the other side, they have their reporting which we need to feed information and that we have to adhere to. So, the structure of a status report needs to be according to the clients wishes. So, getting the status information, handling processes like risk and such, those should be standardized in our software, but the way the status is represented should be adapted to the client. (Participant 8, Expert Project Manager)*

The difference in methodology and software thus often leads to additional effort and potential communication issues in the project. To mitigate this, participants suggested to adapt the reporting to the clients reporting as in this example. In general, differences

in methodology and software between the client and the consultancy, providing status reports can be challenging. Thus, this needs to be aligned between the organizations.

4.9.4 Technical Restrictions

Technical restrictions were also a consideration for participants:

> *So, you should be responsible for selecting the tools that you think you need. But also from client side there can be restrictions to what they already have or what tools you need to integrate with or interface with. Also on the client side it is much more dynamic. You can find any tool at a client. It will take a lot more time to find the correct tools because you need to adjust to the client situation. (Participant 10, Senior Project Manager)*

This statement again mentions the diversity of the software found across different client organizations, but also brings up the additional challenge of integration. Another interviewee portrayed this challenge in combination with the aspect of working in an IT-specific context:

> *What is different [in contrast to other sectors] is that in IT consulting the results is software as well. Our work results are also in a configuration management tool, which is also project management software in the wider context. When I build a ship, I can do the design in the software, but the ship is built physically. IT is created within the tools. (Participant 6, Expert Project Manager)*

Another interviewee described this aspect of what software in the sense of IT project management encompasses as follows:

> *The project management system is usually not only the pure project management it is the solution life cycle, so it starts from the requirements angel through the development part through the testing through the run part. […] So, project management tools need to support the entire landscape. (Participant 17, Expert Project Manager)*

This technical challenge on the need for integration for software the project management and other IT related functions seems to be an additional challenge in client environments:

> *There are also technical aspects. If you work for a client, you do not own the technical environment and cannot make your own decisions. That is different when working within your own company. At the client, you are depending on him in regard to access to the network, can you access it with your own laptop, do you have licenses and such. […] With external parties, license management can be something that creates additional complexity in service projects with multiple companies involved. (Participant 8, Expert Project Manager)*

These excerpts show that in IT consultancy projects, project management software is often used in conjunction with IT software that interfaces with it. This software stack,

which is often different between client and consultancy organizations, should ideally be integrated between the two. This often poses significant challenges to the project.

4.9.5 Working with third Parties

IT consultancies often work together with other service providers that their clients have contracted. This can lead to specific challenges that also reach the area of project management software.

> *In IT consulting, you have an added complexity as you yourself are normally not the only service provider. Currently we have at least 10-15 different consultancies involved, many of which are smaller ones. And all of them have their own culture, using different software products and aligning all those as one of the consultancies working for the client is very difficult. As a client, you have the authority to request certain things from them, but as "just another" consultancy, if you want to change things, they will just challenge your authority. So, you need not only to convince the client, but also the other external parties involved. This is another level that needs to be addressed. As a client, you are still the organization paying and thus have a larger say in how things are done. So, we can ask the client to convince his other consultancies, but that also depends on how the client manages their suppliers and how much he wants to get involved in these discussions. But the more parties the more difficult it gets. Some may even work against you behind your back as you are sometimes in a competition. (Participant 8, Expert Project Manager)*

Thus, resistance from different service providers is another layer of complexity resulting from the involvement of those different parties in the environment and the consultancy just being one of them among equals. This in conjunction with the element of politics and competition makes a standardized approach more difficult and may lead to the question, where it is sensible and to what degree.

Finding: Collaboration with other consultancies and potential competitors for the same client can make selecting a standardized software more difficult.

4.10 The Importance of Project Management Software Selection

A last finding that was common to 14 interviews, was that participants stressed the importance of the topic of software selection. Eight mentioned had not reflected on the topic to the degree that they did through the interview. An exemplary comment was given by this participant:

> *Well I realized that this is quite an important part of the project setup. Normally it is done more on the side, but I just realized through the questions how important this is. So, it is relevant to the project success in regards that if you do not pay attention to it or find a good solution you will lose time later, have to do additional work or have bad quality. So, it is important to have a focus on the software selection. (Participant 6, Expert Project Manager)*

4.11 Summary

This chapter has provided excerpts of the data gathered from interviews with project managers in IT consulting. The findings were identified and grouped through thematic

analysis and structured primarily according to the research questions that were developed in the literature review:

RQ1: What is the process employed by project managers in IT consulting on project management software?

RQ2: What are the key considerations for project managers within the process?

Relating to RQ1, project managers' opinions on the selection process with its' drivers and barriers were summarized. To provide information in relation to RQ2, the criteria and functionalities were synthesized from the data. These aspects will now be discussed in their academic and their practical context in chapter five.

Chapter 5: Discussion

5.1 Introduction

In the previous chapter, the findings from the interviews conducted as part of this research have been pointed out. Thus, it is now time to put them into context and discuss their implication on literature and practice. This will complete the previously outlined research structure by providing the results of this study, as discussed in chapter two:

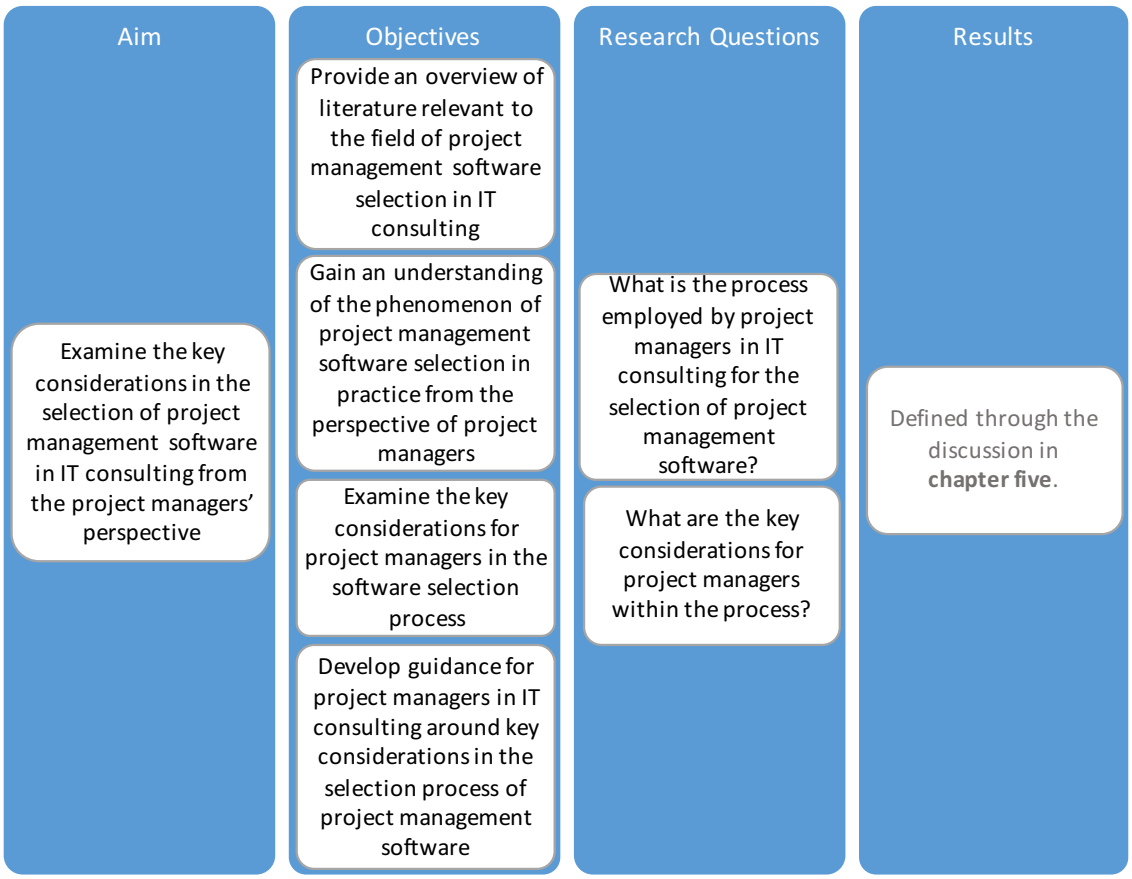

Figure 5-1: Research Structure

The discussion will first verify the working definition of project management software to ensure a common understanding. Secondly it will develop an understanding of the selection process and create a staged process guide. Through a review of the underlying

criteria, the key considerations of project managers will be unveiled. Finally, the impact of the sector of IT consulting on this study will be discussed in more detail.

In the findings chapter, the views of the interviewees on topics related to the research were synthesized. They were clustered in alignment with the research questions as developed from the literature and the developing themes were shown to provide a glance at the areas that the discussion will pick up on. The following diagram provides an overview of the different topics that were covered.

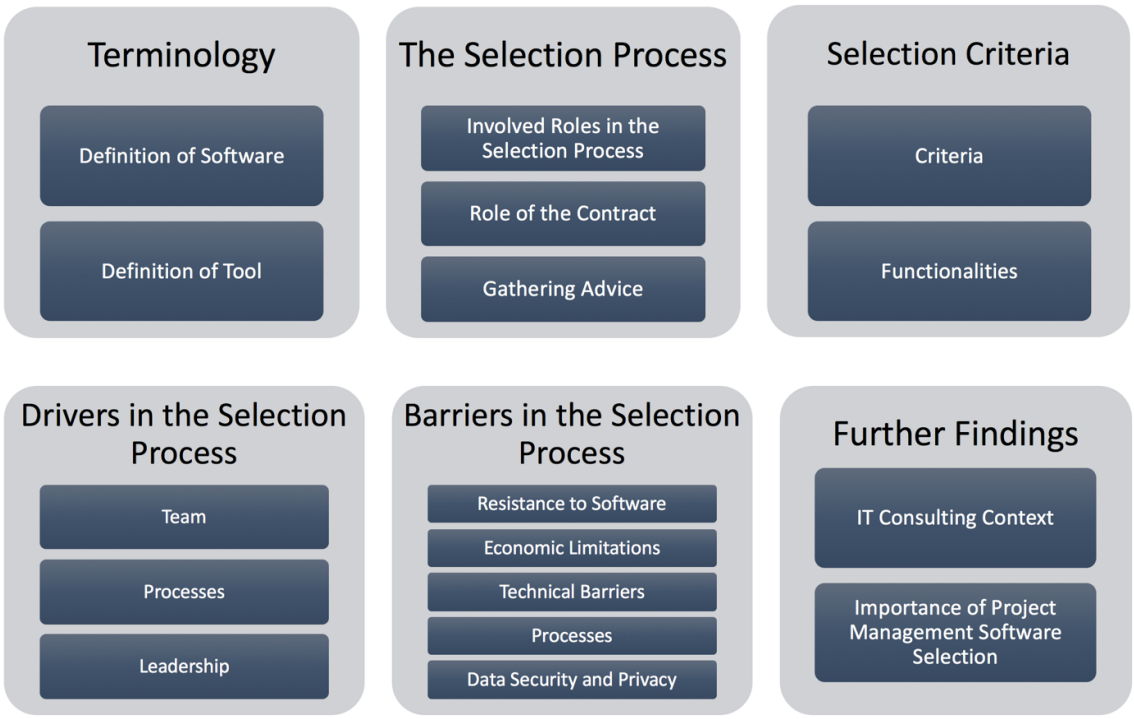

Figure 5-2: Findings Summary

The aim of the discussion chapter is to present the outcomes of the study and the ideas derived from them. The following diagram shows how the findings have been aligned to the research objectives as a basis for the discussion chapter:

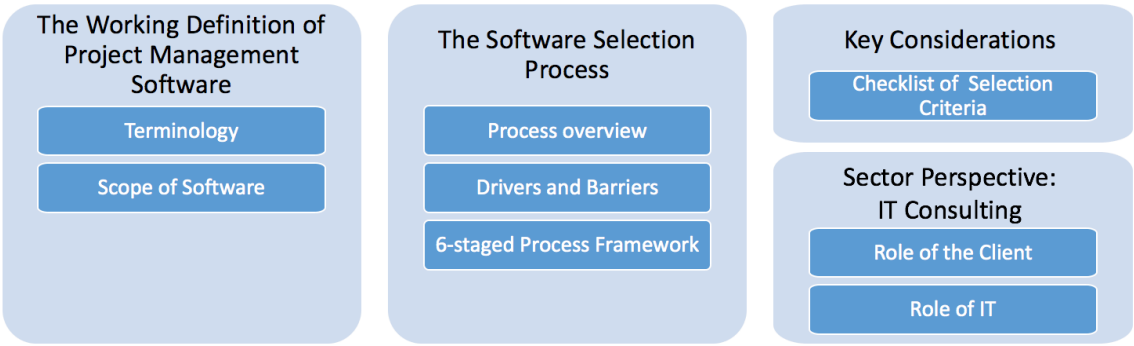

Figure 5-3: Discussion Structure

The first aim of this discussion is to understand what is project management software as seen in practice and how this compares to theory. Thus, it reviews the basic terminology underlying this thesis. What is project management software and what is a project management tool? Based on a comparison between literature and the findings from the previous chapter, there are implications to research that will be elaborated.

