Challenges by defining a scope statement for a digitalisation project

A qualitative study within the public sector based on the case study eAkte

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CHEERS!!

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Abstract

Almost every change within an organisation is done through projects; however this is problematic, since projects often fail due to unavailable resources and a lack of quality. Therefore, management of the project's scope seems to be essential because it has an impact on the whole project performance. Consequently, the scope statement of the project needs to be well defined otherwise it can lead to significant issues during the whole project life cycle. To ensure a successful project and a well-defined scope statement, knowledge sharing within the project team is essential. However, to ensure that knowledge sharing occurs it is in the responsibility of the project manager to create a trustworthy environment, which can be seen as a challenge. Another problem within projects is that knowledge gets lost or is not stored at the end of a project, which is needed to prevent forthcoming projects from failing.

The research topic was chosen because the impact of complex digitalisation projects within the public sector are under-researched. Since all German governmental agencies need to implement electronic files until 2020 according to the German E-Government Act (EGovG), the pioneer project ‘eAkte’ of the Federal Labour Office was chosen as the underlying case study of this thesis. With the combination of the different research areas a unique study is created, since the relationship is shown. To generate the required data for this study, semi-structured interviews with eight participants of the project eAkte were conducted.

The findings of the thesis were divided into four main themes complexity, scope statement, knowledge as well as project challenges in order to see the relationship and interaction of the individual subjects. By connecting the findings with the chosen literature, it can be recommended to incorporate all affected parties in the creation process of the scope statement in order to ensure that the needed knowledge is included for specifying it.

The thesis provides contributions for forthcoming digitalisation projects within the public sector in order to apply the new insights regarding the creation process of the scope statement. Further, a theoretical contribution has been conducted by combining the theories of project management, scope management and knowledge management to highlight the interaction of these subjects.

**Keywords:** Project Management; Scope statement; Knowledge sharing; Digitalisation; Public Sector
# Table of Contents

1 **Introduction** .................................................................................................................. 1
   1.1 Problem Background ..................................................................................................... 1
   1.2 Theoretical Background .............................................................................................. 3
   1.3 Research Gap ................................................................................................................ 4
   1.4 Research Question and Purpose ................................................................................. 5

2 **Theoretical Framework** ................................................................................................... 7
   2.1 Project Management ..................................................................................................... 7
      2.1.1 Project Management Components ....................................................................... 7
      2.1.2 Project Life Cycle .............................................................................................. 8
      2.1.3 Complexity .......................................................................................................... 9
      2.1.4 Project Management Methodology ...................................................................... 13
      2.1.5 Project Scope Management ................................................................................. 17
   2.2 Knowledge Management ............................................................................................. 21
      2.2.1 Explicit Knowledge and Tacit Knowledge .......................................................... 21
      2.2.2 Knowledge Management Life Cycle ..................................................................... 23
      2.2.3 Knowledge Sharing in Projects .......................................................................... 26
   2.3 Public Sector vs. Private Sector ................................................................................... 28
      2.3.1 Project Management Challenges in the Public Sector ......................................... 29
      2.3.2 Digitalisation ...................................................................................................... 30
   2.4 Summary ....................................................................................................................... 32

3 **Theoretical Methodology** ............................................................................................... 33
   3.1 Choice of Subject ......................................................................................................... 33
   3.2 Pre-understanding ........................................................................................................ 33
   3.3 Overview about chosen Theoretical Approach ......................................................... 35
   3.4 Fundamental Assumption ............................................................................................ 36
      3.4.1 Ontology .............................................................................................................. 36
      3.4.2 Epistemology ...................................................................................................... 36
      3.4.3 Axiology .............................................................................................................. 37
   3.5 Research Design ........................................................................................................... 37
      3.5.1 Inductive vs. Deductive ....................................................................................... 37
      3.5.2 Quantitative vs. Qualitative ................................................................................. 38
   3.6 Research Strategy ......................................................................................................... 40
      3.6.1 Key Characteristics of Research Strategy ........................................................... 40
      3.6.2 Case Study ........................................................................................................... 40
4 Practical Method ........................................................................................................... 43
  4.1 Data Collection ........................................................................................................ 43
  4.2 Sampling .................................................................................................................. 43
  4.3 Interview Question Formulation ............................................................................. 45
  4.4 Conducting the Interviews and Location ............................................................... 46
  4.5 Data Analysis .......................................................................................................... 47
    4.5.1 The First Step – Categorising Sub-Themes ...................................................... 48
    4.5.2 The Second Step – Categorising Main-Themes ............................................. 49
  4.6 Ethical Issues and Considerations .......................................................................... 50

5 Empirical Findings .................................................................................................... 53
  5.1 Case Study Description: eAkte ............................................................................. 53
  5.2 Interview Findings ................................................................................................ 56
    5.2.1 Complexity ..................................................................................................... 57
    5.2.2 Scope Statement ............................................................................................. 57
    5.2.3 Knowledge ..................................................................................................... 59
    5.2.4 Project Challenges .......................................................................................... 60
  5.3 Overview of the Findings ........................................................................................ 62

6 Analysis and Discussion ............................................................................................ 63
  6.1 Structural Complexity ............................................................................................. 63
  6.2 Identification of Parties to create the Scope Statement ........................................ 65
  6.3 Agile and Waterfall Elements in the Project eAkte .............................................. 67
  6.4 From Knowledge Sharing to Knowledge Storing ................................................ 68
  6.5 Support of Knowledge Sharing to precise the Scope Statement ......................... 70

7 Conclusion .................................................................................................................. 72
  7.1 General Conclusion ................................................................................................. 72
  7.2 Research Implications ........................................................................................... 73
    7.2.1 Scientific Implications .................................................................................... 73
    7.2.2 Managerial Implications ................................................................................ 74
    7.2.3 Social Implications ....................................................................................... 74
  7.3 Truth Criteria ......................................................................................................... 75
  7.4 Limitations ............................................................................................................. 76
  7.5 Future Research ..................................................................................................... 77

Reference List ................................................................................................................ 79
Appendix ........................................................................................................... 91
Appendix 1: Interview Guideline........................................................................ 91
Appendix 2: Interview Findings......................................................................... 92

List of Figures

Figure 1. Dimensions of project complexity ......................................................... 10
Figure 2. MODeST dimensions ........................................................................... 11
Figure 3. Waterfall Model ................................................................................... 14
Figure 4. Agile Control and Execution Processes .................................................. 16
Figure 5. Conceptual differences between the two methodologies ...................... 17
Figure 6. Project Scope Issues ........................................................................... 18
Figure 7. Phases of Project Scope Management ................................................... 19
Figure 8. Four modes of knowledge conversion .................................................. 22
Figure 9. IOSAEC knowledge management life cycle ........................................... 25
Figure 10. Research Methodology ...................................................................... 35
Figure 11. Process of the eAkte ......................................................................... 54

List of Tables

Table 1. structural and dynamic complexity elements of the MODeST framework .... 12
Table 2. A General Listing of the Types, Reasons, and Nature of Changes .......... 20
Table 3. Main differences between Public Sector and Private Sector ..................... 29
Table 4. Differences between Quantitative and Qualitative Research .................. 39
Table 5. Description of Interviewees ................................................................... 45
Table 6. Information about the interviews ............................................................ 47
Table 7. Sub-Themes .......................................................................................... 49
Table 8. Main-Themes ......................................................................................... 50
Table 9. Ethical Principles ................................................................................... 51
Table 10. Complexity factors of the project eAkte ............................................... 55
Table 11. Information about the interviewees ....................................................... 56
Table 12. Summary of the Findings .................................................................... 62
1 Introduction

<table>
<thead>
<tr>
<th>Chapter overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>The introduction chapter presents the underlying research problem and its theoretical background by providing a brief understanding of the main definitions used in this thesis. Further, this chapter outlines the purpose of the study by providing an understanding of the need for the research and presents the importance of answering the research question within the thesis.</td>
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1.1 Problem Background

Nowadays almost every change within an organisation is done through the usage of projects (Midler, 1995; Turner & Müller, 2003). Indeed, experts estimate “that over 50% of all their value-adding activity [within an organisation] is carried out in projects” (The Economist Group, 2005). Nonetheless, project management remains problematic as it often fails to comply with the available resources and quality expectations. In a substantial amount of cases costs and time are the main reasons that projects are delayed or fail (Holmes, 2001; The Standish Group, 2001, p. 6). Additionally, Allen et al. (2014, p. 1) pointed out that a large number of projects do not fulfil their goals. Further, McKinsey, in cooperation with Oxford University, presented research that indicated “on average, large IT projects run 45 percent over budget and 7 percent over time, while delivering 56 percent less value than predicted. Software projects run the highest risk of cost and schedule overruns” (Bloch et al., 2012).

Further, the management of a project’s scope is said to have a significant impact on the performance of a project overall, thereby emphasising the importance of defining and managing this aspect. Accordingly, a weakly defined scope statement can lead to significant issues during the project life cycle. Nonetheless, researchers claim that most of the projects do not define the requirements specific enough. Collins & Baccarini (2004) for example declare a scope as the necessary factor to meet the expectations of the client; whereas Ward (1995) highlights the importance of a common understanding of the project scope among the involved parties. Therefore, it is even more important to define the scope statement in a proper way to avoid a lack of quality. To counteract the lack of quality additional resources like time, money and working hours are needed to ensure the expected standard (Dumont et al., 1997, p. 54).

Besides the project management issues, Kasvi et al. (2003, p. 571) examined the importance of knowledge sharing. By obtaining and reapplying significant knowledge from prior projects, issues for failing can be prevented in forthcoming projects. Accordingly, with the usage of the pre-generated knowledge, costs can be reduced by minimizing superfluous tasks and avoiding repetition of misconceptions. This understanding is also supported by other researchers, who explained the purpose of knowledge sharing in project management as “observing the full array of knowing practices used by project participants may reveal how they create, maintain and use distributed expertise, how they fail to transfer and mobilise knowledge from past projects or, on the contrary, how they fail by over-relying on past knowledge” (Floricel et al.,
However, the loss of knowledge at the end of a project is still a common issue, even though some techniques already exist to overcome this problem (Farzaneh & Shamizanjan, 2014, p. 84). To encourage the maintenance and continued usage of this knowledge, it is essential that companies start declaring knowledge as a valuable resource within the organisation.

As shown above, the usage of projects within organisations is constantly increasing and the practice of managing projects is becoming more important. Thus, it seems important to continue research in the project management field with particular focus on success and failure criteria (Allen et al., 2014, p. 2). Further, researching project management in the public sector can be seen as valuable since governmental agencies are highly bureaucratic and therefore, every internal implementation or change takes longer than in other sectors. The public sector includes all organisations which are owned and managed by the government. The purpose of the public sector is to provide services for its citizens like insurances, governmental agency and health care services. In contrast to the private sector, the public sector does not aim to generate profit whereby financial capital for the offered services is collected through taxes and fees (Wirick, 2009). Further, a large number of citizens are affected through the provided services within the public sector, highlighting the importance of extending and modernizing their services and processes (Lane, 2000, p. 7). As a consequence, it is difficult for the public sector to be on the same innovative level than other organisations as the implementation of new processes and technologies are time consuming (Meijer, 2015, p. 198). Therefore, research to improve project management within the public sector, especially with the focus on digitalisation projects, is needed.

Organisations have to redefine their existing processes and adapt them to a more innovative approach. To ensure an innovative approach, digitalisation can be seen as one way to overcome outdated operations since it “emphasizes the importance of placing advanced technology at the heart of all processes, products, and services” (Parida, 2018, p.23). A digital infrastructure is essential to increase the performance of the organisation. According to experts, digitalisation may lead to a reduction of work tasks; however, this has yet to be confirmed in longitudinal studies (De Bruyne & Gerritse, 2018, p. 198-199).

The German E-Government Act (EGovG) obliges federal authorities to switch to electronic filing as part of the "Digital Administration 2020". In doing so, the EGovG aims to promote digitalisation in administration and further facilitate electronic communication between citizens and administration. In order to successfully implement these multi-faceted requirements, the public administration must act now and set up e-government projects in a timely manner (BMI, 2014).

The Federal Labour Office has taken a pioneering position with its digitalisation project called "eAkte" (English: electronic file), which has been implemented throughout every governmental establishment in Germany. Further, the project represents an important component of the eGovernment strategy for the use of digital information and communication techniques. It has created the foundation for paperless office and a modern and efficient administrative work (Bundesagentur für Arbeit, 2016). The idea behind the eAkte is to generate a digital data collection of electronic files. Before the implementation of the eAkte, every document was scanned manually, which was time consuming and inefficient. To counteract this issue, the Federal Labour Office has outsourced the scanning process as part of the project. The German Post AG therefore functions as a supplier by providing the needed scanning facilities and is responsible for
the scanning process (Bundesagentur für Arbeit, 2016). By 2020, all German federal agencies have to present an electronic file as well. In this way, the eAkte can be seen as a reference project. This allows federal agencies with large volumes of documents to adapt the solution of the eAkte to become more efficient and digital. For this reason, it is essential to investigate and evaluate the eAkte project, and identify potential challenges, in order to learn for future projects. This knowledge can then be shared with other public authorities. However, within this thesis the focus of the knowledge sharing process is related to the involved parties with the aim to create a better exchange of knowledge. Accordingly, the knowledge sharing process within the project eAkte will be investigated with the aim to elaborate a more detailed scope statement.

Performing a qualitative exploratory single case study on the digitalisation project eAkte using semi-structured interviews will generate a practical understanding of the process of knowledge sharing within this project. In combination with the existing literature, and a comprehensive analysis of the findings, this study will extend and expand the existing knowledge base surrounding this specialty area.

1.2 Theoretical Background

Within the research field of project management several definitions are used to define the term ‘project’. According to Graham (1985), a project can be described as a set of activities with fixed resources like time, budget and people. The Association of Project Managers (APM, 2005) added to this definition, stating that every project is based on a similar life cycle. Moreover, the Project Management Institute (PMI, 2013, p. 3) explained that “a project is a temporary endeavour undertaken to create a unique product, service, or result”. Since these definitions are following a more neutral approach, Lundin & Söderholm (1995, p. 449) added a layer of behavioural approach by defining a project as a socially constructed entity. According to these definitions, a project can be summarised as a set of activities, set within a social construct, based on defined resources with the aim to create a unique result. Furthermore, whenever a project is facing an uncertain and changing environment, it can be defined as complex. The definition of the term complexity is not consistent within the academic world, since several concepts and theories are created. Within this thesis the idea of Williams (1999, p. 269-270) will be used, which divides complexity into two elements: structural complexity and uncertainty.

Generally speaking, a project follows a specific life cycle. Within the defining phase of a project, documents are developed to generate a common understanding among the involved project parties. The most significant document is the scope statement which links the project aim, the customer, the planning and controlling methods (Larson & Clifford, 2018, p. 17). Within this document the deliverables, the requirements and specifications, the budget, the timeline and the expected outcome are precisely listed to ensure a shared understanding of the project aim. Moreover, the scope statement also includes limitations and defines a clear framework of the project (Larson & Clifford, 2018, p. 8; Burke, 1999, p. 24). As a condition for continuing the project, both sides need to agree on the document. Afterwards, the scope statement is seen as the basis of the whole project and its success is measured on the predefined requirements in the document. If the definition of the scope statement is too broad or too superficial, the scope
may require amending, which can lead to an increase in costs, or a delay of the project (Larson & Clifford, 2018, p. 16; Burke, 1999, p. 25).

In addition to the research area of project management, this thesis provides an understanding of knowledge management with a deeper focus on knowledge sharing. Alvesson & Karreman (2001, p. 1000) noticed that over the last decade the research field of knowledge management gained increasing interest. Knowledge can be viewed as one of the most important resources within an organization because it is crucial for operating success (Nahapiet & Ghoshal, 1998, p. 247; Spender & Grant, 1996, p. 7; Nonaka & Takeuchi, 1995, p. 6). In general, knowledge sharing can be seen as a set of activities with the aim of exchanging information within an organisation among individuals and involved parties. Therefore, it is important that “the person who shares and distributes knowledge ideally is, or should be, aware of the knowledge purpose, use, needs or gaps of the person receiving the knowledge” (Riege, 2005, p.19). However, the individual then decides which knowledge is seen as valuable and sharable. Overall, the aim of knowledge sharing is to enhance organisational effectiveness by expanding, sharing and using knowledge in a controlled way to add value to the communication process of an organisation (Gwin, 2003, p. 45). The framework of knowledge sharing supports organisations to survive and grow in a constantly changing environment by presenting more agile and adaptable approaches. Every member in an organisation has an individual knowledge base, and creating a project team brings together different expertise within the group. To complete a project successfully it is essential that the project members are sharing project specific knowledge with each other to create a significant knowledge pool (Chang et al., 2013, p. 261).

The definitions given above are used to narrow down the holistic view of the research area of project management and knowledge management. Within this thesis the social side of a project occupies a major role because it is an essential part of the project, which can either lead to failure or success. The interpersonal level influences the dynamic of a project by affecting the communication and the flow of knowledge (Tannenbaum et al., 1992, p. 125). In addition, the interpersonal interdependencies of a project can fail due to weak planning. By highlighting the defining phase of a project, especially the creation of the scope statement, failing issues can be identified and prevented.

1.3 Research Gap

In general, the research areas of project management, knowledge management and the public sector are well explored and fundamental concepts have been developed. However, there are still some aspects that have not been fully covered, especially in the field of digitalisation and project management. Moreover, researchers highlight the importance of scope management; however, little research has been conducted within this field. Therefore, further research and investigations in the field of scope management seems necessary (Mirza et al., 2013, p. 722; Al-Rubaie et al., 2018, p. 1) and the academic specialties need to play a significant role in developing new insights in these areas (Parida, 2018, p. 23; Parke-Shields & Boyer-Wright, 2017, p. 170). Digitalisation projects within the public sector, are generally under-researched and the added value generated by the technology behind digitalisation is still not fully realized (Parida, 2018, p. 23). By adding knowledge sharing to this area of research, a unique study will be created by combining
these important aspects. To meet this demand, the aim of this study is to look into this specific research gap by providing a deeper analysis of a project within the public sector.

1.4 Research Question and Purpose

How can knowledge sharing support the defining phase of a complex digitalisation project to precise the scope statement?

The purpose of this thesis is to investigate the sensible usage of knowledge sharing for defining the scope statement within a complex digitalisation projects as outlined in the research question. The idea behind the research question is to elaborate upon the knowledge sharing process between the involved parties which are needed to create a precise scope statement. Moreover, issues will be highlighted regarding the creation of the scope statement within the complex digitalisation project eAkte, and potential preventive measures will be presented in the discussion section in order to precise the scope statement. Within the thesis complexity will play a fundamental part to understand the overall project framework of the project eAkte and specially to evince issues arising in the defining phase by creating the scope statement. Therefore, the theory of complexity will be presented in order to comprehend different kinds of complexity for generating a deeper understanding. As an added benefit the new generated insights may be helpful for future projects with the same framework in the public sector.

The focus of the study is to present theoretical underpinnings by exploring fundamental concepts and theories regarding project management, knowledge management and public sector. Moreover, the methodological focus relies on semi-structured interviews based on the single case study eAkte. The theoretical framework and the methodology outline the processes and procedures used to develop these findings. The focus of the empirical section is to provide a discussion about the analysis of the findings in relation to the research question and to build a conclusion. The outline of the study will then attempt to link the theoretical and practical aspects.

On a theoretical level, the thesis contributes the under-researched criteria of failure and success for a complex digitalisation project within the public sector by generating a theoretical understanding of dependences in this field. Indeed, knowledge sharing is already a wide field of research, but by combining it with the outcomes of a complex digitalisation project within the public sector, it is our hope that new insights for application in theory and practice will be uncovered. Further, by uniting these research areas it presents new aspects relating to the economic term scope statement. This, in turn, provides new data and create new directions for future research in this constantly growing field.