Then the key research question that lies at the heart of this research project will reviewed. The findings gathered on the selection process will be interpreted and structured to generate an overall understanding of the process in its larger context. The aim is to identify a structure for this process, which is drafted into a 6-staged process guide. This process guide is supported by guidance derived from the drivers and barriers identified. This is supported by the selection criteria, which will be discussed and synthesized into a checklist to help project managers considering the important aspects of the decision. The outcome of this section will not only contain the key contribution this study makes to theory, but also guidance for practitioners.

Also, the specifics of the selection process in the sector of IT consulting will be summarized. Important elements discussed here provide a differentiated view on the role of client and his potential involvement, dependencies on the contract and the role

of IT. After these key topics have been covered, the discussion will be summarized and framed through limitations that apply to the statements made and any knowledge uncovered. An assessment in regard to future research will follow in chapter 6 - Conclusion.

5.2 What is the Working Definition of Project Management Software?

The findings shed some light on what project management software is based on project managers' perspectives. Two aspects will be reviewed on this. Firstly, the discussion on terminology and the terms software vs. tool in this context will be concluded. Secondly, practitioners mentioned varying scope of project management software, as can be seen from the list of functionalities to be considered in the selection process. Thus, it is sensible come to an understanding of perspectives.

5.2.1 Terminology

The following question was developed through the literature review:

Aim: Provide clarification of the terminology in the context of project management by investigating practitioners point of view.

As part of the investigation, the author wanted to gain an understanding of the words used to describe project management software or tool, as all further discussion will be based on the underlying terminology. In the literature, researchers implied different meanings when using the term. From the interviews, it was found that 15 out of 17 practitioners used the terms interchangeably. This shows that there seems to be some disconnect between academic literature and practice in regard to the definition. Due to the nature of qualitative research, this should not be taken as a generalizable definition, but would need to be verified in different contexts. However, it shows the importance

of the approach taken in this study of predefining the terminology, but then verifying it with practitioners.

Project management is a field where research studies social phenomena to generate knowledge and subsequently inform and hopefully improve the practice within the field. Definitions as applied in practice should also be applied to academia where suitable. This would contribute to the exchange between practice and research and thus help to maintain a more collaborative development of both, as they would apply the same terminology. In addition, any empirical research conducted on the matter of tools or software needs to consciously address terminological differences to ensure the accuracy of the data gathered. As project management is often applied sector-specific, it would also be important to verify the usage of different definitions in different sectors through future research, as further discussed in the next chapter.

5.2.2 The Scope of Project Management Software

As part of the literature review, it became apparent that there was no unanimous definition among academics of what qualifies as project management software.

Aim: Provide clarification on the scope of project management software.

From the interviews it became clear, that the view of practitioners also widely varies. While some viewed project management software as software that supports the classic project management activities, the widest definitions encompassed all software that was used to conduct an IT project. Both groups linked the scope of project management to the responsibilities of the role of the project manager. The group that argued that only software directly related to classic project management activities would qualify as

project management software, saw the project manager as being more narrowly focused on project management. The rationale given by the second group was, that all software in the project is part of the project managers responsibility and needs to tie into his project management system. This is aligned with the scope of application lifecycle software found in the IT sector, which encompasses both IT and project management capabilities in a single system (Kääriäinen & Välimäki, 2009). The common theme and potentially a better interpretation is that project management software is software, that supports the project manager by providing him with information and functionalities relevant to his role. While this could encompass a wide array of software, it also broadens the perspective the project manager needs to take when considering how he leverages software. As the findings showed the importance of gaining information across different systems, this seems to be a sensible approach. This also substantiates the need for guidance throughout this process.

5.3 The Software Selection Process

This software selection process is the central element within this research. This section is based on the key research question in relation to it that aims to give the perspective of the project manager.

Aim: What is the process employed by project managers in IT consulting for the selection of project management software?

The interviews have provided an understanding of the different aspects throughout the selection process from the view of project managers. These will be reviewed and put into context here to create a more holistic view on the process of software selection. Through the refinement of the key findings, a process guide is constructed that can be

exemplary of a software selection process. It provides a general understanding of the phenomenon of software selection from the project managers perspective. It can also be used as guidance by project managers.

Thus, this section will provide insights into:

- What steps are taken in the process? Which dependencies exist?
- Who is involved in the process? What roles are relevant to the selection and how?
- What selection criteria can be distilled from the findings?
- How do drivers and barriers impact the selection process and how can they be utilized?
- What would a framework based on the process as researched from practice look like?
- Similarly, what could a checklist for application in practice look like?

Figure 5-4 depicts these areas of interest around the software selection process, that were synthesized from the findings.

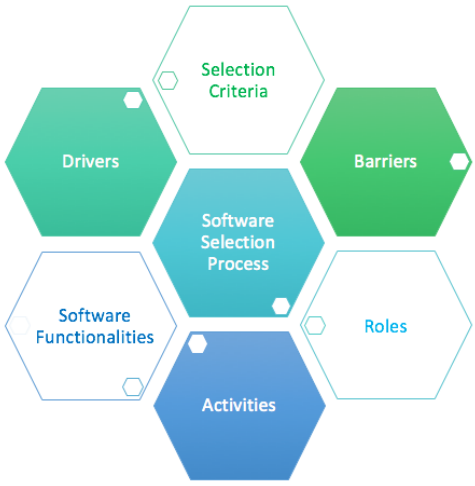

Figure 5-4: Selection Process Elements

As seen in the figure, the software selection process contains and links to different elements. It consists of activities, which are related to the roles involved within them. Throughout each activity there are also different drivers and barriers to consider. In the

different phases of the process, the selection criteria and especially specific functionalities will also need to be incorporated. All these elements will be utilized to create a process guidance within this chapter.

5.3.1 Process Overview and Activities

The process of software selection is comprised of different activities. To better understand them, it was decided to discuss them and utilize them to create a process guide from the findings uncovered through this study. It will be comprised of the different stages throughout the process, by compiling the key considerations as pointed out in the last chapter. The process guide will be defined with a focus on the role of the project manager as this is the central responsible role in project management. The process guide will be a key tool in understanding the software selection as investigated by this research project.

5.3.2 Time of the Selection

The first aspect to note from a process perspective is when the selection process takes place. This defines the time any decisions are taken. As interviewees mentioned the negative impact that a late change in project management software has on the project, beginning activities around the software selection process should be a conscious decision. Before a project is delivered by an IT consultancy, the solution is defined in a proposal phase and then this approach is formalized and agreed between the consultancy and the client through a contract. Interviewees pointed out that the proposal phase is often the time during which the approach to project management software is decided on. From this it can be argued that it should also be the time, during

which most software selection activities need to be conducted. This is even more critical as participants mentioned the limiting effect of cost. This is in line with the importance that Raymond and Bergeron attributed to project budget when researching the usage of software on projects (2008). So any efforts and licenses required throughout the process should be calculated as part of the budget before the contract is signed. While this approach could lead to a cost increase in the initial calculation, the findings suggest that this will be outweighed by the long-term benefits of adequately selected project management software. Following the assessment of Pellerin et al. (2013), the subsequently higher utilization of softwrae will likely contribute to the overall project success.

The basis for the calculation is the knowledge of the approach to project management software and any activities related to it. To visualize this, the first stage of the process guide was created:

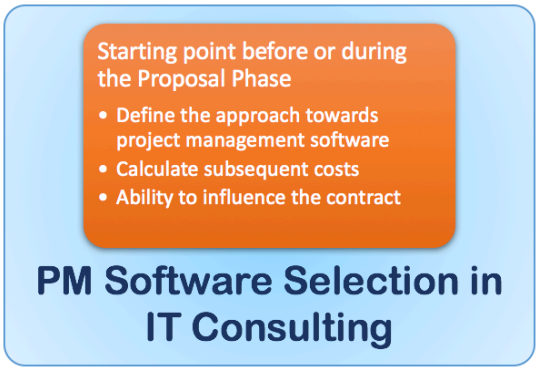

Figure 5-5: Selection Process Guide Stage one

5.3.3 Gathering Information

Based on participants' responses, project managers often need to gather information about the software to be able to take an informed decision. Sources for this information mentioned were mainly peers or the software itself. It would be recommendable to look beyond that as well and utilize existing literature and research. A third aspect is to utilize project management trainings, which can enhance practitioners capabilities as Robertson (2015) points out. As the process of software selection is not focused on a single tool, it would be important to note that any means of gathering further information and advice should be linked to developing a broader perspective. This can be seen as crucial to understand the complexities of the decision process and the consequences of software decisions on the project itself. This provides the second stage in building the process guide:

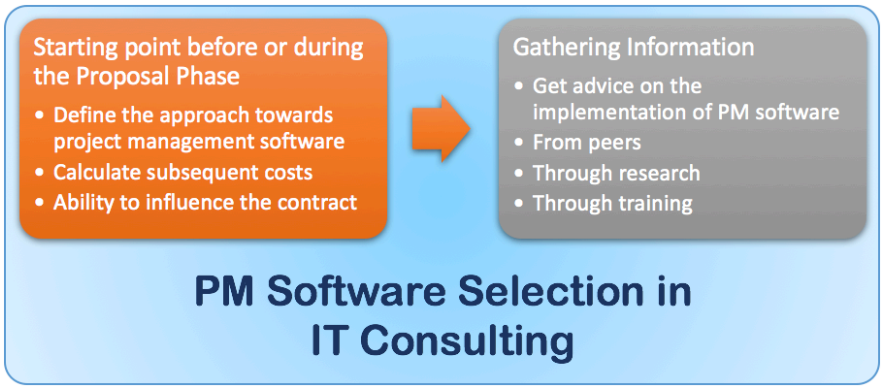

Figure 5-6: Selection Process Guide Stage two

5.3.4 Preparing the Decision Process

Once a general understanding of the necessities of software selection has been acquired, it is sensible to focus on preparing the decision. As this study has shown there is a multitude of dimensions tied to the decision point. One key aspect that has been

mentioned repeatedly is that of involving future users to drive software usage, but also as practitioners recommended to utilize the knowledge of other experts on the team. Thus, the roles and respectively the candidates to further involve in the selection need to be defined. Furthermore, the information gathered in the previous step of the selection process can now be synthesized into potential options and alternatives. This would provide a direction for the discussion with different roles that is to be expected prior to the decision. Finally, it was noted during multiple interviews that cost and effort for implementing project management software are constraints in almost every project. This means that the project manager needs to understand these limitations at this point in time, as it will influence the options available to him and his team in regard to future decisions. Considering these three components enhances the conceptual model by a third step:

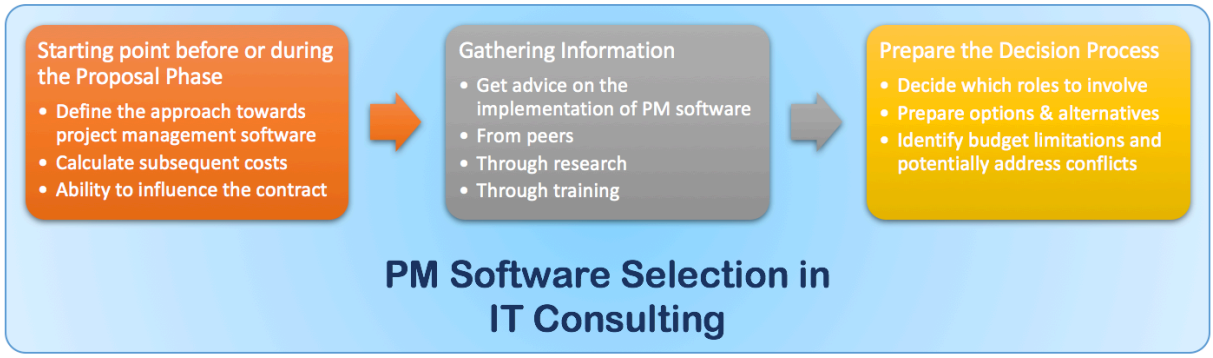

Figure 5-7: Selection Process Guide Stage three

As it was one of the key arguments made, it is sensible to investigate a bit more on the role of driving software usage through user involvement, an approach similar to the idea of self-direction that is applied in agile project management as promoted by Wysocki (2012). To be able to structure it, one needs to understand which roles are of relevance to the selection process. This is especially true in the context of an IT consulting project,

as this may mean there are sector-specific roles to consider which may not be of relevance in other projects. Further details on usage, user involvement and roles is provided in the following subsections.