From a practical perspective, this thesis contributes toward different issues regarding the creation of a scope statement and possible ways to prevent these problems from arising. Further, it provides insight into knowledge sharing within a project team by including the
affected parties themselves in the research. Therefore, the thesis provides an added value to project managers regarding the defining phase of a project; in relation to both general project management, as well as within the public sector.
2 Theoretical Framework

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<td>This chapter generates a theoretical underpinning of theories, concepts and terms of project management and knowledge management. Additionally, an overview about the public sector and its project management practice is given. Moreover, it creates an understanding of the theoretical grounding of the study by providing a critique of the existing literature.</td>
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2.1 Project Management

Project Management can be defined as “planning, monitoring and control of all aspects of the project and the motivation of all those involved in it to achieve the project objectives on time and to the specified cost, quality and performance” (British Standard, 1996, p.2). Therefore, controlling all the fixed aspects in a project like resources is not enough to guarantee the quality of the result. It is also important to lead and motivate the project team by having a strong communication, both internally and externally (Pádár et al., 2019).

2.1.1 Project Management Components

The Project Management Body of Knowledge defines the iron triangle as the main concept of measuring the project success. The iron triangle is based on three elements: time, cost and quality/scope. Therefore, the three elements are reflecting the main characteristics or goals of the traditional project management (Maylor, 2010, p.84; Atkinson, 1999, p.337). This view is also supported in a variety of other studies - in connection with other measurements, or on its own (Papke-Shields et al., 2010, p. 653). Agarwal & Rathod (2006, p. 360) emphasised that “cost, time, functionality and quality remain the important criteria for assessing performance of software projects in the mind of professionals.” Recent developments postulated that this measurement technique is outdated and that there is a need to add other dimensions to the iron triangle like operational results or a sustainable impact on the future to generate a wider view (Papke-Shields et al., 2010, p. 177). Shenhar et al., (2005) highlights that a more strategic approach is needed, which should not only focus on the unappropriated components like “efficiency, operational performance, and meeting time and budget goals” (Shenhar et al., 2005, p. 8).

Researchers have defined critical success factors that can be adapted to almost every project. According to Milosevic & Patanakul (2005, p. 183) critical success factors are declared as “characteristics, conditions, or variables that can have a significant impact on the success of the project when properly sustained, maintained and managed.” More precisely, Fortune et al. (2011, p. 561) identified throughout different studies a variety of critical success factors that are seen to be essential like “clear goals/objectives, realistic schedule, support from senior management and adequate funds/resources.” In addition, Borman & Janssen (2013) concluded that critical success factors are closely connected to
the operating setting, implementation procedures and the outcome of a project. “Therefore, a number of previously identified [critical success factors] may be outside the control of those involved in the project” (Papke-Shields & Boyer-Wright, 2017, p. 170), which adds a layer of uncertainty to the project and may influence the project in a negative way.

2.1.2 Project Life Cycle

The Association of Project Managers (APM, 2005) presents the concept of the project life cycle. This model includes four steps: Defining, Planning, Executing and Delivering. Every phase has its own focus and concentrates on different chronological and content-related outcomes. The specific order of the phases and included activities follows an implicit logic, since each phase or activity is dependent on the previous one. Indeed, every phase or activity must create a specific outcome, which can be used as input for the following phase or activity (Oellgaard, 2013, p. 72). Within each phase the project team defines part-goals called milestones that need to be achieved before moving on to another phase. This ensures that every part needed for the result is fully developed and has the expected quality aspiration. According to Larson & Gray (2018, p. 9) the project life cycle can also be used to plan the resources arrangement through the project since they differ between the single phases. Throughout the thesis the main focus will be on the defining phase of a project, but to enhance overall understanding the other phases are explained below.

Defining
Within this stage the purpose of the whole project is created. Accordingly, the overall goal for the project is set by defining the specifications and requirements. Moreover, the project objectives are established. The resources needed for the realisation of the project are set by presenting a clear time line and budget. The project team is formed by ensuring that the required expertise is covered within the team (PMI, 1996, p. 5). This stage has the aim to build the theoretical ground for the project and to ensure that the necessary knowledge, resources and underpinning understanding for the project is shared among the included parties (Burke, 1999, p. 24; PMI, 1996, p. 15).

Planning
The general plan defined in the first step is developed further to obtain a deeper understanding of the project goal. Accordingly, the roughly defined requirements and specifications of the project are elaborated further to ensure a realistic and expected result. The techniques and tools for the executive phase are set and alternative methods discussed. The aim of this phase is to conceptualise the whole project and to ensure that the expected requirements can be fulfilled (PMI, 1996, p. 14).

Executing
Within this step the conceptualised plan is taken into action. By creating the physical deliverables, also forecasts and a measurement system has to be done for controlling the progress. Accordingly, tracking of the resources is essential to finish the project in time and budget (Oellgaard, 2013, p. 71). Moreover, this step includes not only the actual creating of the product, but also a proof of concept. This is where the product is tested on a small scale, which is followed by final testing in a wider environment which can be defined as the piloting phase of the project. After the piloting provides a successful result,
the product can be integrated in the organisation. The aim of this phase is to create and test the product and do whatever may be needed to change or adapt requirements to fulfil the overall expectations of the project.

**Delivering**

The last phase is to deliver the product by implementing it through the whole project scale. Further, the project resources and the team are redeployed, and a post-project review is concluded by the project team to present the assessing performance but also to capture their experience and knowledge through the whole process. Employee or customer training could be part of this step (PMI, 2000, p. 13-14).

Despite the existing knowledge surrounding the project life cycle exist and the identification of essential critical success factors, many projects are failing to fulfil their requirements nowadays. According to the literature, they are running over time or budget or they are not meeting the expectations or defined goals (The Standish Group, 2001, p. 6; Allen et al., 2014, p. 1). To avoid this generalization and the “almost Tayloristic ‘one-size-fits-all’ approach” (Maylor et al., 2008, p. 15) the critical school of project management provides a different view on projects itself by declaring every project as unique. Further, the critical school is pointing out that there are no common characteristics among projects since every project is influenced and shaped by its environment. Therefore, generalised concepts and methods do not ensure a good project result (Oellgaard, 2013, p. 65).

In general, a connection to this thesis, and consequently to the used case study, can be drawn in order to understand the basis of project management. Further, the authors have included the concept of the project life cycle by Larson & Gray (2018) to highlight the importance of the different phases and their different issues arising in each phase in general. Secondly, it is essential to gain a deeper understanding of the defining phase since the thesis is concentrating on the creation of the scope statement within the case study. The iron triangle is a fundamental concept used by many researchers in the research field of project management (Maylor, 2010; Atkinson, 1999) as explained above. The value for including this concept in the thesis relies on the definition of the elements: time, cost and quality/scope. The concept is taken to elaborate the usage of the elements in the case study and to understand potential problems arising based on them during the project eAkte. This will help to highlight potential issues, which have occurred during the creation process of the scope statement in the case study. To understand the unique problems may arise in projects, a deeper look into the complexity, project management methodology and the project scope management will be examined to provide an underpinning theoretical basis.

### 2.1.3 Complexity

The understanding of the importance of project complexity is on the rise because so far traditional project management seems unable to deal with it. Researchers declare the linear-rational paradigm of decision making as the main reason for it because it excludes dynamics, variations, repetitions and uncertainty in the interrelation with the outcome regarding human and non-human elements of a project (Cicmil et al., 2009). For this reason, researchers are developing theories and concepts to explain complexity within a project and to make it manageable.
For example, Baccarini (1996) elaborates a new perspective of complexity in projects by including a variety of interrelated aspects and conceptualizes them “in terms of: differentiation - the number of varied elements, e.g. tasks, specialists, components; and interdependence or connectivity — the degree of interrelatedness between these elements” (Baccarini, 1996, p. 201-202). By defining and measuring project complexity towards differentiation and interdependencies, the integration of coordination, communication and control is a logical consequence of the concept (Baccarini, 1996, p. 203). This idea is also picked up by Williams (1999, p. 269), who summarised the components differentiation and interdependencies into the term ‘structural complexity’. This term presents the first part of the new concepts developed by Williams (1999, p. 270). The other part of the concept is contributed to by the idea of Jones & Deckro (1993), which emphasises the unpredictability of the conditions a task is influenced by. Based on both approaches Williams (1999) created a new concept about project complexity highlighting structural complexity and uncertainty as the two main aspects as shown in Figure 1.

![Figure 1. Dimensions of project complexity](source: Williams, 1999, p. 270)

Williams (1999, p. 270-271) emphasised that the issue for the complexity in projects are based either in a structural complexity of a project or in uncertainty. The structural complexity of a project can increase when components of the project are becoming more complex by using an advanced technology, increasing the functionality or generating a higher inter-connectivity between elements. Further, a short time line for projects can also increase the structural complexity since a lot of tasks have to be done in a brief time. The uncertainty within a project can be caused through many aspects and need to be considered from different perspectives. Moreover, uncertainty is recognized individually by every project team member, which makes it difficult to manage. Further uncertainty can occur internally and externally which leads to different risks within the project.

Maylor et al. (2008) contributed a pragmatic view on project complexity by investigating the structural complexity of a project. Since a project is a set of activities involving resources and parties, it is complex to manage. Moreover, a correlation between the level of complexity and the necessary resources to manage the project can be seen. The
managerial challenge within every project is unique since the environment, the scope and included individuals differ between every project (Maylor, 2010, p. 37). Therefore, the MODeST framework was invented by Maylor et al. (2008) to present a way of structuring complexity within five elements: Mission, Organisation, Delivery, Stakeholders and Team. For being unbiased about the factors included in the elements, the factors will be formulated as potential issues without valuation (Maylor et al., 2008, p. 8).

The element Mission presents the factors objectives, scale, constraints and uncertainty. The aim of this element is to point out if the fixed requirements of the project are consistent and possible (Maylor et al., 2008, p. 18-19). Potential issues include a lack of clarity in the vision and success criteria of a project, a high scale of deliverables and resources, the consideration of many constraints or a high level of interdependency with other projects (Maylor et al., 2008, p. 18-19). Within the element of Organisation, the factors time and space as well as the organisational setting are included. By examining these factors this element represents the actual setting of the project (Maylor et al., 2008, p. 18-19). Accordingly, it illuminates issues that can arise in the complexity of a project like multiple time zones within a project team, lack of collocation of the project team, linguistic barriers and a high level of organisational changes influencing the project (Maylor et al., 2008, p. 18-19). Delivery is the next element in the MODeST framework and it presents the processes and resources a project is facing with. The aim is to generate an understanding of how to run a project and further and how to use the given resources in an adequate way (Maylor et al., 2008, p. 21). Issues arising in this element are crucial because they have a direct impact on the quality of the result. For instance, a lack of clear or timely decision-making, usage of unappropriated project management methods, lacking flexibility to respond to changes and unsuitable access to needed resources like

Figure 2. MODeST dimensions
Source: Maylor et al. 2008, p. 19
technology tools (Maylor et al., 2008, p. 21). The element Stakeholder includes the factors stakeholder attributes and inter-stakeholder relationship. Therefore, it represents the external view on a project and how this view needs to be integrated into the project by the project team. Accordingly, potential issues could be a lack of commitment to the project by the stakeholders, lack of communication with the key stakeholders and problematic inter-relations between different stakeholders (Maylor, 2010, p. 38). This element is normally covered by stakeholder management since it needs explicit strategies to deal with “the salience (e.g. power, legitimacy, urgency) of different stakeholder groups” (Maylor et al., 2008, p. 23). The last element Team covers the internal environment of the project team and is therefore relevant to the overall performance. Issues regarding lack in communication, lack in leadership style or low level of motivation are included in this element (Maylor et al., 2008, p. 23). Indeed, this element is relevant for the success of the project since the project team is the most valuable resource.

Furthermore, Maylor et al. (2008, p.15) investigated the structural complexity through its bipartite nature and present structural and dynamic qualities. The structural qualities are relatively constant, whereas the dynamic qualities are more changeable and inter-correlated to the environment. Further, every element of the MODeST framework can be considered from both dimensions by asking different questions regarding the element as shown in Table 1.

<table>
<thead>
<tr>
<th>Structural Dimension</th>
<th>Dynamic Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission</td>
<td>Are the requirements clear? How frequently do the requirements change?</td>
</tr>
<tr>
<td>Organization</td>
<td>Is there a mismatch between matrix structure of project and department structure of organization? Is there ongoing organizational restructuring that impact the project?</td>
</tr>
<tr>
<td>Delivery</td>
<td>How well does the project team understand the project management methodology? Is a new project management methodology being introduced?</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>How many stakeholders are there? Are the stakeholders changing?</td>
</tr>
<tr>
<td>Team</td>
<td>Are the team members motivated? Is the level of motivation of team members changing?</td>
</tr>
</tbody>
</table>

Table 1. structural and dynamic complexity elements of the MODeST framework
Source: Maylor et al. 2008, p. 21

To elaborate the complexity of the project eAkte, the authors have chosen the concept created by Williams (1999) because it combines uncertainty as well structural complexity, which is needed to understand the specific complexity of the eAkte. For a deeper evaluation of the complexity of the project eAkte on the basis of the elements, included in the two aspects of Williams’ concept, the Table 10 is created in chapter 5.1. Further, for structuring the complexity within the eAkte, the approach of the MODeST-framework by Maylor et al. (2008) is used because it includes all the needed components represented in the case study.
2.1.4 Project Management Methodology

In an effort to implement well-known strategies in project management adequately, researchers and managers worldwide have considered alternative strategies and approaches (Englund & Graham, 1999, p. 53). Based on this, the project management field is constantly evolving but is still characterised by traditional approaches. This creates a discrepancy in the used and expected project management requirements. This deviation is attempted by emerging methods (such as agile) and by elaborating existing approaches (such as the waterfall model) (Rodrigues & Bowers, 1996, p. 213). The project-oriented approach is a promising methodology and is currently regarded as a pioneer. McElroy (1996) supports this approach by talking about a paradigm shift from traditional to project-oriented techniques for strategy implementation. For a better understanding of the terms traditional project management and agile project management a short definition of each will be given.

The Project Management Institute defines traditional project management as “the application of knowledge, skills, tools, and techniques to project activities to meet project requirements” (PMI, 2004, p. 8). Agile project management is based on the ability to perform proactively in dynamic, unpredictable and continually changing settings (Owen et al., 2006) and therefore it entails a unique expertise supported by agile tools to handle this uncertainty (Fitsilis, 2008; Alleman, 2005). Chin (2004) summarised this definition by defining agile project management environment as:

Agile PM Environment = [Uncertainty + Unique Expertise] x Speed

Traditional project management is characterised by a variety of well-organised methods which allows managers to plan and control a project. The management of major projects (Fitsilis, 2008, p. 379) requires a kind of formality within project management, which has led to clear structural requirements by traditional project management (Cadle & Yeates, 2008, p. 94). Thus, projects are broken down into different phases over their life cycle and any tasks within the project are predefined in a clear order, which is immutable even by facing subsequent changes (Chin, 2004, p. 13). The underlying premise is that the circumstances within the project development are considered as predictable and therefore, the tools used to generate results are also foreseeable. However, experience and literature have shown that this is not always the case and unpredictable incidents can actively affect project planning (Hällgren & Wilson, 2008; Yusuf et al., 1999). Thus, traditional project management requirements are a solution in terms of project placement and control. Researchers such as Alleman (2005, p. 15) criticize this ‘on the shelf approach’ as an obstacle to a dynamic and constantly changing project environment. According to Fernandez & Fernandez (2009), such dynamic conditions can be managed through iterations, but the feedback loops required for this are not part of traditional project management. As a result, traditional project management no longer reconsiders completed tasks and phases of the project and thus excludes subsequent changes or adaptations. However, this view is partly in opposition to the assumptions of Cadle & Yeated (2008, p. 272) and Collyer & Warrern (2009, p. 359), which see a level of iteration between tasks but not between project phases. This lack of iteration between phases is due to the high degree of planning and process control, which makes feedback loops between project phases impossible. More precisely, this means that traditional project management can show iterations on a smaller scale, without actually adding a value to the project as a whole. This approach is illustrated by the waterfall model, which is the
most established model for planning projects in traditional project management (Larson & Gray, 2018) as shown in Figure 3.

The waterfall model visualises the individual phases or stages of the project, whereby each stage is defined as an independent activity with a fixed duration. Each phase with its included tasks must be completed before the next phase can begin, which is in line with the approach from traditional project management (Cadle & Yeates, 2008; Thomsett, 2002, p. 137). The benefits of this approach can be found in the simplicity of determining development steps, as well as in the ability to increase quality management by validating and verifiability of project processes (Cadle & Yeates, 2008, p. 85-86). Based on these main advantages, the waterfall model is still one of the most important models in project management. Nevertheless, Thomsett (2002, p. 137) titled the waterfall model as “poorly suited to the chaotic and client-driven business environment of the 21st century [because of its missing predisposition of flexibility].” This argument is also supported by Collyer & Warren (2009, p. 361) who highlighted that in reality projects do not follow a sequential nature. This is due, in part, by the fact that it is difficult to define all project requirements in the initial phase of the project cycle (Cicmil et al., 2006, p. 680). The consequential changes of requirements lead mostly to chaos because the waterfall model is not designed for any changes. The result is either loss of quality, delays or cost overruns and, in the worst-case scenario, project failure (Aguanno, 2004). On the other hand, researchers such as Bechthold (1999) are in favour of the waterfall model and its advantages, so it cannot simply be put down. A key argument of the proponents is that the waterfall model is particularly applicable to well-understood projects with a short
period of time as well as fixed tasks. Taking both opinions into account, researchers have further developed the waterfall model (Cantor, 1998, p. 93-95).

Closely related to the waterfall model is the spiral model, which in contrast to the traditional model has an iterative approach to project management (Collyer & Warren, 2009, p. 358-360). However, both models are considered as deficient when confronted with uncertainty and a changing environment (Cicmil et al., 2006, p. 683). The spiral model defined by Cadle & Yeates (2008, p. 77) is more adaptable in an uncertain environment because it includes feedback loops. These ensure a linkage between an objective setting as well as planning and risk management. This approach is therefore closer to agile project management and is particularly suitable for projects with uncertain requirements. Although the spiral model is an improvement, the traditional project management approaches fail by addressing uncertainties in an adequate manner. That is why agile project management has been developed, as it can respond proactively to all the demands and changes that may arise in an uncertain environment (Macheredis, 2009, p. 45).

According to several researchers, the origin of agile project management methods is grounded in software development. For example, the software-related framework of Scrum was invented in the 1990s (Larman, 2004; Boehm, 2006; Cicmil et al, 2006; Fitsilis, 2008; Macheridis, 2009). The consideration of adapting agile methods to other industries arose around 2002 and is therefore still evolving. In general, agile project management methods such as Scrum can be regarded as management principles that regularly use iterative development methods. In this technique, all project participants are closely involved to define the project requirements at a certain time by taking into consideration the contextual environment (Griffiths, 2007).

The approach of agile project management focuses primarily on a short iterative development of projects (Sauer & Reich, 2009; Larman, 2004). Schuh (2005, p. 95) emphasises that the implementation within short intervals (usually between 6 and 8 weeks) with a focus on cooperation and iterations represents the main difference to the spiral model. This iterative way of agile project management fits perfectly for projects carried out under unsafe conditions and a changing complex environment (Alleman, 2005, p. 326). This approach is presented in Figure 4 below. As shown in the figure, individual related requirements are first excluded from the priority list, which consists of requirements defined by the customer. These iteration features are then processed and assembled within the framework of the implementation interval. As in traditional project management, the selected requirements are analysed, developed, tested and evaluated with the help of feedback loops. In addition, risk assessment takes place continuously from level 4 to identify and minimise risks at an early stage. This makes the process more robust and goal-oriented.