5.3.4.1 Driving Software Usage through Involvement

The benefit of software is limited by the amount it is used (Participant 7, Participant 10). This confirms statements found in the literature on the importance of usage towards impact of software (Raymond & Bergeron, 2008). While Raymond and Bergeron mainly identified usage as having a positive impact on benefits that projects gain from software, the interviews unveiled further information on how to influence software usage. The findings highlighted the importance of the users. Involving and informing the users of the software seemed a primary concern for most project managers to drive software usage. Interviewees specifically mentioned the positive influence on the teams' acceptance and usage of software based on their involvement in the decision process. From the project managers' perspective, this could mean to define the level of involvement for groups and individuals based on their role in relation to the software. This will require additional planning by the project manager, which means an investment of his time. To increase the efficiency of this process, the following sections give guidance on the roles to involve.

5.3.4.2 Roles in the PM Software Selection Process

One key aspect found from the interviews was that of involving the users of the software in the selection process. To understand the rationale, one should first look at how

involvement in the selection process is seen in regard to usage of the software and the benefits derived for a project.

5.3.4.3 An Overview of the relevant Roles

Based on the findings on roles and involvement of different stakeholders, an overview was created depicting the roles which could be of relevance to the selection process based on the data gathered from practitioners. All roles mentioned should also be seen as potential users of the project management software, as the idea of involving different roles is related to the concept of utilizing it to drive software usage.

The following table shows the roles derived from the findings and a definition of it in the context of IT consulting.

Role	Description
Project Manager	The role leading the project, could potentially also subproject manager or program manager. Should have authority to take decisions on project management software.
Profit and loss Owner	The person financially responsible within the consultancy organization for the business benefits of the project.
Client Stakeholder(s)	Stakeholder(s) from the client organization.
Team Leads	In larger projects, parts of the project are grouped into teams and managed by team leads or subproject managers.
Lead IT Architect	The role in charge of the IT architecture.
Lead Developer	The role in charge of the development team and processes.
Test Manager	The role in charge of the test team and processes.
Infrastructure Lead	The role in charge of the projects' IT infrastructure.
Project Team	The project team.

Table 5-1: Overview of Roles

The role of client stakeholder is more abstract in this context, as within the client organization there will always be different roles as well. This will be elaborated in the section on client involvement. The roles mentioned here can also be part of the activities

occurring throughout the selection process. Though they may already be part of the discussion about software selection at an earlier stage, the step where the decision process is prepared would be the latest recommendable stage to take a conscious decision of who to involve. One aspect to take into consideration at this point is also the project size, as smaller projects may allow a more general involvement whereas in large projects, the group of involved roles may need to be limited for practical reasons. This is shown in the following table:

	Project Team	**Team Leads**	**Client**	**Project Manager**
Small Project	Involve users	Involve users	Involvement depends on project context	Facilitates the process or takes the decision
Large Project	Inform users	Involve users	Involvement depends on project context	Facilitates the process or takes the decision

Table 5-2: Involved Groups and Roles

The following sections should provide some clarity to the project manager on the potential inclusion of roles and stakeholders at times of the selection process. Further decisions will likely situational, though they may need to be made based on aspects outline in the following discussion.

5.3.4.4 Team Involvement

Different strategies can be derived from this. Building on the strong tendency of participants to involve the team and the beneficial influence on the outcome found by researchers (De Dreu & West, 2001), project managers may want to follow this approach to a sensible degree. The findings indicate that in small projects this might be the entire team whereas in large projects only team leads may be involved in the decision process directly. It can be reasoned, that involving too many people in the selection could

lengthen the decision process unnecessarily. As the data points out, most projects struggle from time pressure and thus the level of involvement needs to balance efficiency and long-term benefits. From the analysis, it can be argued that the part of the team involved should be limited to actual users of the software. The other approach that few participants recommended was for the project manager to take the decision on his own, which seemed to mainly be based on practical reasons. While this saves time, the arguments made indicate this could have a negative long-term impact on usage. As participants of this study unanimously agreed, once a decision is taken, it needs to be communicated with the team to increase the level of acceptance.

Claim: It is supported through this study, that usage of software drives its' contribution to success, as claimed by Raymond and Bergeron (2008). The current study shows furthermore that from a project managers' perspective, the usage of project management software is a desired result of the selection process. From a project managers' perspective, the process can be fostered by involving those team members in the decision process, who will be future users of the software.

Building on this finding, it would make sense for future research to investigate the aspect of user involvement from the team further to understand their perception of the selection process. This could mean reviewing their perceived expectations and benefits as well as motivational factors considering project management software usage. As IT projects often require other software to conduct the project as well, it would also be interesting to see their view on integration of the software.

A second aspect would be to verify the involvement of users from the team in regard to the quantitative impact on projects success. This would allow to anticipate what a worthwhile effort would be for project managers to involve their teams in comparison to the benefits that could be expected.

5.3.4.5 Client Involvement

The second role identified was that of the client. Some project managers did not seek to involve the client in the selection. The reasons behind that seemed to again be linked to practicality and lack of a rationale to do so. In the other cases, client involvement was argued in the same way that team involvement was. The aim was to drive usage of the software, in this case by client users. Depending on the nature of the project, the necessity for the client to use the software or be actively involved in the project overall seemed to be seen differently. Some participants stated that the degree of collaboration depended on the type of contract. Contract types have been discussed in the general context of IT projects (Franklin, 2008; Gopal & Sivaramakrishnan, 2008) and the insight into their relevance in IT consulting will be detailed through this study. Two types of contract were differentiated: Fixed price contracts, in which the consultancy is more autonomous and time and material contracts, which focused more on client collaboration. This has different implications for the approach towards software selection depending on each contract type. So, what are the aspects to consider in context of the contract based on the previous findings?

Fixed price contract:

- No or little client involvement
- This means little collaboration
- High level of responsibility of the consultancy
- No or little need for usage of software by the client
- No involvement in the selection process

Time & material contract

- Client personnel is directly involved in the project
- Strong collaboration with the client
- Need for usage of software by the client
- Involvement in the selection process

This general distinction has been derived from the findings and indicates the implications of each contract type. There are other variants of this topic, for example projects where the client involvement goes up to the level that the IT consultancy only provides project members and the project is run and managed by the client. Such a scenario would be managed by the project manager of the client. Though the claims made in this study may apply in such cases as well, this would need to be verified through further research.

As the findings suggest, the contract seems to influence the level of collaboration, which then in turn determines the potential benefits a project can derive from usage of the software by the client. Thus, it seems sensible to estimate that the decision whether to involve the client should partially be based on the form of contract. One may however be mindful, as the contract type is not the only indication of the need for collaboration. One key aspect would be the scope of the project. Any form of technical integration with existing systems would be an example, where collaboration would likely be required regardless of contract type.

Additionally, the findings indicated the need for the alignment of software, reporting and processes across collaborating organizations. An assumption would be that the degree to which this is necessary varies with the level of interaction between the companies. Such a task can be seen as similar to process and IT alignment within organizations in general. Similar phenomena on process alignment in single companies have been described by Babar, Brown and Mistrík (2013). Similarly, such an endeavour

would likely require the application of practices found commonly in process design and potentially process modelling, as well as software customization.

Adjusting software, reporting and processes also raises the question of the different roles that need to be involved from within the client organization. It can be assumed that technical discussions on the integration between an IT consultancies' test management software and the clients' test management software should be had among experts with sufficient experience. This underlines the needs for an awareness to also involve technical experts from the client where needed. It may also raise the question of the degree to which such an alignment is necessary, as it would mean involving experts that may not necessarily be available without being explicitly requested. Thus, the project manager of the IT consultancy needs to be aware of this, so he can request the availability of key personnel and plan the selection and the project accordingly.

5.3.4.6 Leadership Involvement

For the purpose of this discussion, three type of leadership roles will be reviewed as synthesized from the interviews:

- Project manager
- Profit and loss owner
- Technical leaders, such as lead architect, lead developer, test manager, infrastructure lead and potentially other lead technical roles in a project.

These leadership roles are of increased importance either due to their authority over the project or people or their expertise in areas of relevance to the selection process. This may be especially important when it comes to necessary integration between

different processes and software products outside of the direct scope of project management.

5.3.4.6.1 The Project Manager

Through the analysis of the data it was suggested that the project management software is part of the management system a project manager sets up. From this perspective, it was pointed out to be of major relevance to the success of project managers. Without a structured management system, the project manager would likely struggle to maintain control especially in complex project situations. Based on the importance of the software selection, project managers should see it as their responsibility to act and engage the project team and the client where sensible. The degree to which they themselves ultimately take a decision or leave it up to the users they involve could vary. This would depend for example on project managers' experience, the teams' and the clients' experience. Based on the findings it may also vary based on the individual project managers' leadership style. Whether it is beneficial to the project success to take the decision on his own based solely on his leadership preferences would need to be investigated through further research. Based on the outcome of this study that clearly stresses the benefits of user involvement, it can be seen as rather unlikely. This is also in line with Medinillas' (2012) recommendation to build leadership based on involving and empowering teams. However, to be able to benefit from involving users it should be done with a conscious view on identifying the right users, a suitable degree of involvement and the right stage within the project (Bano & Zowghi, 2015). Techniques on how to involve other parties through the decision process will be discussed in a later section.

5.3.4.6.2 The Profit and Loss Owner

The findings indicate that it could be sensible to involve the profit and loss owner in the decision process. This is the role financially responsible within the consultancy organization for the business benefits of the project. As cost has been pointed out to be one key limitation in the selection process, he needs to be aware of the financial impact that the software selection can have on the project. He would potentially also need to formally approve any decisions made, that have a direct financial impact. Also, although he may not be working in the project directly, he would likely be impacted by the software in terms of reporting, as the profit and loss owner would be the person receiving reports on the projects' performance throughout its duration.

5.3.4.6.3 Technical Leaders

The findings have shown that technical leaders also should be considered when selecting project management software. They provide knowledge in their area of expertise. The data showed that project management in IT consulting also contains more technical aspects such as test management, architecture and development. The data generated within each of these is relevant to project management over the course of the project. This indicates the benefits of a consistent information flow from in these teams needs into the project management system. Thus, the involvement of these teams through their leaders could benefit the data availability and quality in the project management software. This underlines the importance of their involvement. In addition, technical leads often also have direct reports. It can be assumed that their influence in raising the acceptance of the software among their teams will also drive software usage throughout the project.

5.3.4.7 Involvement of Roles Summary

The different interests and the number of roles and people relevant to the decision process raise its' complexity. While the benefits of the involvement of each role was pointed out, it should also be clear that involving more roles also means increasing the number of different opinions. Different interests regarding cost, features, technical capabilities and usability will need to be aligned to come to a decision on project management software. Thus, consciously choosing who to involve into the process and how can be assumed to be a key aspect of successful software selection.

5.3.5 Informing relevant Roles

After defining who will be involved in the decision, the people in these roles need to be informed. While the activity may seem simple, it is likely to be of great importance due to their necessary contribution during the decision process. As mentioned in the interviews of this study, the importance of software selection is often underestimated and this will likely also apply for potential decision makers. Thus, it would be recommendable to raise awareness through consciously defined communication. This means to not only ask people to participate in a meeting or workshop on this topic, but to give the rationale for their involvement. In addition, one may ask for preparation of information or decisions required from them as part of the overall decision process. Based on this argument, the stage has been added to the process guide before the actual decision itself, as shown here:

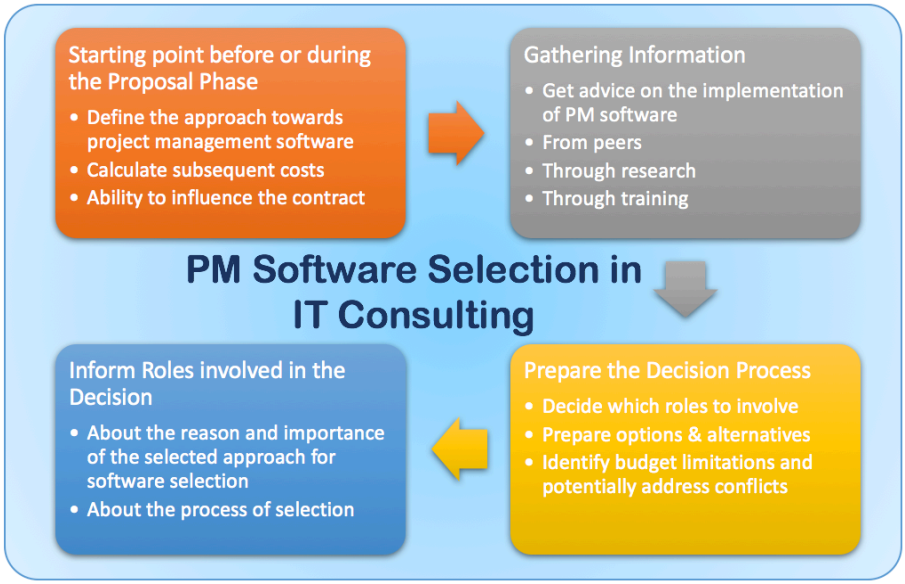

Figure 5-8: Selection Process Guide Stage four

5.3.6 The Decision

This is one of the main activities within this process, as it depicts the actual decision point within the selection. Thus, this section will cover the different aspects around this important step. The approach will be impacted by his preference for decision taking, be that more facilitative or authoritative. As interviewees in this study remarked, the software should follow the processes. Thus, the definition of project management processes will need to be a key element of the decision process. Only then can a software be chosen based on the selection criteria and then the adaption of the software will need to be planned. All this will need to be aligned with financial, technical and organizational constraints as depicted later.