Regular meetings with stakeholders and the project team represent an essential role in agile project management. During these meetings, feedback on progress is exchanged and experience is recorded to improve the next iteration. Continuous cooperation between all project participants is an essential feature of agile project management to achieve an optimal understanding of business and technical requirements for subsequent iterations (Cadle & Yeates, 2008, p. 272). Thus, the agile project management approach "instead of trying to develop the whole system in one go, the system is divided into a number of iterations each adding some functionality or perhaps improved performance to its
predecessors” (Cadle & Yeates, 2008, p. 79). This approach and its benefits are supported by many researchers. For instance, Owen et al. (2006, p. 26) and Macheredis (2009, p. 50) enumerate some of the benefits of this approach like an improvement in management and personnel skills, flexibility, responsiveness and quality. All these advantages lead to a cost reduction and thus to downstream profits in the company (Cadle & Yeates, 2008, p. 242). Despite its advantages, the agile project management is not free of opponents either. As Fitsilis (2008, p. 381) criticises, agile project management methods contain only a limited number of elementary processes such as communication management and project integration management. Other criticisms include the flattening of hierarchies within the project due to the missing titles, organisational crisis and possible budgeting problems as well as problems at the start of the project because the vague predictability (Cadle & Yeates, 2008, p. 415).

According to Macheredis (2009, p. 47), the biggest difference between traditional and agile project management is based on their techniques leading to fundamentally different assumptions about change, control and solutions. Figure 5 illustrates the conceptual differences between the two approaches using the iron triangle. While both approaches are based on the same three basic elements, they treat them differently. While the goal is predefined or rigid in traditional project management, the facets of the goal are flexible in agile project management. On the other hand, resources and time are the predefined elements in agile project management, whereas in the traditional project management they are considered flexible. It is recognizable that traditional project management with its rigid goals is more suitable for stable conditions and the agile project management by its adaptability of the goal is more suited to an unstable project environment. Furthermore, traditional project management tends to exceed time and resources, as they are not rigid, while agile project management must not exceed it due to its rigid standards in terms of time and resources (Fernandez & Fernandez, 2009, p. 11; Owen et al., 2006). Since traditional and agile project management both present advantages as well as disadvantages, there is no right or wrong in choosing one method. Rather, it depends on the project itself as to which method is the most suitable.
The new approach of agile project management is raising a lot of interest among modern researchers and is characterised by its impact on big and complex projects where a variety of different project parties need to be involved. Therefore, it is essential to explore its whole potential and to understand its influence on the project team, the stakeholders and the organisation to generate the maximum usage. Due to the fact that both approaches have their own strengths it might be useful to combine them to create a mixed concept. This idea is also supported by Frye (2009) by highlighting that both approaches can support each other. Agile project management can benefit to adapt the clear instructions for risk management, communication management and project integration management given by the traditional approach. On the other side, the traditional project management can profit from elements included in the agile approach like flexibility, the reduction of documentation and bureaucracy and constant feedback loops.

For a general understanding of the existing methodologies used in the project management both contrary approaches are presented above. But this thesis will only elaborate the traditional approach because it has been used in the case study. Based on the chosen approach the scope has been fixed in the project eAkte but time, as well as cost can vary. Therefore, only the traditional approach and its concept is valuable for generating an understanding of the case study.

### 2.1.5 Project Scope Management

The Project Management Institute (2000) defines the scope as a condition for delivering services and products to meet the expectations of the customer. Management of the scope is one of the essential responsibilities within projects in every sector. Even when the project management is characterised as a dynamic business approach, it is important to define and set the project scope within the initial phase of a project. This ensures the success of a project by having an impact on major project management elements like cost, time and quality (Khan, 2006; Al-Rubaie et al., 2018; Khan, 2010). Accordingly, it leads to a precise fulfilment of the required goals and objectives in time. Further, the measurement of the success of a project is determined in relation to whether all
requirements or specifications are met (Mirza et al., 2013, p. 727). On the other hand, constant changes of the project requirements and scope due to an uncertain environment may lead to a project failure. As a consequence, resources like time, money or working hours may need to be increased to avoid a lack of quality (Dumont et al., 1997, p. 56).

Since an inadequate definition of the project scope is correlated to the performance of a project, it is important to highlight significant issues arising with the creation of the scope. Fichter (2003, p. 43) has explored four major problems occurring with the project scope “1) unclear definition of scope, 2) incomplete or partial scope, 3) not finalizing scope documents and 4) not sharing scope statement” (Mirza et al., 2013, p. 727). To overcome these issues Fichter (2003, p. 44-45) has also defined approaches, which are depicted in Figure 6.

<table>
<thead>
<tr>
<th>Project Scope Issues</th>
<th>Overcoming Scope Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unclear</td>
<td>Realistic, Demonstrable</td>
</tr>
<tr>
<td>Partial</td>
<td>Real Requirement, Responsibility</td>
</tr>
<tr>
<td>Temporary</td>
<td>Real Requirement</td>
</tr>
<tr>
<td>Unshared</td>
<td>Demonstrable, Responsibility</td>
</tr>
</tbody>
</table>

*Figure 6. Project Scope Issues*
*Source: Mirza et al. 2013, p. 727*

**Project vs. Product Scope**
Generally, projects aim to generate a product or service and therefore, project scope and product scope are essential concepts within the project management to define the scope of the project successfully. Without a clear formulated product scope as well as a project scope it is difficult to fully understand the purpose of the project and to fulfil the expectations of the stakeholder regarding the deliverables (Usmani, 2018; Jaiendrakumar, 2015, p. 1). To facilitate understanding, both concepts will be explained in detail.

The *product scope* encloses all the details regarding the product, which can be seen as an overall framework the deliverables need to fulfil. Within these concepts a document is created which contains the “features & functions that characterize the product, service, or result documented usually by the Business Analyst in consultation with the stakeholders” (Jaiendrakumar, 2015, p. 1). Accordingly, all requirements and specifications of the product are defined in close cooperation with the stakeholders. To prevent future issues, it is essential to define these specifications and requirements clearly and completely. After this process is finalized, the created document is audited and signed by all involved parties and is considered as binding. It is necessary to complete the product scope carefully before moving on to the project scope because the underpinning understanding of the product is needed (Usmani, 2018; Jaiendrakumar, 2015, p. 6; Mirza et al. 2013, p. 723).
The *project scope* encloses the requirements defined in the product scope and all further information needed to develop the product or service. Moreover, it also specifies the project goals and assumptions, as well as the potential limitations of the project. Therefore, it is the “work that needs to be accomplished to deliver a product, service, or result with the specified features and functions” (Jainendrakumar, 2015, p. 1). The created document within the concept of project scope is also known as the scope statement. The scope statement needs to be audited, agreed upon, and signed by all involved parties. After it has been finalised, the document binds the project team to the contracting authority. For the best result the project scope needs to be as detailed as possible because it is the guiding foundation throughout the project (Usmani, 2018; Janiendarkumar, 2015, p. 4).

**Phases of Project Scope Management**

Project scope management can be generally divided into five phases, each with a different focus and outcome (Al-Rubaiei et al., 2018, p. 1-3). The thesis will focus mainly on the third phase called ‘scope definition’, since the creation of the scope statement is part of this phase. These phases will be explained more in detail in the following paragraph and an overview is given in *Figure 7*.

![Figure 7. Phases of Project Scope Management](source: Dumont et al. 1997, p. 57)

The first phase is called *initiation*, which includes the feasibility analysis. Generally, a project is used to implement and adapt new business needs and processes. There are three main criteria of feasibility a project has to fulfil in order to add a value to the strategic operations of a company. A feasibility analysis is seen as one of the key tools within the initiation phase. Within this analysis financial, economic and technological aspects are considered (Khan, 2006, p. 12). The financial feasibility elaborates on the availability of the project budget by highlighting needed funds, loan charges and arising expenses for borrowing equipment. The economic feasibility focuses on the ratios required in order to evaluate costs and benefits. Further, the project profit over the lifetime is determined and evaluated (Khan, 2006, p. 12). The technical feasibility deals with the availability of technological knowledge, competencies, infrastructure and utilities (Khan, 2006, p. 12-13).

The second phase *scope planning* requires a positive outcome from the feasibility analysis. Following this, the project manager starts to define the project scope with its team. This is declared as a first draft, since project scope management can be seen as an iterative process. This process involves a work-breakdown-structure, however, since there are not enough details given in this phase, the work-breakdown-structure is not comprehensive (Khan, 2006, p. 13).
Within the third phase, *scope definition*, the roughly defined requirements and work-breakdown structures are developed further. To move the project forward in an organised manner the scope statement must be developed precisely by including the deliverables and limitations, as well as the scope of a project (Shrivastava & Hariharan, 2015). Therefore, identification of the project requirements and the project drivers is paramount. To determine the requirements, it is essential that the predicted needs of the expected product or service do not change and are clearly communicated through all included project parties. The requirements themselves should remain constant during the project life cycle to ensure the success of the project. Another factor that must be considered when elaborating a precise scope statement are identification of the components that are grounded in the project drivers. These include the standards, laws and regulations a project must meet in order to generate a successful output. In addition to these legislative factors, elements such as equipment, technical infrastructure, and software are examined (Mirza et al., 2013, p. 724).

The fourth phase *scope verification* is closely connected to the two previous steps of scope planning and scope definition because it represents a feedback loop of both. However, this process cannot be separated from the previous steps because it proceeds almost simultaneously with them. Within this feedback loop every outcome of the two phases is elaborated, measured and the results are protocoled (Kahn, 2006, p. 15).

It is essential for the fifth phase, *scope change control*, to understand that scope changes are unavoidable for almost every project and that plans need to be developed to control these changes. Implementation of a mechanism to control scope changes is required in the early stage of a project. Further, types of change requests and their reasons need to be defined in order to understand which changes are essential and which are discretionary for the project. Overall an understanding of the effect of change requests on the project is essential to impart because it has a negative consequence on the project schedule, the quality as well as on the project resources (Shirazi et al., 2017; Khan, 2006, p. 15). *Table 2* presents the most common types of change and their influencing factors.