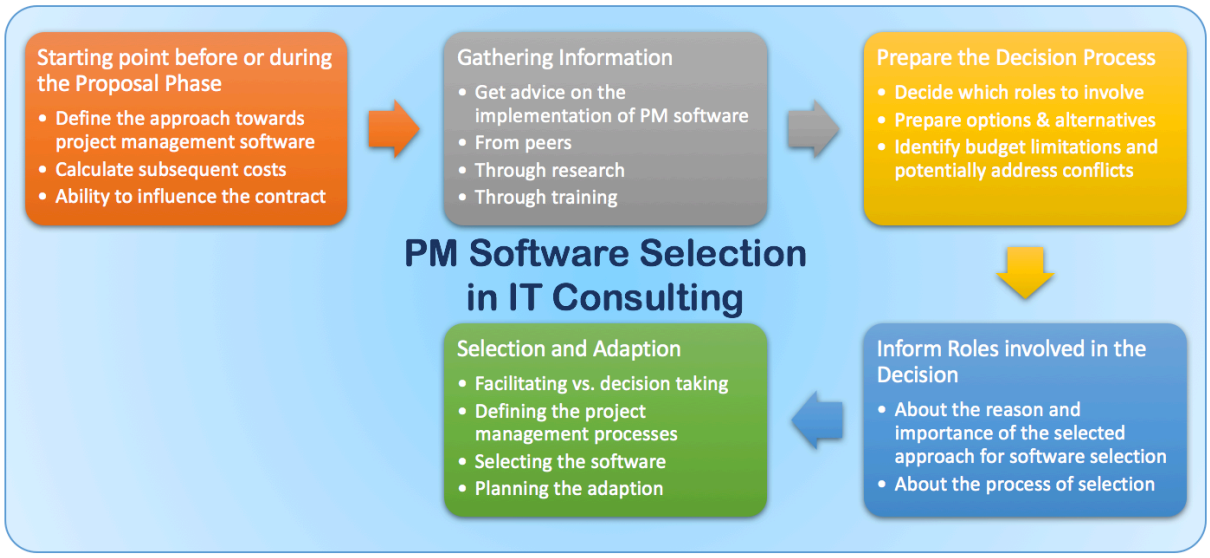

Figure 5-9: Selection Process Guide Stage five

5.3.6.1 Facilitating the Discussion vs taking the Decision

Since it has been recommended that the team should be involved, it seems sensible to investigate techniques to design and facilitate the decision process. These may be different leadership techniques as well as the format of the communication. As different interests will need to be aligned, a format of open communication such as a meeting or a workshop would likely be adequate (Andler, 2015). This would allow for an iterative exchange of opinions and continuous development of the processes. However, depending on the complexity and the positions of individuals on the selection, it could require multiple instances of such an event. This again ties to the aspect of preparation and the need for communication prior to the workshop itself, to drive efficiency. Alternatively, the decision could be taken through individual meetings, which may however have a negative impact on acceptance from different project members as they may feel as not being sufficiently included in all meetings.

An aspect to consider here is also the approach of the project manager. To involve the team in the decision process, a project manager would likely focus on facilitating the

decision process, whereas if the project manager has a clear and specific view on the desired outcome, he may also take decisions himself. The latter would again negatively impact involvement and acceptance of users, leading to a potentially reduced usage of the software later. On the positive side this would likely shorten the decision process and directly save time.

5.3.6.2 Selecting the Project Management Processes

The topic of adaption came up multiple times during the interviews. As stated by participants, in a collaborative environment and especially where clients are involved in a project, not only does the software need to be aligned but also the processes. This is required for software support those processes. Thus the selection or definition of the project management processes can be seen as a requirement in these situations, although as there are also technical limitations to what software could do, aligning software and processes would likely be iterative as well.

As previously pointed out, this would vary based on the kind of contract. With fixed price contracts, which would likely not require much collaboration, this would be focused on defining the consultancy process only. An exception would be the reporting, as it was found that reporting would likely be required by a client regardless of the contract type. With a time and material contract, the level of collaboration would likely be higher, thus any process alignment would need to consider the difference in software and processes between the consultancy and the client organization. Also, the influence of the client will be higher in the latter type of contract, which could even lead to the software simply being decided upon by the client. In this case, an alignment of processes and software would likely still be necessary, but the decision on software products would already be taken.

As for the processes to take into consideration, this would likely not only encompass the traditional project management processes, but as stated the processes that it is linked to such as development, test management, architecture and such. This would align the process with the need for a single repository containing the “one version of truth”, as wished for by project managers.

5.3.6.3 Selecting the Project Management Software

Based on the process definition, the project management software can be selected. As previously mentioned this will likely be based on requirements derived from the defined project management processes, the knowledge of the decision takers about software and specific products and the economic constraints. The selection criteria will be part of a separate discussion in a subsequent section due to the complexity of criteria and features identified in this study.

5.3.6.4 Planning the Adoption

As indicated by the findings, when selecting the software, it is sensible to also consider the adoption as part of this process. The complexity of the adoption and the decisions made regarding the approach can be assumed to impact the cost of the project. Thus, one of the outcomes of the decision be a plan that shows the implementation and rollout of the project management software and processes and the steps necessary to achieve it. This will allow an estimation on the time and associated cost. Discussing the concrete actions necessary for the implementation among the different involved parties may also bring to light yet unforeseen options and limitations associated with it. Examples would be technical network restrictions, the need for licenses, or aspects around data security and privacy.

5.3.6.5 Summary of the Decision Process

The collaborative nature of the decision process and its' benefits towards software usage have already been pointed out by practitioners and in the literature (Borštnar Mirjana & Pucihar, 2014; Raymond & Bergeron, 2008). Thus, conducting the aforementioned steps not only with the outcome in mind, but also the aspect of involvement of key project roles seems crucial. As the long-term benefits will likely not be evident in the moment of decision-making, it will be part of the project managers' role to facilitate the process of decision making. This would include not only negotiation skills, but also the ability to provide transparency on the benefits and disadvantages of different decision paths. The time invested at this point will also likely enable a more efficient implementation and rollout of the project management software and the underlying processes.

5.3.7 Implementation and Rollout

Though implementation of the software has not been a focus of the current study, many findings synthesized relate not only to the point of the decision, but also the actual implementation and rollout of the software. This emphasizes the importance of reviewing the practical implications and activities alongside the selection, as an awareness of these factors may influence the choices made along the way. Organizations may need to consider the implementation, potential means of adoption, as well as communication with the users and training during the project. While all previous activities may still have been part of the proposal phase, the activities depicted here will likely be conducted only after a contract is signed as they encompass little conceptual work and are largely based on implementing and delivering work products.

In regard to the process guide, this adds the final stage. The complete 6-staged process guide is depicted as follows:

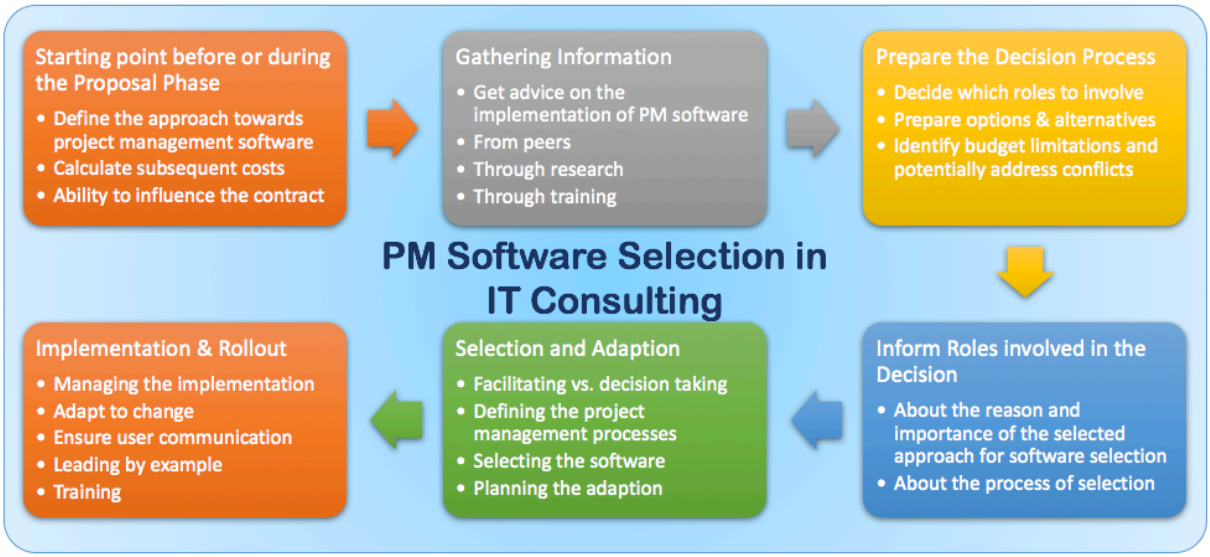

Figure 5-10: 6-staged Process Guide

5.3.7.1 Managing the Implementation

The plan for the adoption of the software was created in the previous process step. As any other project management activity, the implementation now needs to be managed to ensure it is implemented. Depending on the activities necessary this would possibly be conducted by the project manager in case of very simple, Excel based solutions in small projects, or by different technical experts where interfaces to other software is concerned and a high degree of technical automation should be achieved. The role of the project manager would then be more focused on tracking the progress and managing the implementation. As this is, as one participant of this study stated, his management system being setup, it would still be sensible to stay involved in this process.

5.3.7.2 Adapting to Change

While the project management is implemented and throughout the project itself, there could always be new requirements that impact the project management software and require a change from a technical or organizational and process perspective. An example may be, that a software used in the project is no longer supported by its' vendor and needs to be replaced or a change in the client organizations' processes which needs to be catered to. Also, some previously defined processes may actually be conducted in a more efficient manner, which only comes to light once the software is in use. For the involved organizations that would mean that they may need to at least partially adapt the previously defined processes and software. In such a case it can be assumed, that the changes will encompass or at least influence not only the project managers' activities, but also other users. Thus, it would be sensible to revisit the previous stages of the process guide in regard to their applicability for the necessary change.

5.3.7.3 Ensuring User Communication

Also during the implementation and the entire project, communication on the aspects of the project management software to the users could still be deemed relevant in order to maintain acceptance. This encompasses the previously mentioned changes on the technical or process side, but also information on the progress of the implementation of the system. In larger projects, there may be a central role for project communication and collaboration, so it could be advisable to align this communication with any general project communication that is sent considering software, processes or collaboration within the project. This would avoid confusion among users through inconsistent information.

5.3.7.4 Leading by Example

The findings portrayed the importance of the role of the project manager. An important aspect was that leading by example would drive the acceptance in the project. This behaviour should not only encompass the project manager, but his entire leadership team. Within the organization this can then create traction and users throughout the project are more likely to follow and show the consistency needed to gain value from the solution implemented. Once such organizational behaviours have been established, the surfacing benefits of the software will likely become self-evident.

5.3.7.5 User Training

As shown from the analysis, users need to be aware of how to utilize the software. Thus, it seems sensible to consider project specific training. If this is formal or done through documentation may depend on the situation. A high complexity of the project management software could also mean that the potential need for more in-depth training exists, as also suggested by Schwalbe (2015). The training may not only include the team, but could extend to the leadership team and the project manager himself depending on their current level of expertise. This would also support the approach of leading by example.

5.3.8 Outcome: The 6-staged Process Guide

The selection of project management software as defined through this 6-staged process guide shows the different activities that are recommended to increase the positive impact of project management software on project success. As the study is based on the project managers' perspective, the 6-staged process guide is focused on supporting this view. The subsequent section will provide further details on the selection criteria that can be applied at the decision point of this process.