*Table 2. A General Listing of the Types, Reasons, and Nature of Changes*

*Source: Khan, 2006, p. 14*

<table>
<thead>
<tr>
<th>Types of Change</th>
<th>Reasons for Change</th>
<th>Nature of Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Design specification change</td>
<td>• Correct deficiency to meet safety</td>
<td>• Discretionary</td>
</tr>
<tr>
<td>• Process design development</td>
<td>• Correct deficiency to meet operational</td>
<td></td>
</tr>
<tr>
<td>• Project execution change</td>
<td>requirements</td>
<td></td>
</tr>
<tr>
<td>• External budget transfer</td>
<td>• Correct deficiency in cost estimate</td>
<td>• Essential</td>
</tr>
<tr>
<td>• Estimate adjustment</td>
<td>• Adjust budget to reflect changed execution bias</td>
<td></td>
</tr>
<tr>
<td>• Field change</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Commissioning change</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Since the creation of the scope statement within the case study is the topic of interest for this thesis, the authors have described potential issues that may arise theoretically. The aim is to compare the practical issues arising in the case study, as elaborated through in the data analysis, with the theoretical issues. To understand the creation process of the scope statement of the project eAkte, it is essential to understand and to highlight product scope as well as the project scope. Therefore, a theoretical definition is given to ground the understanding of this topic in the analysis. The phases of project scope management are explained to give a general overview about the topic, with a focus on the scope definition phase as it includes the creation of the scope statement.

2.2 Knowledge Management

Knowledge management deals with the acquisition, development, transfer, storage and usage of knowledge. Therefore, information is the necessary condition for generating knowledge. Accordingly, there is an essential difference between knowledge management and information management since information can be seen as a tradable matter whereas knowledge needs to be generated. As a logical consequence, knowledge is one of the most important resources within a company (Bouthillier & Shearer, 2002, p. 2).

2.2.1 Explicit Knowledge and Tacit Knowledge

Davenport & Prusak (1998, p. 5) describe knowledge as “a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information.” Knowledge has the ability to increase the understanding of relationships and patterns on an interpersonal level (Udeaja et al., 2008, p. 840; Hislop, 2005, p. 247). As researchers have described, it is possible to differentiate between two types of knowledge, namely, explicit knowledge and tacit knowledge (Nonaka et al., 1996, p. 834; Alavi & Leidner, 2001, p. 110). Explicit knowledge can be documented and it is tangible for others like in form of work instruction, procedure drawings or reports. According to Nonaka et al. (1996, p. 834-835) “Explicit or codified knowledge […] refers to knowledge that is transmittable in formal, systematic language.” Therefore, explicit knowledge can also be referred as factual knowledge or codified knowledge. This type of knowledge can be shared more easily among other individuals or groups because it can be viewed as impersonal, which means that knowledge can be separated from the person itself. In this way, explicit knowledge can be logically understood and described in its application (McInerney, 2002, p. 1012; Blair, 2002 p. 1019-1020). This kind of knowledge is advantageous as it can be easily organized, to some extent assessed, and is freely available to people who want to make use of it (Davenport & Prusak, 1998).

Tacit knowledge, on the other hand, shows completely different characteristics because “tacit knowledge is persona, context-specific, and therefore hard to formalise and communicate” (Nonaka et al., 1996, p. 834). Further, tacit knowledge is generated from personal experience, routine, interaction with other people and builds on emotions. It is a hidden and inarticulate knowledge and can therefore be difficult to share with other people (Magalhaes, 2004). As mentioned by Grant (1996, p. 111) tacit knowledge sharing takes more time and is more cost intensive. However, for organisations or projects to run
successfully it is necessary to take into account both types of knowledge, because they are interlinked with each other. Nonaka et al. (1996) shared the view that explicit knowledge and tacit knowledge cannot be completely separated. Therefore, researchers have created the model called ‘knowledge conversion’ to present the interaction between explicit and tacit knowledge to show how knowledge is created (Nonaka et al., 1996, p. 835). Within their concept, four different modes are presented, as described in Figure 8.

The first mode is called **socialization** which occurs from tacit to tacit knowledge. “Socialization is a process of sharing experiences and thereby creating tacit knowledge such as shared mental models and technical skills” (Nonaka et al., 1996, p. 836). In the process of socialization, the knowledge of one individual is transferred to another individual in form of exchanging experiences. This is done through imitation, observation and practical exercises. This process can be done without the use of any language (Nonaka & Konno, 1998, p. 42-43). The second mode is **externalization**, which occurs from tacit to explicit knowledge. Externalization transforms implicit knowledge into explicit knowledge through articulation. This process is accomplished through metaphors, analogies, models and hypotheses. However, when it comes to complex knowledge it might lead to a loss of knowledge, because not everything can be articulated (Choo, 1996, p. 335-336). Nevertheless, Nonaka et al., (1996, p. 838) see the externalization of knowledge as the “key to knowledge creation”. The third mode is **combination** which occurs from explicit to explicit knowledge. Combination is achieved by sorting, adding and categorising the explicit knowledge of different individuals. This process can generate new explicit knowledge because connections between the individual parts of knowledge are recognised (Nonaka & Konno, 1998, p. 44-45). The last mode is **internalization**, which occurs from explicit to tacit knowledge. In the process of internalization, explicit knowledge is internalized by individuals and linked to existing implicit knowledge. Experience in using this knowledge (‘learning by doing’) is crucial for effective internalisation and the resulting expansion of the knowledge base (Nonaka et al., p. 840-841). This model provides a general understanding of different kinds of knowledge and how they interact with each other. This theoretical underpinning is
2.2.2 Knowledge Management Life Cycle

The basic idea of knowledge management is to involve systematic processes to improve the performance of an organisation and to create value. The theory of knowledge management presents how knowledge is built and used by understanding the creation and control process of it. Therefore, the aim of knowledge management is to enhance the possibility of getting access to valuable knowledge resources, including its use and reuse. Knowledge management is essential not only for the organisation itself, but also within every project (Gasik, 2011, p. 23). However, it is a serious problem that knowledge gets lost at the end of a project. Research has shown that organisations do not know how to manage knowledge or the best methods to promote the transfer of knowledge. Therefore, it is essential for organisations, project managers, and participants to have a deeper look at the concepts of knowledge management (Liu & Liu, 2008, p. 425). Managers within an organisation or a project need to generate a general understanding about what knowledge is and how knowledge can be managed systematically and efficiently (Evans et al. 2014, p. 85). To improve the whole process from acquiring knowledge to knowledge use, many different knowledge management cycles with different phases have been developed. Within this section, the knowledge management life cycle created by Wiig (1993) will be described. Further, a second concept of a knowledge management life cycle, called IOSAEC knowledge management life cycle, will be explored. The advantage of the IOSAEC knowledge management life cycle is grounded in double loop learning (Evans & Ali, 2013, p. 156).

The life cycle developed by Wiig (1993) describes the importance of identifying the individual steps within the cycle. However, to successfully implement knowledge management within an organisation or a project requires consideration of the stages together. The model consists of four major functions: building knowledge, holding knowledge, pooling knowledge and applying knowledge. In the first phase building knowledge, the fundamental functions are obtaining knowledge, analysing knowledge reconstructing knowledge, codifying and organising knowledge. That means after generating and assembling new inputs, the new information can be analysed. This can be done through selecting and purloining striking aspects of the collected and generated data. Furthermore, education and personal experience can help to acquire new means, which leads to the building of new knowledge. When doing this, it is recommended to scrutinise if the content is valid and correct (Evans et al. 2014, p. 88). The next major function is holding knowledge. Within this phase the focus is on memorising knowledge, cumulating knowledge in repositories and archiving knowledge (Wiig, 1993, p. 59). It means that knowledge is assimilated in the minds of employees or kept in concrete forms, such as documents and archives (Evans et al. 2014, p. 88). The third phase focuses on how to pool knowledge. That includes coordinating, assembling, accessing and retrieving of knowledge (Wiig, 1993, p. 60). One approach for archiving this is that teams or expert groups are formed to share knowledge personally or using technological systems like portals or intranet to share information. Social interactions and brainstorming sessions are other approaches to pool knowledge. The last phase deals with the use of knowledge. The goal here is to apply knowledge in order to generate a benefit. In addition, it is mentioned...
that for routine tasks refined knowledge should be used and more general knowledge to detect exceptional situations (Evans et al. 2014, p. 88).

In comparison, Evans et al. (2014) created the concept IOSAEC as a new knowledge management life cycle, where some steps are based on the concept of Wiig (1993). However, the new concept also includes adaptations from other important knowledge management life cycles. Further, the new created life cycle includes ‘second generation knowledge management’ and shows the use of ‘double loop learning’ (Evans & Ali, 2013 p. 160). Second-generation knowledge management explains the improvement of knowledge integration and knowledge production, while first-generation knowledge management starts by assuming that valuable knowledge already subsisted (McElroy, 2000, p. 92). The new concept of the knowledge management life cycle consists of six steps, as seen in Figure 9.

The first step within the cycle is identify. By different methods such as brainstorming or network analysis, subjectively held tacit knowledge can be identified within this phase (McElroy, 2003; Dalkir, 2011, p. 48). In addition to the effective search of knowledge resources, the identification phase involves the analysis and evaluation of resources based on “organizational rules, cultures and evaluation criteria” (Evans et al., 2014, p. 92). Creation of knowledge can be seen as a part of knowledge identification (Heisig, 2009, p. 10) and occurs, as soon as the needed knowledge request is not found within the identification phase. Another reason why new knowledge assets may need to be created is that existing knowledge resources may only partially meet the knowledge requirements (Evans et al., 2014, p. 92). Further, if the knowledge seems valuable for the organisation, based on the analysis in the identification phase, it will be organized and stored. Within the organization approach, the organisation categorises the data and defines the criteria for knowledge. By storing knowledge, it is important that knowledge assets are stored in a structured way in order to retrieve and share it (Evans & Ali, 2013 p. 160-161). The phase organizing and storing is very similar to the Wiig’s phase ‘holding’ and is also described in other knowledge management life cycles (Wiig, 1993; Heisig, 2009; Meyer & Zack, 1999).

The next phase, sharing of knowledge, is based on Wiigs’ concept step ‘pooling’. This phase can be seen as essential because through the sharing of knowledge employees may enhance individual and collective decision making which may improve problem solving within projects. Therefore, communication and cooperation internally as well as externally are essential for effective knowledge sharing. The next step apply is significant as it is the basis for further creation and valuation of knowledge. Moreover, by applying new knowledge, employees will create new approaches and concepts for particular situations (Evans & Ali, 2013, p. 161). As McElroy (2003) mentioned, by interpreting influences and different perspectives in an employee’s environment, they will gain new experiences. The step evaluate and learn is based on the life cycle of Bukowitz and Williams (1999). This phase refers to employees who hone and develop their intellectual knowledge assets through experiences, for example, by finishing projects or other tasks. Employees can also learn and improve by getting feedback from other organisational members. Through this process ‘intangible knowledge assets’ can be generated, which may improve problem solving and decision making approaches (Evans & Ali, 2013, p. 162-163). As noted by McElroy (2003), employees’ application of knowledge is decisive successful results or failure. If mismatches are present, this model has the possibility to include new knowledge by integrating double loop learning. Therefore, the loop goes
back to the identify phase (Evans & Ali, 2013, p. 162-163). The last step within this life cycle is called create. In the previous phases employees learned from their experiences and, as a result, new knowledge can be created (Dalkir, 2011, p. 43).

![Double-Loop Learning](image)

**Figure 9. IOSAEC knowledge management life cycle**

*Source: Evans & Ali, 2013, p.163*

**Double-loop vs. Single-loop learning**

The IOSAEC knowledge management life cycle uses stages consisting of practical, simple and major predominant concepts (Evans & Ali, 2013 p. 163). Since this life cycle is one of the rare models that uses double-loop learning, the advantages and differences in contrast to single-loop learning are highlighted in the following paragraph.

Learning is an essential part of being human and it can be defined as identification and correction of mistakes (Argyris, 2002, p. 206). Argyris (2002), as one of the founders of the double-loop learning theory, defines the differences between the two theories as such “Single-loop learning occurs when errors are corrected without altering the underlying governing values. Double-loop learning occurs when errors are corrected by changing the governing values and then the actions” (Argyris, 2002, p. 206). Reasons for adopting the double-loop theory are, inter alia, that it is easier to develop new knowledge within an organisation (Blackman, 2004, p. 11). The issue of applying single-loop learning is that it repeatedly tries to deal with the same problem, without seeking better methods or to get more information about the learning tasks. Double-loop learning on the other hand underlines the usage of other learning stages to generate more knowledge or to find better approaches to be more solution-oriented during the learning process (Hwang & Wang, 2016, p. 190-191). According Van Dooren (2011), employees should try to solve the problem again, but in a different way. By doing this and applying the model of double-loop learning, there is a high potential to create an added value and to increase the performance in general.

The concept of double-loop learning is also usable within projects. This assumption is based on the concept of project-based learning, which includes the idea of iteratively
learning and gaining in future projects from the achievements and errors of past projects (Keegan & Turner, 2001, p. 78; Parnell et al., 2005; Schindler & Eppler, 2003). The aim therefore is to create a project framework which makes the implementation and design of future projects easier, in consideration of lessons learned from previous projects (Brady & Davies, 2004; Holt et al., 2000; Wong et al., 2009). Holt et al. (2000, p. 417) describes double-loop learning in this context as “a high level of evaluation and analysis of information into knowledge, enabling changes to be made for mutual benefit.”

2.2.3 Knowledge Sharing in Projects

Within the knowledge management life cycle, knowledge sharing is one of the most important components because it means that in form of activities through different ways, individuals, teams and organisations share knowledge with each other. Even if the research agrees that knowledge sharing is an important concept within an organisation and within a project, there are different views what knowledge sharing actually means. According to Bostrom (1989) effective knowledge sharing occurs if respect to the team members and mutual understanding exists. Hendriks (1999) in turn argues that knowledge sharing is a communication process. He contended that knowledge is bound to a knowledge subject and not an object that can be handed on randomly. Other researchers maintain that for organisations with a conductive environment it is easier to generate the provision of knowledge sharing.

Knowledge sharing goes beyond the classic information exchange since it is not just about communicating to another party. The aim of knowledge sharing is to understand the generated knowledge in order to learn from it and apply it (Eriksson & Dickson, 2000, p. 1330; Senge, 1997). However, by having a deeper look at project teams it appears that the members normally belong to different departments and are assigned to partake in the same project. Therefore, it is important that the project members apply knowledge sharing to provide a link between the project team and the members, in order to increase the performance and to reduce costs (Jafari Navimipour & Charband, 2016, p. 730). Further, almost every project is confronted with uncertainty, which mainly occurs because of the lack of knowledge (Pavlak, 2004, p. 8; Häggren & Maaninen-Olsson, 2005). By missing project relevant key knowledge, it can be difficult to achieve the pre-defined goals, resulting in potential complications or crises (Lossemore, 1999, p. 13; Häggren & Maaninen-Olsson, 2005).

To counteract to this difficulty, it is essential to improve knowledge sharing within an organisation in general, but especially within a project. The dilemma thereby is, that the given organisational structure separates the different project teams. This configuration has a negative impact for the knowledge processes within the whole organization because a smooth flow of knowledge between the project teams is prevented (Ajmal et al., 2009, p. 162; Ruuska & Vartiainen, 2005, p. 374). This point of view is also emphasised by Ma et al. (2008) who state that it “is well-known that organization members may be hesitating in sharing their knowledge, especially key knowledge, in part due to the pursuit of individual benefits, which often leads to huge loss of valuable organizational knowledge once employees retire or leave the organization, rending the knowledge generated in the organization less useful” (Ma et al., 2008, p. 98). This shows the essential need for increasing knowledge sharing with an organisation and in order to reach that it is
necessary to understand the influence factors as well as the mechanism of knowledge sharing to effect this process (Ma et al., 2008, p. 98).

In order to understand the influencing factors of knowledge sharing, Tannenbaum et al. (1992, p. 125) defined six categories, which are the critical factors of success within the nature of projects group: characteristic of the project team members’ (e.g., motivation), project team characteristics’ (e.g., time, resources), characteristics’ of project tasks (e.g., complexity), project team process (e.g., communication), work structure of the project (e.g., norms) and project management process (e.g., leadership). Knowledge management and especially knowledge sharing within projects includes tools, policies and knowledge processes, which can be used by projects to take advantage of the internal and external knowledge (Kotnour, 1999, p. 32). Therefore, the challenge for project managers is to understand the complex relationships that exist between knowledge sharing and the nature of projects to support organisational and project learning (Nobeoka, 1995, p. 432; Kontour, 1999, p. 32).

**Conditions for Knowledge Sharing**

That knowledge sharing can be performed in a proper way within projects, trust is an essential factor. The internal environment and also the context of a project team can influence the willingness of an individual person to share knowledge with other participants. In other words, project team members are hesitant to share their knowledge if the environment is not trustworthy (Ma et al., 2008, p. 100). Furthermore, “given the special characteristic of knowledge, that is, once shared, knowledge becomes public to every one, some team members may be afraid of losing their privileged status if they share their own expertise or special skills” (Ma et al., 2008, p. 101). It is the responsibility of the project leader to increase interpersonal trust by creating a comfortable environment that encourages people to share their knowledge. As a consequence, the exchange of knowledge within the project team is perceived as accepted and fair and due to that, the knowledge is moving from an individual level to a team level, which helps to finish a project successfully (Ma et al., 2008, p. 98; Mueller, 2015, p. 55). Additionally, the outcome of the research of Annadatha (2012, p. 3) shows that face-to-face communication is an important factor in trust building.

As written previously, members of a project are more willing to share their knowledge if they can trust their surroundings, but additionally this willingness can increase if the individual feels dependent (Chiregi & Navimipour, 2016, p. 281). The feeling of dependency is influenced by the seen experience and frequency of communication. To promote knowledge sharing among the team members, project managers need to focus on these variables, especially in development projects because there are primary tasks which are significant knowledge intensive (Park & Lee, 2014). However, trust and dependence are not the only important factors. According to Annadatha (2012, p. 4) factors of the social and cultural science, like collaboration, shared language and shared goals are important aspects. But the most relevant factor is to have a shared vision to ensure a successful exchange of knowledge. As defined by Gagné (2009, p. 572) “Knowledge sharing is the process of mutually exchanging knowledge and jointly creating new knowledge, it implies synergistic collaboration of individuals who work toward a common goal.” Therefore, it is possible to say that the most important factors for a successful and fluent knowledge sharing are trust, dependence and a clearly defined and shared vision. Factors such as empowerment and leadership style on the other hand
do not influence whether employees sharing their knowledge within the project team (Ma et al., 2008, p. 100).

It has been researched that knowledge varies in their difficulty to share it. Therefore, knowledge complexity is another impact that may influences knowledge sharing among a project team. Even when explicit knowledge is easier to share that does not mean that tacit knowledge is less important, on the contrary, it is even more important because it is necessary to complete tasks (Nonaka & Takeuchi, 1995). The knowledge of human is switching between the two principles of knowledge by a process of learning and interaction. The findings of the research from Ma et al. (2008) present, that in particular explicit knowledge is increasing the exchange of knowledge within a project team, because it is positively linked to knowledge sharing. This finding is comprehensible, since explicit knowledge is easier to share compared to tacit knowledge. That leads to the second finding, namely, that knowledge which is not so easy to write down, is negatively linked to knowledge sharing. In other words, tacit knowledge may create barriers that consequently hinder knowledge sharing within project teams (Ma et al., 2008, p. 104-106). Therefore, tacit knowledge is a critical factor and it is necessary to create an environment within the organization and the project team that allows sharing of tacit knowledge. That is essential, as mentioned above, tacit knowledge is even more important and decisive to achieve success (Zhang et al., 2012).

2.3 Public Sector vs. Private Sector

The differences between public sector and private sector are a central interest of the research field public administration (Rainey 2009; Rainey & Bozeman 2000) but nonetheless, the debate on this issue has not found a significant conclusion yet (Boyne 1992). Discussions about changes in public administration often call for consciously business thinking and take a striking approach to comparison with the private sector. However, this does not always take adequate account of the fact that there are serious differences between the public administration and the private sector. This idea is also supported by Allison (2015, p. 397) who highlighted “the notion that there is any significant body of private management practices and skills that can be transferred directly to public management tasks in a way that produces significant improvements is wrong.” However, many research fields like politics, economics and public administration discussed about the public and private sector by focusing on the communalities and differences. The main similarities according to Rosacker & Rosacker (2010, p. 590) are that “Public sector and private sector business organizations share broad managerial attributes such as a requirement for fiscal accountability, the need to allocate resources, requirements to adhere to laws and regulations, as well as a need to apply effective, efficient, and reasonable management principles in guiding their employees and actions.”