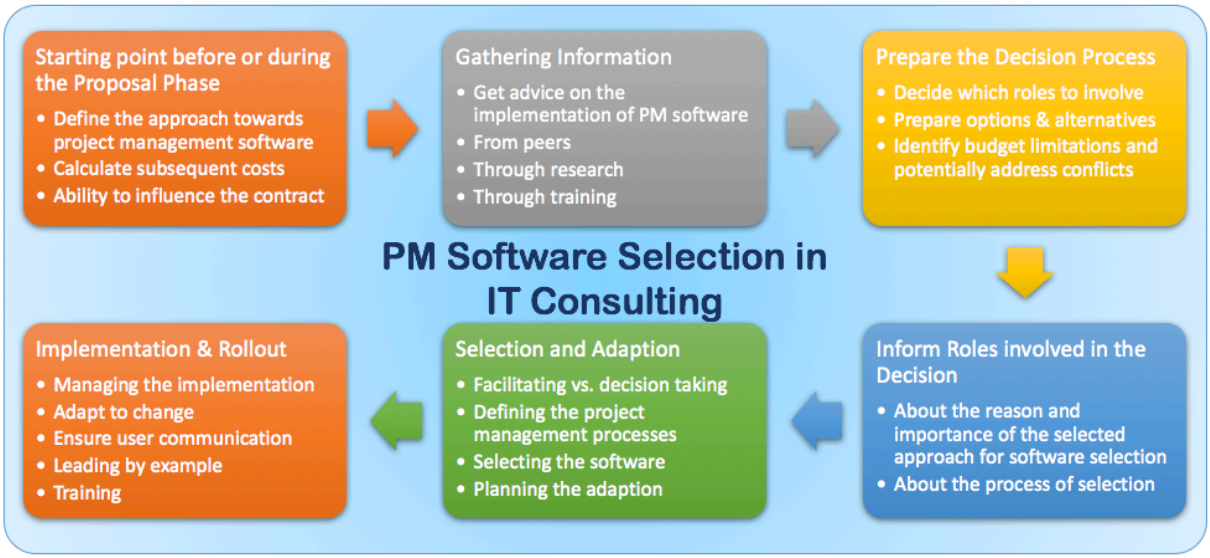

Figure 5-11: 6-staged Process Guide on PM Software Selection

5.4 Selection Criteria – Key Considerations for Project Managers

The selection criteria are based on the requirements that project managers have towards project management software. These give a more detailed insight into fields of application as considered by project managers. This section will review the findings form the interviews, compare them to the list of potential criteria initially derived from literature and discuss the individual aspects of each criterion. The functionalities required will be discussed separately as functional technical requirements as they are specific to the use case the software is applied in.

5.4.1.1 Experience and Skill

The findings give a strong indication that the experience and skill of the project team is of relevance in the software selection. A team that is experienced with a certain software means that the project needs to invest less in training and can also potentially utilize the software to a fuller extend. This is of course beneficial to the project cost and increases the level of efficiency of the team. Also, the skill of the project manager is of relevance. As familiarity with a certain software also increases efficiency with the

software, project managers mentioned they were more likely to use a familiar product. In addition, a project manager can only select the software he knows, so not only is in-depth experience with a certain software product helpful, but also knowledge of different products would be beneficial. As according to the findings, different clients have different software, such breadth of experience would be especially important in consulting environments where project managers work for different clients.

5.4.1.2 Cost & Time Investment

The aspect of cost and budget has been mentioned in the literature to influence project management software (Besner & Hobbs, 2013; Raymond & Bergeron, 2008). This could be confirmed through this study, as it appeared in most of the interviews. Any investment in work, licenses or IT infrastructure has a commercial impact on the project. The findings showed that this leads to a commercial disadvantage for consultancies when competing at a proposal stage. When thinking about project management software selection, the necessary considerations could be aligned to two types of cost:

1. Direct Cost – Depending on the selected software and way of implementation and adaption, this has a direct cost impact on the project.
2. Indirect Cost – Software selection has an impact on the performance of projects. If done poorly, a negative impact on project performance will cause cost increases throughout the project.

For decision makers in organizations it may be tempting to focus on the direct cost, as any reduction in cost becomes immediately evident. The findings of this study propose that entirely focusing on direct cost has a significant impact on long-term project performance. For IT consulting organizations, this means that project management software selection is should be included as one aspect of the commercial considerations in relation to a proposal and a project. The complexity regarding the conflicting goals of

short-term gain while maintaining long-term profitability will likely complicate any decisions.

5.4.1.3 Standards

Standards have been part of the findings in two different dimensions. On the one hand side, collaboration with the client often means to adapt to the clients' needs. This means that most organizational standards established by the consultancy cannot be applied in commercial client projects. On the other hand, there are standards from the clients' side as well as the consultancy side, that are mandatory and thus influence the selection process. An example are mandatory internal reporting standards that are sometimes also linked to regulatory industry standards. This would mean that it would prove beneficial to familiarize oneself with the industry-specific standards and include them in the considerations for the selection of project management software.

5.4.1.4 Project Parameters

As mentioned during the definition of the process guide, project size and complexity should be considered as a factor when deciding on project software. Smaller projects can often be managed with simpler solutions. Also, the methodology is of importance. If the methodology is more agile, is the software flexible enough to support for example constant change in the plans? Thus project managers transfer key aspects of IT projects as identified by Stepanek (2005) also into requirements during their software selection. Findings showed MS Project to be a negative example of this, as it was found to be too complicated to document and manage constant changes in the schedule. Additionally, technology has an impact, as IT development projects can require an integration of development software, SAP projects can be conducted with the solution manager which

is already available in SAP itself and build and deployment software can automatically provide status updates to integrated reporting solutions.

5.4.1.5 Client Requirements

The findings unveiled contractual and non-contractual requirements. These could be related to the client organization requiring to use certain standards or specific client stakeholders having their own preferences. These preferences could be from most of criteria stated in this list as well, as clients have similar considerations. It would be sensible for project managers to verify these early on to be able to discuss the alternatives with their clients and be aware of the implications.

5.4.1.6 Collaboration

This criterion has been mentioned a common theme and relates to many of the other findings. As project management software is often used by multiple users and provides for example reports for communication with stakeholders and teams or create transparency of areas of the project, this seems natural. From the project managers' perspective, this means that any collaborative aspects of a software could be thought about up front. These may include for example:

- Transparency of the data – how easily can users get the information they need?
- Availability of the software to project users – can everyone in the project access it?
- Notifications – are users informed by the project, does it have notification options

These are some examples, but there are more collaborative features available. Some of these are also covered by other criteria identified through this study. The application of project management and collaboration platforms has been further investigated for example through the works of McMahon (2016) and Sprenger (2016).

5.4.1.7 Data Security and Privacy Requirements

In business, most projects deal with sensitive data. This could be client data or financial data or the source code of software used that could be used for cyberattacks if published. As the findings showed, keeping this data secure when it is part of a project is of critical importance to maintain trust between organizations. So, project management software should be secure and potentially use encryption or authorization mechanisms. Similarly, if some of the data in the software may need to be handled confidentially within the project itself. This would require providing access on a need-to-know basis, which means that for example visibility in a project repository needs to be limited to authorized users. From the project manager, this would in turn also require ensuring the implementation of a security concept. While not in the context of project management software, these data security and privacy aspects and best practices have also been mentioned in other studies relating to different IT technologies (Lane, Shrestha, & Ali, 2017).

5.4.1.8 Integration

The benefits of technical integration or single platform application lifecycle management (ALM) solutions came up during interviews, especially in the context of complex projects. The reason for this is likely, that the information flow within complex project environments can hardly be handled through manual integration. Instead an integrated system and integrated processes can lead to an automatized transfer of data. For organizations, this comes at a price, as adapted software solutions of higher complexity likely require an invest of time and budget at the beginning of the project. In projects being conducted in IT consulting this may be even more complex, as the integration would potentially be across client and consultancy IT environments, posing additional technical challenges. These likely result from increased security risk when

connecting IT services between two different company networks and aligning the information flows between two organizations, similar to challenges also faced by companies after mergers (Wijnhoven, Spil, Stegwee, & Fa, 2006). As a result, projects face increased configuration efforts and risk a higher exposure of their data. Especially in projects and sectors with sensitive data, this could prevent any form of technical integration.

5.4.1.9 Availability of Data

The availability of the data in project management software has been implied to be of importance in consulting for multiple reasons. As being mentioned by participants, consultants tend to travel frequently, instead of constantly working from within the same company network. In order to access project data and work while somewhere else, they need the data to be accessible from outside the company network, for example through cloud services on the internet. However, others also mentioned the need to work on a train or plane, where there is no internet connection at all, so in parallel they would ideally choose a solution where data can be transferred and worked on offline as well. These more complex requirements are not yet implemented in many companies, where work is done within the company with access to the companies intranet and services (Meier, Lütolf, & Schillerwein, 2015). Additionally, in times of globally distributed project teams, the reliability of internet speed and accessibility cannot always be guaranteed. This in turn may lead to delays in the schedule as teams are unable to work based on the latest information.

5.4.1.10 Usability

As studies have shown, to promote the usage of software, usability is key (Nielsen, 1999; Steinhueser, Richter, & Smolnik, 2015). This has been confirmed through the findings as

it was recognized by project managers in the interviews. Usability also reduces the amount of training (Donahue, Weinschenk, & Nowicki, 1999; Richter & Flückiger, 2016), which can reduce cost.

5.4.1.11 Agile Capabilities & Flexibility

Agile has been a trend for over a decade and has evolved beyond its' roots in IT companies into other sectors (Gloger, 2017; McHugh et al., 2012). This became evident as the findings indicated project managers also evaluating project management software based on the capability to support agile project management practices. One feature specifically mentioned was that of constant change in the plan, which McHugh et al.(2012) see as a key aspect of agile and whether software supports it. Participants have also mentioned the use of agile terminology in the software. This links to the aspect of usability within an agile context, as the use of the right terminology simplifies the use of the software product. Through such means, user acceptance could be increased.

5.4.1.12 Acceptance of Software by the Team and Client

The aspect of acceptance was revealed as a finding as well. While acceptance of users can be recognized and measured, it can be difficult to understand the underlying motivation. Based on the technology acceptance model (TAM) Wallace and Sheetz (2014) find acceptance to be linked to two factors, perceived usefulness, which could be related to actually utilizing software functionality, and ease of use. This can be linked to usability, which has already been discussed as a criterion. The usefulness has been found to be linked to the communication and importance given to it by project managers and other leadings roles in software projects (Wallace & Sheetz, 2014). This is supported by the 6-staged process guide for the selection process as defined in a previous section of this chapter.

5.4.1.13 Functionality

Different functionalities of software were gathered through the interviews. A functionality has been interpreted as a selection criteria for the purpose of this study. The variation of identified functionalities has been found and many were common to only a few interviews. This indicates that there is an underlying complexity which could relate to the nature of the project. Examples could be technical differences between IT projects and the use cases depending on the project scope. The functionalities were consolidated and categorized into general project management functionalities and IT specific functionalities. This gives an indication of which functionalities result from the IT aspect of projects and may differentiate IT consulting project requirements from regular consulting. The functionalities have been sorted in order of occurrence for this purpose. They have been related to findings from the literature review.

No	Functionality	Identified in the Literature	PM or IT
1	Traceability	(Kääriäinen & Välimäki, 2009)	IT
2	Planning & Monitoring	(Besner & Hobbs, 2012; Pellerin et al., 2013)	PM
3	Repository	(Pellerin et al., 2013)	PM
4	Task & Work Management	(Besner & Hobbs, 2012; Pellerin et al., 2013)	PM
5	Reporting	(Besner & Hobbs, 2012)	PM
6	Financials	(Besner & Hobbs, 2012)	PM
7	Risks & Issues	(Besner & Hobbs, 2012)	PM
8	Document management	(Pellerin et al., 2013)	PM
9	Collaboration	(Kääriäinen & Välimäki, 2009)	PM
10	Change management	(Stepanek, 2005)	PM
11	Test & Test Management	(Stepanek, 2005)	IT
12	Build & Deploy	(Stepanek, 2005)	IT
13	Development	(Kääriäinen & Välimäki, 2009)	IT
14	Service Management	(Kääriäinen & Välimäki, 2009)	IT
15	Requirements Management	(Stepanek, 2005)	IT
16	Release Management	(Kääriäinen & Välimäki, 2009)	IT
17	Configuration Management	(Kääriäinen & Välimäki, 2009)	IT

Table 5-3: Functionalities from the Literature Review

What can be seen is, is that while the need for IT or development project capabilities was recognized by many project managers in this study, their focus in desired functionalities as project managers in IT consulting seems to be mainly on their own

role. A second factor influencing this distribution may be the varying scope of IT consulting projects, as was discussed in the literature review based on the sector definition by Boehm et al. (2011); Joshi et al. (2010); Reineke (2007) and Valacich et al. (2012). Thus, while all project managers have their core responsibilities and want them supported by software, they will need varying IT project related functionalities based on the technological area of their project.

The one exception that has been found was that of traceability, which is attributed to IT. This could be, as traceability appears as a functionality of application lifecycle management (ALM) software, which is used to manage complex IT projects and often provides a centralized platform for PM and IT functionalities (Kääriäinen & Välimäki, 2009). Thus, this could be a trend within larger IT projects which also applies to IT consulting. This is supported by the answers gathered in the interviews that sometimes mentioned the Rational Jazz platform as a software product, which is an ALM software.

5.4.2 Checklist of Selection Criteria

In order to utilize the decision criteria and functionality, they have been compiled into a checklist for project managers or consultants as points to consider when deciding on processes and software.

Criteria	Key Aspects
Experience and Skill	Which software does the team know?
	What experience do they have?
Cost & Time Investment	What is the cost of licenses for each option?
	What time and effort needs to be invested to setup and align the solution for each option?
	What are the economic long-term consequences of not investing the time & money?
Standards	What standards need to be adhered to on client and consultancy side?
Project Parameters	Is the project small? -> simpler solutions Is it complex? -> more integration
Client Requirements	Identify clients' requirements towards the software
Collaboration	Does the software support collaboration?
Data Security and Privacy Requirements	Consider sensitive data, visibility within the software, authorization mechanisms or encryption
Integration	How will the processes and software be integrated? Consider cost for integration vs. cost of manual labour.
Availability of Data	How can consultants access the data while working in a different environment or offline?
Usability	Consider the usability of the solution.
Agile Capabilities & Flexibility	How flexible is the software if data needs to be changed?
5.4.2.1 Acceptance of Software by the Team and Client	Communicate and involve future users to raise acceptance and usage of the solution by the team and client.
Functionalities	Which functionalities are needed? Examples could be Traceability, Planning & Monitoring, Repository, Task & Work Management, Reporting, Financials, Risks & Issues, Document management, Collaboration, Change Management, Test & Test Management, Build & Deploy, Development, Service Management, Requirements Management, Release Management, Configuration Management

Table 5-4: Compiled List of selection Criteria

This list can be used in conjunction with the 6-staged process guide, as it provides the individual decision criteria. This can aide project managers in considering important aspects in the preparation and throughout the decision process. It is meant to be used as a checklist, which can give a structure to document the opinions of different stakeholders and users in the selection process. Instead the project manager may just

utilize it to form his own opinion and potentially adapt the structure for a written documentation.

5.5 Sector Perspective: IT Consulting and Project Management Software Selection

IT consulting projects incorporate aspects of both sides: IT and consulting. This has been confirmed through the findings. They also indicate some differences in contrast to regular projects and specifically point out additional characteristics of projects conducted within both, the world of IT and the world of consulting.

5.5.1 Working with Clients

The collaborative aspect of management consulting in general has been previously researched, as done by Appelbaum and Steed (2005), where they recommended aligning procedures and processes for consulting engagements. This recommendation was supported by interviewees statements in this study, who recommended to align the collaboration in projects for certain types of projects.

A second difference found is the role of the contract, which would not exist for most projects conducted within the organization. The impact of the different types of projects, time-and-material and fixed-price have previously been mentioned. While a fixed-price contract often allows most of the work on projects to be conducted within the consultancy organization, time-and-material requires closer collaboration, thus also requiring further alignment to achieve effective collaboration.

Also, the point in time at which decisions are taken is strongly focused on the proposal phase. At the end of this a negotiated contract is signed between the client and the consultancy. As opposed to most internal projects, this fixes aspects of scope and price in a legally binding form. Thus, any flexibility required needs to have been considered at this point, or becomes part of contract change negotiations.

5.5.2 Conducting IT Projects with Clients

This leads back to a question the literature review established.

Aim: How are development projects in a consulting environment potentially different from other IT projects.

As investigated during the literature review, the nature of IT projects has been investigated to some degree. As Stepanek (2005) pointed out, IT projects have distinct features that need to be considered and that differentiate them from other projects. Conducting IT projects as consulting engagements however, adds another level of complexity, as long as collaboration between the two parties is required, so mainly in time-and-material contracts.

As previously identified, client organizations and consultancies often have their own way of doing things (processes) and their own software products/tools they utilize for not only project management, but also the IT part of processes. As both are virtual, this could be missed on the first glance, but when imagining how this would look if the tools were physical tools, it clearly poses a barrier to collaboration. One could imagine two people trying to build a house together, but one has only worked with wood and brings a saw, nails and a hammer, and the other has worked with mortar and concrete, bringing

heavy machinery. While they can work together on a house, they will first need to align their way of working and decide on which tools to use and how. The danger in IT consulting is, as some interviewees stated, that this is not considered in the moment it needs to be. This moment, as stated above, is normally the proposal phase. Otherwise projects are started with the wrong setup and require a later change during the project, which is similar to a car needing to get somewhere in time with a flat tire. It would be faster if it were changed at the beginning and not during the trip, or it could try to go on with the flat tire and hope for the best. And as mentioned previously there may be additional challenges in aligning processes and software, as there are technical barriers and organizational barriers to overcome, that do not exist when conducting a project within a single organization.

The following table depicts the specific challenges coming together at the junction of consulting and IT:

Sector-specific Aspects of PM	**General**	**IT**
General	None	Uses IT specific processes and software, often integrated into project management
Consultancy	Collaborates with the client and aligns processes with the client	Collaborates with the client and aligns and integrates IT processes and software across organizations into project management

Table 5-5: Sector-specific Aspects

This clearly differentiates IT consultancies in their line of work and requires project managers to be aware of this dilemma they need to resolve. It also likely poses an additional challenge for the consultants working in these projects as they will always have varying ways of collaboration as processes and software changes depending on

which client they work for. On the other side, clients will need to be aware of this as it could also mean changing the processes and software they want to utilize for projects.

5.6 Summary

This chapter has critically discussed the findings gathered in academic and practical context. Three key areas have been investigated from the perspective of project managers:

1. The key definitions and understandings of project management software
2. The process employed by project managers in IT consulting
3. The key considerations for project managers within this process

As a result of evaluating the terminology, it has been found that while there is no unanimous view in theory, the practical application suggests the definition project management software and project management tool as interchangeable terms from a practical standpoint. Additionally, project management software in IT consulting is often seen as going beyond classical project management and encompassing IT functionalities as well.

The selection process that was subsequently reviewed was reconstructed using a process guide by bringing together identified activities, roles and recommendations. The process was an outcome that specifically provides an answer to the question of how the selection process of project management software works in IT consulting. Additional recommendations were drawn from the drivers and barriers identified from the interviews. Thus, the 6-staged process guide can be used to lead the project manager through the different steps of the selection process, providing guidance on each activity.

In addition, a checklist of criteria has been compiled that shows the considerations of project managers along this process to provide guidance to project managers while preparing the decision and to ensure important aspects are covered.

The final section provided a concise summary of challenges when working across organizations in an IT project. It also provided a view, which showed the conjunction of challenges faced in relation to their origin from the IT and the consulting sector.

Chapter 6: Conclusion

6.1 Introduction

Based on the discussion in the previous chapter, the conclusion reviews the progress of this study and critically interprets its' contribution to theory and practice. This is achieved by going back to the beginning of this thesis and assessing to which extend the initially formulated aim and objectives have been met. It will also reiterate the key findings in light of the research questions, to summarize how the research at hand has enhanced existing literature. To clearly outline the contributions, it will identify and point out the limitations. The chapter will then conclude with a recommendation for future research and a final summary. This is shown in the completed overview:

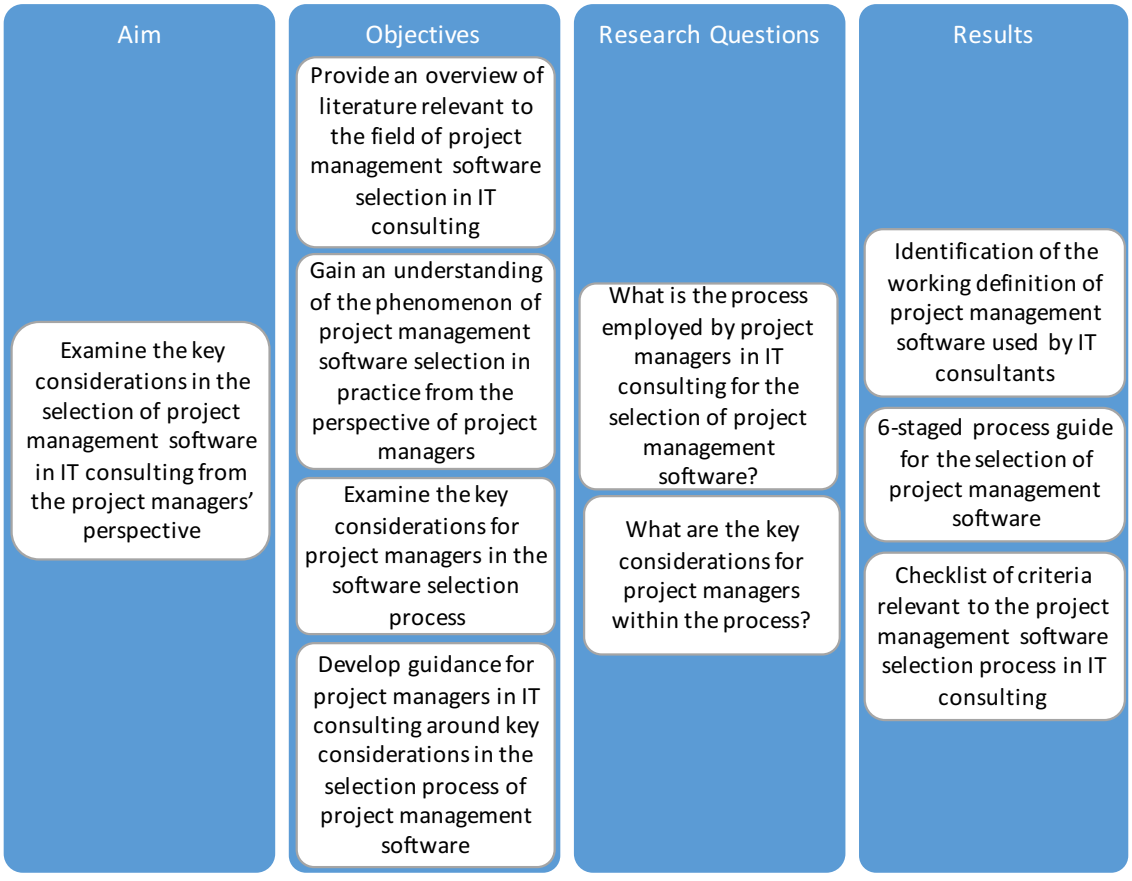

Figure 6-1: Overall Research Structure

6.2 Main Results

The aim of this research was to examine the key considerations in the selection of project management software in IT consulting from the project managers' perspective. This has been achieved through the development of two elements of guidance. The first one is the 6-staged process guide, describing the process and recommendations from the project managers' perspective. The second one is the checklist of criteria for the selection process, that project managers should consider when being involved in the decision process. The process is shown in the following diagram. It was discussed in greater detail in chapter 5 alongside the checklist. This section will discuss these results in light of the research questions.

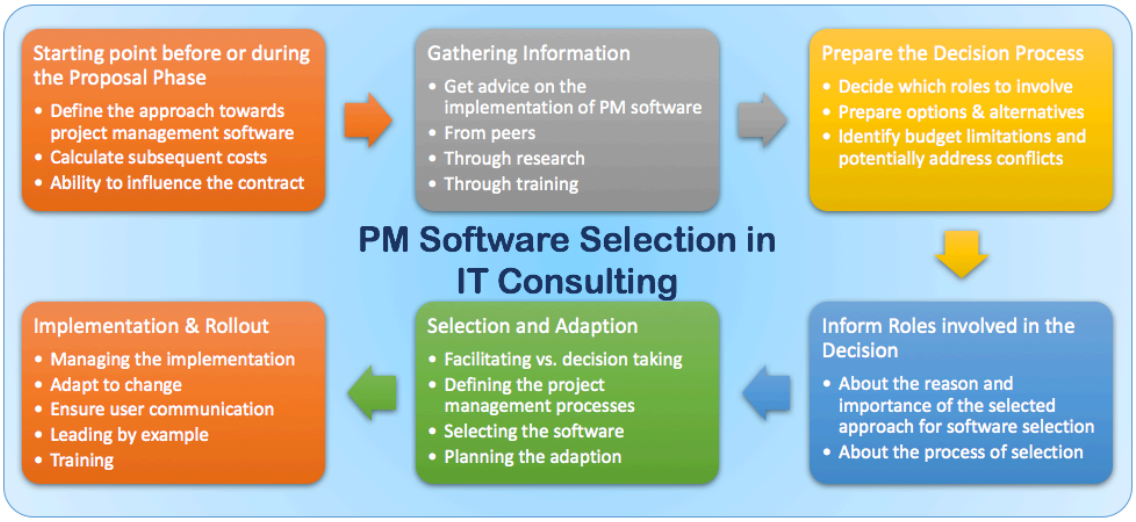

Figure 6-2: 6-staged Process Guide on PM Software Selection

6.2.1 Objectives

6.2.1.1 Objective 1: Provide an overview of literature relevant to the field of project management software selection in IT consulting

This objective has been met through the literature review. Areas of academic literature related to the phenomenon or project management software selection were

investigated through literature research. Through this, it became apparent that the phenomenon itself has not yet been investigated. However, partial aspects and context of the phenomenon had indeed been covered. Thus, the fields of project management in IT projects, project management software, success factors and IT consulting were utilized to shape the research questions. It was also found that little academically supported knowledge of the sector of IT consulting exists today. The detailed research questions and how they were answered will be discussed in a later section in this conclusion.

6.2.1.2 Objective 2: Gain an understanding of the phenomenon of project management software selection in practice from the perspective of project managers

To gain insights based on this second objective, a qualitative research approach was chosen. It was grounded in an interpretivist research philosophy. From this epistemology, a phenomenological research design was developed that utilized semi-structured interviews as a method to gather data. Over the course of half a year, 17 project managers working at a global IT consulting firm were interviewed. The resulting transcripts were explored through thematic analysis. The patterns that emerged provided an understanding of the phenomenon which was utilized to facilitate the discussion in chapter five and to construct a 6-staged process guide. Through this evidence, the research objective 2 as stated above has been met.

6.2.1.3 Objective 3: Examine the key considerations for project managers in the software selection process

The third objective builds on the second one by seeking to inquire more about the considerations within the selection process. Thus, it aimed to understand not only the activities within the process, but also the underlying criteria. Through the analysis of the data gathered through the interviews, the specifics of the process such as the drivers

and barriers, but also specific selection criteria and the functionalities were found. These provided the information necessary to fulfil objective three. This information was also the basis to create the checklist of selection criteria.

6.2.1.4 Objective 4: Develop guidance for project managers in IT consulting around key considerations in the selection process of project management software

The fourth objective was met by the development of the 6-staged process guide for the selection process. The guide was developed not only through the information on the process, but also based on the critically evaluated project managers' recommendations and concerns as they were voiced in the interviews. From these, the drivers and barriers in the selection process were identified and mapped as guidance to the activities within the 6-staged process guide. Additionally, the selection criteria applied by project managers in practice were identified and consolidated in the form of a checklist. This can be used by project managers involved in the process to remind them of the aspects to consider. Thus, the two elements of the 6-staged process guide and the checklist form the result that meets the fourth objective of this research.

6.2.2 Answering the Research Questions

The research questions were developed based on the objectives after reviewing the literature. No literature was found that would provide a comprehensive understanding of the phenomenon of project management software selection in IT consulting. Instead, the areas of IT consulting, project management software, IT project management and project success were investigated. This resulted in the following research questions, which were answered through the empirical study:

6.2.2.1 *RQ1: What is the process employed by project managers in IT consulting for the selection of project management software?*

The first research question was derived from research objective 2. As the literature review found, that literature could not provide an answer meeting this objective, understanding the phenomenon of software selection became a key question that shaped the entire research project. It was answered through the 6-staged process guide that was constructed, which proposes a process for the software selection in the investigated context.

6.2.2.2 *RQ2: What are the key considerations for project managers within the process?*

The key considerations build on objective three. Through researching academic literature related to the context of this study, aspects of potential relevance were identified. These were then compiled into a list of potential criteria. This information was later used to align the empirical findings that related to these criteria and discuss their relation to the existing body of knowledge. This provided an answer to the second research question.

6.3 Implications of this Study

As outlined by Turner (2010), project management research has evolved in conjunction with the field of practical project management over the last two decades. Through its completion, the current research project becomes part of this evolutionary process by providing contribution to both, academic knowledge and practice.

6.3.1 Contribution to Theory

A significant amount of research has been done on project management, with focus on quantitative studies (Floricel et al., 2014; Turner, 2010). In relation to project

management software, Raymond and Bergeron(2008) have found the usage of project management software to contribute to project success in a cross-sector study. Similarly, Besner and Hobbs (2012) have evaluated project management tools and software as a subcategory in a cross-sector study to identify their efficiency. For the engineering sector, Pellerin et al. (2013) have taken a similar approach focusing only on project management software by utilizing self-defined project management subsystems. While these studies propagate the benefits gained from software usage, little was known on the underlying considerations of project managers and the selection process that leads to the usage of such software. Their focus on cross-sector and engineering also does not evidence any implications in regard to the IT sector.

The study utilizes a qualitative approach and employed interviews to collect data from experienced project managers to develop a process guide based on their considerations. This goes beyond previously existing knowledge as it provides an understanding of the selection process in their view. It also shows the different considerations in the selection process in their broader context. Previous research often build solely on cross-sector project management standards such as PMBOK (Project Management Institute, 2013), which makes the research process and results prone to a purely theoretical view without practical relevance. The descriptive account brought out through the findings from the interviews in this study, which is cumulated in the 6-staged process guide, allows researchers to understand project managers' perspectives. This in turn will enable future research to be tailored on practitioners' considerations. This answers Jacobssen and Söderholms (2011) call for project management research to go beyond deterministic works.

In addition, this study is the first to relate the different activities within this process and the sector context of IT and specifically IT consulting. By this it provides insights into the phenomenon of project management software selection and the underlying considerations. The selected sample of seasoned practitioners with an average experience of 15,1 years in project management also contributes to the credibility of the outcome and provides information not previously accessible to academia. Their experience supports the relevance of the created process guide and the checklist of criteria that were generated. As such models were previously not available for project management software selection, they can be utilized by future researchers to verify and enhance these outcomes.

IT projects have been covered by many academic papers discussing insights into specifics of such projects. IT consulting however, has only been mentioned marginally as a side aspect of other research (Schwalbe, 2015; Shelton, 2013; Yaqoob et al., 2016). Thus, little knowledge of IT consulting persists that is grounded on academic standards. As one of the few studies located in this sector, this study provides additional insights in relation to the phenomenon of software selection. It also highlights aspects of relevance to the IT consulting sector as identified through the findings.

Lastly this study has addressed the lack of a common terminology for project management software. The literature review showed that in the context of project management, the terms of software, tool and information system were used differently by different authors in academia. Based on this finding, it also gathered an

understanding from practitioners' perspective on the terminology. It found that the terms tools and software were commonly used, and mostly interchangeable with each other. By uncovering the working definition and relating it to academic terminology, this study allows future researchers to be mindful of this gap, which in turn will simplify the exchange of information between academia and practice. It should also contribute to the precision of future research results in this field as researchers can now deal with this gap consciously.

6.3.2 Contribution to Practice

As identified through this research, the lack of attention on the selection of project management software can lead to unsuitable software being selected or to software not being adapted to the project needs. The result of this is additional work as tasks need to be done manually rather than automatically through the software. Also, a lack of focus on project management software and the users during the selection process can lead to acceptance problems in the team. As users reject the software and thus use it only to little or no amount, data quality within the software is deficient and no or few benefits can be derived from it. In other cases, the missing emphasis on the selection results in a lack of integration of the software, which is especially negative for large scale projects where a lot of information needs to be correlated to allow the project manager to get consistent reports and steer the project. These examples show the negative impact, if the software selection is not conducted consciously. The findings of this research underline the importance of such cases and provide measures to improve the software selection and the resulting utilization of project management software.

Firstly, this study shows the importance of the selection process itself. As many practitioners stated, the selection of project management software is an important aspect in IT consulting projects. To some, this became a conscious realization through participation in this study. Thus, this study has had a positive impact on the perception of project managers of project management software selection, which can lead to more conscious decisions in future of projects.

As the data has been raised through interviews with experienced project managers, it gives a summary of their learnings and best practices. The 6-staged process guide of the software selection process provides an orientation and recommendations for the selection. The diagram is an overview and depicts the individual steps to take during the selection process. Thus, any project manager working in a similar context can utilize it to get an understanding of this phenomenon. Inexperienced practitioners can use this as a guide to select software for their first projects, whereas senior project managers can employ it as a structured method that is informed by their own knowledge. The process guide is enhanced by the best practices as detailed in the discussion, to give more in-depth information, for example on who to involve in the selection process or critical decision points on this path. Through the combination of both, the overview and the additional guidance, a concise view is created of the overall process that saves time for practitioners and potentially helps avoiding mistakes.

This guidance is supported by the checklist of selection criteria, which was synthesized from the criteria and functionalities that project managers mentioned during their interviews. It provides a set of criteria in combination with a set of aspects, questions

and considerations for the project manager. It can be used by itself to prepare the selection of a software or it could also be used to review an existing solution already in place.

Many organisations have their own methodological approach in regard to project management. IT consultancies can utilize the process guide and the checklist to strengthen their internal project management frameworks by following the advice given as part of this research. This will likely lead to a better utilization of project management software and thus higher project efficiency. It can also be used for training project managers and raising awareness of the subject of project management software selection. The guidance can also be utilized by other organizations, but need to be adapted to the specific industry needs. Especially in these cases it would also be sensible to verify if other industry specific guidance is available to complement or replace aspects within this study.

6.4 Strengths & Limitations of this Study

The way the research was approached, shaped and conducted leads to a number of strengths and limitations, that are inherent to its nature and context. This section will discuss these aspects in greater detail and provides an argument for the outcome and the aspects to consider within their interpretation and application in further research.

6.4.1 The qualitative Approach

As this study is of qualitative nature, it shares the strengths and limitations commonly found among such research projects. The data gathered was rich and provided a multitude of information. As a limitation resulting from this, it will not be able to provide any statistically proven conclusions. Instead, it focused on trying to get a broader understanding of the phenomenon through semi-structured interviews and in depths discussions as a basis for future quantitative research. The qualitative approach also increased engagement of the practitioners involved. The method of semi-structured also allowed practitioners to reflect on their experiences during the discussion, which seemed to contribute to their awareness of the importance of the selection process as many of them mentioned after the interviews.

6.4.2 The Author as a Practitioner

As a project manager in a global IT consulting company, the researcher had access to a large network of participants for this study. This allowed to involve experienced interviewees of varying seniority in the field of project management, which provided a better understanding of the phenomenon through diversity of participants. Including participants from within the same company also limits the generalizability of this study, as the claims made would need to be validated regarding applicability in other companies with a different culture. The decision in regard to the sample were made consciously, as this allowed interviews to be conducted in trusted environment, as company internal information could be discussed without concern.

Through his experience as a project manager in IT consulting, the author already had a non-academic understanding of the phenomenon prior to this study. This may bring a potential subconscious bias to the research, which was minimized by grounding the research project in existing literature. His role as both a practitioner and a researcher also had the positive influence, that he could provide a holistic perspective on the phenomenon investigated.

6.4.3 Sector-specific Approach

As previously mentioned, many contextual elements of this study such as IT consulting, software selection and project management software have only been partially covered in existing literature. The focus on this phenomenon within its' specific context produced not only an understanding of the phenomenon itself, but also contributes to a better understanding of the sector itself. It also outlines the contextual elements, specifically IT and consulting, and tries to identify their influences, which gives additional substance to the findings and claims made.

6.4.4 Practical Relevance

The thesis was written on the journey towards a doctor of business administration (DBA). The practical focus of a DBA requires a practical contribution, which resulted in a strong focus not only on academic, but also practical outcomes. These were developed by focusing on the practitioners' perspective of project managers throughout the study. The 6-staged process guide and the recommendations towards the process of software selection that were created as part of this study are both grounded in the on average 15

years of experience of the interviewees of this study. This increases the quality of the outcomes created from a practical perspective.

6.5 Recommendations for Future Research

This section gives recommendations for areas of future research in relation to this study and its outcomes. It is separated into three areas. The directly related options for future research are based on the limitations the current study has. Additionally, will provide suggestions on the areas of project management in general and specifically project management software. The third aspect to be considered is that of IT consulting as a sector to investigate further.

6.5.1 Research based on the Limitations

The first and potentially most obvious link for future research would be to build on the limitations the current study has. As previously pointed out, the current study is qualitative in nature. Thus, any findings are not statistically proven. To make any insights that were part of this research more specific and relevant, it could thus be beneficial to evaluate these through quantitative measures. An example would be the criteria for software selection, which would benefit from an investigation into the comparative importance of each item. This could follow a quantitative approach based on surveys. This would also help practitioners focusing on the key aspects when they need to prioritize.

As part of this research, the terminology for project management software was investigated. Similarly, it would also be sensible to verify the terminology in a larger context and across companies to gain a more complete definition as used in practice. This would then provide more substance to the definition formed. As the current study was conducted in a large global company, it would also be of interest to see if there is a difference in smaller or more locally operating consultancies. This would allow a better differentiation based on the context the selection process takes place in. It would also be interesting to conduct a similar study using focus groups to put more emphasis on the areas of agreement and disagreement in regard to the selection process. This could lead to a clearer concept of the potentially controversial points and practitioners' views after a critical discussion on them.

Lastly, the current research was based on interviews with project managers, as it focused extensively on the project managers' perspective. It would, however, be also helpful to gain an understanding from other perspectives, in order to uncover influences on the process that are potentially hidden from the view of project managers. It would also give more detail to these influencing factors where they are related to other involved roles. Examples for potential participants for similar studies would encompass the profit and loss owner, IT architects or technical lead roles, team members and especially roles on the client side. The last would be especially interesting to know for consultants as they are not part of their own organization, thus it may be harder to get an understanding of their perception.

6.5.2 Project Management Software

Project management software has been researched as part of this study. Still many questions about it are unanswered. For example, the studies that exist on the topic only cover few sectors such as construction (Son, Hwang, Kim, & Cho, 2016), thus studying other sectors and identifying sector specifics would be beneficial to develop insight into the process as applied there and gain an understanding of the applicability of such studies across different sectors. This would make it easier for academics and practitioners alike to contextualize information within this field.

It has previously been mentioned that project management software usage drives the benefits it brings to the project success (Ali et al., 2008; Raymond & Bergeron, 2008). As part of this research, some aspects were uncovered that project managers identified to drive software usage. In order to get a more complete understanding, it would be worthwhile to investigate further aspects on software usage, not just within the selection process, but with a focus on what influences there are during the project lifecycle. It could focus on the users' perspective, as opposed to the decision makers as in this research. This would likely help to also get a better understanding of the emotional factors that may have an impact on the acceptance of project management software.

Also, the potential of training in this area should be investigated further, as it has been mentioned as a factor influencing software usage during this study. Robertson (2015) contributed to the research on project management training. Similar studies could be conducted to specifically review project management software trainings, the application

of specific evaluation frameworks and its impact on practitioners. This could help to improve training and subsequently software usage in practice as well.

Lastly, an investigation into future trends for project management software would be interesting to anticipate further developments. This again would likely need to be differentiated by sector, as required functionalities and thus developed and preferred products would likely vary.

6.5.3 IT Consulting

IT consulting is the sector this research is located in. Through the literature research it became apparent, that this sector has not yet been the focus of much research. Thus, there is much potential for future studies. The first and foremost would be to develop a clearer definition of what IT consulting is and what contrasts it from management consulting. Some definitions were mentioned in the literature, but these varied broadly. As part of such a study, one could also define the areas that are part of IT consulting through investigations into practice. This should be done ideally by developing an understanding not only from the perspective of consultancies, but also from their clients.

As part of this research the contract was mentioned to have significant impact on the software selection process. Thus, providing a concise evaluation of the contractual aspects that relate to project management in this sector would pose a significant contribution. The role of the project manager or other roles in IT consulting would also be different perspectives to investigate, potentially through qualitative investigation,

thus expanding the understanding that academic literature has of this field in general. Due to small amount of literature on IT consulting and especially on project management in this context, any endeavours to investigate this further would be highly commendable.

6.6 Recommendations for Practice

The research at hand poses implications for multiple levels of an IT consultancy. Some key suggestions will be listed as follows based on the previously discovered contributions of the study and the findings related in the discussion.

Raise Awareness

The first and foremost the general relevance of PM software should be stressed. Decision makers in IT consultancies need to be aware of the implications that the related decisions have. A short-term focus on low cost when planning a project is likely going to have a negative impact in relation to the utilization of PM software and consequently on the long-term efficiency and cost.

Provide Training

In addition, IT consultancies should consider the need for additional training in relation to PM software selection to enable project managers to better make conscious decisions on this topic. In relation to the training, it would be suitable to train with a focus on the selection process itself and not just a specific software, as this may change depending on the client.

Standardization

As mentioned, many organizations aim for standardization when utilizing processes and software. In the IT consulting industry however, this should be handled with caution. The collaborative nature of many projects requires consultants to often work with clients, thus a too rigid set of standards may hinder collaboration. In consequence, standards in the area of project management software and processes should be standardized in a way where they flexible enough to be adapted to specific project and client situations.

Involve the Team

As most project managers recommended, those team members that need to use the software should be involved in the process of software selection. This will lead to higher utilization of the software and thus increased benefits for the project.

6.7 Summary

This chapter has given an overview of what was achieved through this study and how the research met its' objectives. The aim of this research project was to provide an understanding of the project management software selection process in IT consulting as encountered by project managers. This has been met through the identification of underlying definitions, the 6-staged process guide, the list of selection criteria and the selection criteria synthesized from the data. Through the application of qualitative methods, this study has expanded existing theory by contributing a new perspective on the selection of project management software. The working definition of PM software that was synthesized strengthens the communication between academia and practice. The 6-staged process guide gives an understanding of the phenomenon of software

selection itself in the relation to project management and relates the practitioners' standpoint to researchers. This understanding is expanded through the selection criteria identified. Furthermore, as IT consulting has not been in focus for many studies, it also gives some insight into the sector itself. The three key results are also represented in the following figure.

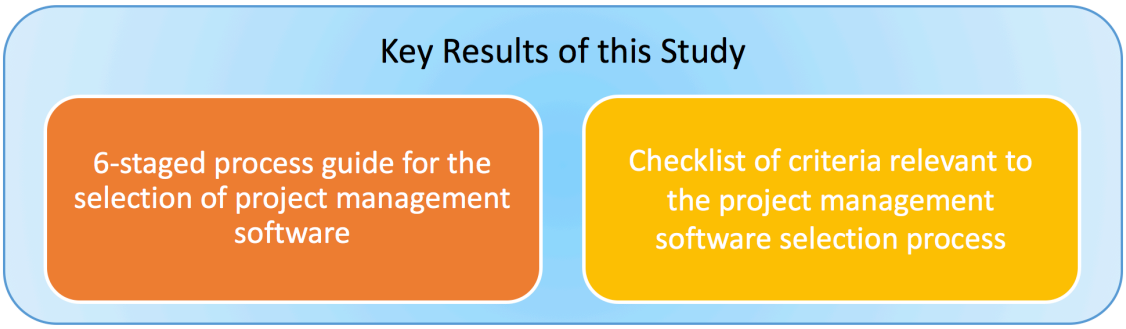

Figure 6-3: Research Results

The chapter has further pointed out the strengths and limitations of this project, to provide guidance and context to the claims made. It has shown which opportunities for future research are available based on the limitations of this study and beyond. Being located in the IT consulting sector poses limitations towards the generalizability of this study, but it also provided rich information bringing to light multiple aspects to be investigated through future research.

Based on the feedback that participants gave on the interviews, this research is also a contribution that fills a gap in practical knowledge and gives emphasis to an important aspect of project management often overlooked. Thus researchers and practitioners alike may hopefully both be able to draw helpful information from this study, to develop their own capabilities and understanding beyond what is formulated here, thus making it irrelevant for their further activities (Wittgenstein, 1961).

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Appendix

Appendix I: Interview Schedule

Introduction
Start with Smalltalk
Explain why the thesis is written and why the topic was chosen.
Inform the interviewee about the interview being a trusted environment, confidentiality of the researcher, ask to sign form for Informed Consent
Ask if interview in English is possible
Then start into the interview
Education
What is your educational background? (sub-questions to identify titles, academic degree, if necessary)
Do you have any further professional educational qualifications like PMI and if so, which?
Work Experience
How many years have you worked as a project manager?
Have you worked as project manager within a non-consultancy organization - not in the role of consultancy PM?
Can you give examples of different projects you have been working on? (sub questions: size (team, duration, budget), national / international, collocation/distributed, client industries, agile / waterfall)
PM Software
What is your definition of project management tool?
What is your definition of project management software?
Which project management software did you use in your past projects?
What were the key factors for considering certain software products?
How did you involve the project team in the selection of the software?
How did you involve the client in the selection?
What kind of contract did you have with the client? (time & material, fixed price)
What specific challenges have you encountered when selecting and introducing tools on a project?

- Challenges with people
- Technical Challenges
- Other aspects?

How have you resolved them?
Which key advice would you give to a project manager in regard to selecting software in similar projects?
Context
As a project manager in an IT consultancy, which challenges do you think are specific to your role in context of the PM software selection (and why)?
How do you address these?
Closing
What would you like to add?

Appendix II: Form of Informed Consent

Informed Consent Form

Interview regarding the "Selection of Project Management Software by Project Managers in IT Consulting"
Please read this document carefully.

Purpose of the Research and the Interview
The interview is part of a doctoral thesis, which will attempt to answer the following research questions:

- What are the key definitions and understandings used by managers in IT consulting on project management software?
- What is the process employed by project managers in IT consulting for the selection of project management software?
- What are the key considerations for project managers within the process?

The interview consists of a set of prepared and additional spontaneous questions. These will ask for the interviewees experience in relation to the mentioned research questions and investigate those in more detail. The questions will also try to identify what has proven successful and what has not worked in order to derive practical guidance for practitioners as a result of the thesis. The interview itself will be recorded and the information will later be transcribed. The interview will take approximately one hour.

Confidentiality
Your identity will only be known to the interviewer and not be disclosed to others. It will also not be used in any publication. Any names of people or organizations that you mention other than IBM will be removed and replaced by anonymous placeholders in the transcription.

Voluntary Participation
Your participation in this interview is completely voluntary. There is no penalty or loss of benefit for choosing not to participate. You can abort and withdraw from the interview at any time in which case the recording will be deleted.

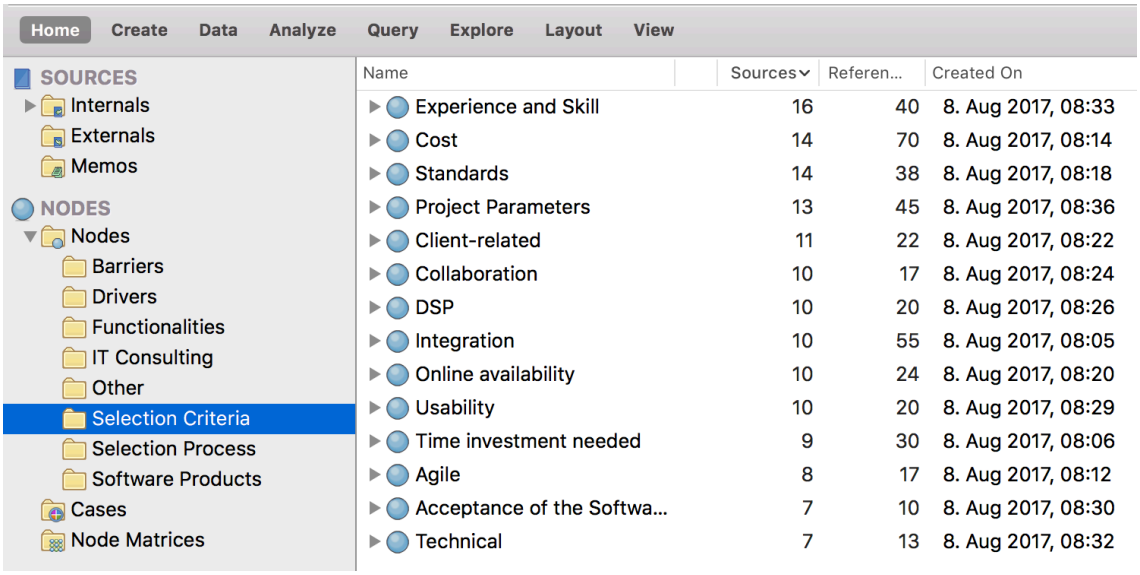
Agreement
I agree to conduct the interview under the terms stated above.

Name: _____

Signature, Date: _____

Appendix III: NVivo Project Structure Snapshot

The following picture provides a partial snapshot of the NVivo project structure as it was utilized for sorting the data and identifying the findings as described in chapter three and four.



Appendix IV: Software Products

As part of the interviews, different specific products were mentioned. While these were not directly related to the research questions, the do give an impression of which project management software products were used by practitioners interviewed. The following list provides an overview, but should not be seen as representative or complete. It also does not show whether experience with the mentioned software were positive or negative

Product or Product Category	Sources	References
MS Project	15	31
Jira	8	18
Software from smaller vendors	2	2
IBM internal software	7	14
Rational Jazz	12	31
Self-made custom software	4	5
MS Excel	15	51
IT project-specific products	4	7
Project / document repository products	9	27
Slack	5	8
Other messaging software	6	9