Bozeman (1987) and Rainey et al. (1976) defined three fundamental differences between the two sectors: ownership, funding and control. By having a look into ownership as the first difference, shareholders or entrepreneurs are normally owners of a company in the private sector, while political communities are the proprietors of agencies in the public sector. Further, in contrast to the private sector, nearly the whole funding for public agencies is taken from taxation rather than from charging fees for the offered services
Another difference is that the public sector is mainly controlled by political forces rather than market forces, which means the public sector is mostly depending on the political system whereas the private sector is mainly influenced by the economic system (Dahl & Lindblom, 1953). Moreover, the markets of both sectors can be defined as fundamentally different since the environment of the private sector is characterised as polypolistic whereas the public sector based on its non-existing competition can be seen as monopolistic (Rosacker & Rosacker, 2010, p. 590). Furthermore, organisations in the public sector are more bureaucratic and rigid in comparison to the private sector, which lead to a lower organisational commitment and a less materialistic thinking of the responsible managers (Boyne, 2001). Another difference between both sectors is based on the contrary definition of their overarching goal. The aim of the public sector is to provide social and non-profit services to the citizens whereas the private sector aim focus on generating profit and growth. Based on this opponent goal setting the management tools as well as the operational techniques are different (Wirick, 2009; Lane, 2000). As pointed out above, there are more differences than similarities between the public sector and the private sector. For this reason, some researcher claim that it is pointless to compare both management approaches. Moreover, it is irrelevant trying to adapt techniques from the private sector to the public sector because of the huge inter-sectoral differences (Boyne, 2001). For a better overview the main differences of the sectors are summarised in Table 3.

### Table 3. Main differences between Public Sector and Private Sector

<table>
<thead>
<tr>
<th>Public sector</th>
<th>Private sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned by political communities</td>
<td>Owned by shareholders or entrepreneurs</td>
</tr>
<tr>
<td>Financed by taxation</td>
<td>Financed by revenues and profit</td>
</tr>
<tr>
<td>Political forces</td>
<td>Market forces</td>
</tr>
<tr>
<td>Political system</td>
<td>Economic system</td>
</tr>
<tr>
<td>Monopolistic</td>
<td>Polypolistic</td>
</tr>
<tr>
<td>Maximizing public welfare</td>
<td>Profit maximization</td>
</tr>
</tbody>
</table>

#### 2.3.1 Project Management Challenges in the Public Sector

The public and the private sector are not only representing two different ideologies but rather showing differences by managing projects. Traditional elements of project management like the iron triangle are still a part of the project management approach for the public sector but other factors are additional and exclusively belonging to this specific project management approach. Therefore, the public sector includes many characteristics of a projects, which do not exist in the private sector (Wirick, 2010, p. 74). Since projects in the public sector often enjoy high attention, it is even more important to perform in a transparent way and in conformity to the legal framework. To ensure transparency,
projects above a certain budget need to be published for finding an adequate partner to
give every company the possibility to get the offer. The main characteristics of managing
projects within the public sector can be summarised in three traditional attributes
“financial rectitude, reliability of performance, and the mitigation of risk and uncertainty”
(Baldry, 1998, p. 35).

Furthermore, projects within the public sector may be influenced from parties which are
not directly involved, but have the power to put a veto on decisions. As a consequence,
the whole life cycle of a project can be influenced by the power of inter-organisational
hierarchy. Furthermore, projects in the public sector normally include internal employees
as well as external commercial partners or consultants to enlarge the needed expertise for
the project (Baldry, 1998, p. 35-36). As explained by Wirick (2010, p. 52) the main
difference in managing projects in the public sector compared to others are based on
human factors, so called ‘soft issues’. These issues are caused by the involvement of the
stakeholder throughout the project, which can equally lead to a project failure as well as
technical defects. Even though, it is hard to measure and analysis the risk arising from
stakeholders for the project, it highlights the importance of this topic for project risk
management to prevent arising interpersonal conflicts (Baldry, 1998, p. 37; Wirick, 2010,
p. 110).

Beside the differences in project management approach there are also challenges arising
because of the lack of appropriate management techniques for the public sector. Project
managers have to deal with different ideas of their stakeholders, which may increase the
budget and lengthening the schedule (Wirick, 2010, p. 85). This could lead to the problem
that another project which should be implemented in the same period of time will be
cancelled, due to the overrun of the project costs. Another issue arising from the time
overrun of a project could lead to operational difficulties by interlinking the existing
processes with the new but not fully developed processes. As a consequence, the project
performance criteria are not fulfilled which leads to a dissatisfaction of the employees and
stakeholders and thus, inadequate operation support occurs (Baldry, 1998, p. 37).

2.3.2 Digitalisation

In August 2013 the German Law on the Promotion of Electronic Administration (E-
Government Law) came into force, in order to facilitate electronic communication with
the administration. It enables federal, state and local governments to provide simpler
usability and more efficient electronic administrative services. The provision of electronic
evidence and electronic payment in administrative procedures will also be facilitated.
Moreover, principles of electronic filing and replacement scanning are specified. The
German Federal Government has defined the goal of increasing its citizen-friendliness.
The administration contributes for the planned renewal the ‘Digital Administration 2020’
programme. It is intended to set binding standards for comprehensive digitalisation and
the use of innovative technologies (BMI, 2014; BMI, 2018).

New technologies on one side help the public sector to create a better interaction between
government organisations and citizens, and on the other side it increases the effectiveness
of processes internally. Nevertheless, organisation in the public sector are surprisingly
slow in modifying new technologies (Meijer, 2015, p. 198). However, in some public
organisation digitalisation is already present and in the short future the major impact of
digitalisation and automation is expected. This changes the functioning because the amount of work will be reduced (De Buryne & Gerritse, 2018, p. 198). With the change from analogue processes to digitalised processes the paper-based information is reduced, since the information and documents are digitally available. This process renewal brings some benefits and opportunities with it. All documents and data are retrievable and can be found at any time. Within the systems all documents and information can be find easily due to the full text recognition. Therefore, the working times will be reduced because of the enhanced filter and search function. Since the data are all digital available, the archiving costs can significantly be reduced (Leyer & Hollmann, 2014, p. 959). In general, digitalised documents, data and information are saver. There is a much lower risk of documents disappearing within the organisation. In order to achieve safeness of the documents, it must be clearly defined beforehand which employee may access to which documents and information. Also the data sharing, namely moving the data from one person to another one within the workflow process is much easier and faster with digitalised data (Komito, 1998, p. 235). It has also the advantage that the customers experience and the transparency of the service processing increase. The major opportunity however in digitalising data and documents are the increasing efficiency (Leyer & Hollmann, 2014, p. 950). Further, because of the fast changing environment and the growing digitalisation impact, the public sector will increase their adaptability. That means that services, products and also the processes need to be quickly adaptable that the organisation can react in time when market changes occurs. “The need for efficient and effective use of resources and capacity calls for a better coordination of government-wide knowledge, information and skills” (De Buryne & Gerritse, 2018, p. 202). Based on the statement it leads to the assumption that in the future government organisation will increase their co-operation with each other (De Buryne & Gerritse, 2018, p. 201).
2.4 Summary

The purpose of this chapter is to provide a theoretical framework for the thesis. Further, all components of the research topic as well as the research question are highlighted.

Firstly, aspects included in the project management theory are presented to ground an understanding of the subject. Therefore, the phases of the project life cycle, the iron triangle and the concept of the critical success factors are presented. Further, complexity is included in the research question several concepts are presented whereas the main focus is on the model by Williams (1999). Moreover, the MODeST-framework by Maylor et al. (2008) is taken as one approach to structure complexity. Furthermore, for presenting a general understanding of the existing methodologies used in the project management both contrary approaches, waterfall and agile, are presented. For generating an understanding of the aspect ‘scope’ included in the research question as well as in the research topic, the phases of project scope management are presented.

Secondly, aspects included in the knowledge management theory are presented with a focus on knowledge sharing as this is another component of the research question. The fundamental theory of Nonaka et al. (1996) is used in order to understand the different types of knowledge. The difference between explicit and tacit knowledge is also explained. Since knowledge sharing is part of the knowledge management life cycle, two different concepts are confronted. Due to that, the differences between single- and double-loop learning are explained. Further, conditions for knowledge sharing within projects are demonstrated.

Lastly, to ground an understanding of the environment of the case study the differences between the public sector and the private sector are presented. Challenges regarding project management arising in the public sector are highlighted. Moreover, the potential of digitalisation within the public sector is covered.
3 Theoretical Methodology

### Chapter overview

This part motivates the research design of the thesis. Within this chapter the chosen research strategy, research approach, fundamental assumptions and the used technique are discussed in detail. Moreover, an overview regarding literature search and source criticism is given.

### 3.1 Choice of Subject

Since the environment is changing very fast it seems reasonable to focus on a topic with an innovative impact. Therefore, our aim is to provide an academic contribution within this field of study. The authors have studied business administration and e-business management in their bachelor studies, which arouses the interest in digitalisation and knowledge management. During their master studies in the field of Management at Umeå University, the authors additionally set a focus on the theories of project management. The knowledge the authors have generated throughout their studies provided the basis for the thesis topic.

Besides their background, the authors have chosen this topic because they want to highlight practical issues. More detailed, the authors want to formulate recommendations of action for the creation of a scope statement and the usage of knowledge sharing within the project management in the public sector, which can be useful for future digitalisation projects in the same environment. By providing recommendations, the authors add value to a sector, which is influencing every citizen of the country. Therefore, the authors belief that is beneficial to study this sector and to present a contribution for increasing the innovative behaviour of governmental agencies.

### 3.2 Pre-understanding

Bryman & Bell (2011, p. 414) state that the pre-understanding can be defined as the experience, knowledge and opinions the authors gained before the research has been conducted. Therefore, general research shows that pre-understanding is essential to understand the research topic in a certain way. Since pre-understanding differ between individuals leading to different understandings of topics, it is necessary to ground a common understanding in this thesis. Accordingly, these shared insights ensure a conduction of the research topic without negative influences because it increases the understanding of the chosen method as well as the grounded fundamental assumptions. As stated above, the pre-understanding is depending on the personal experiences of an individual, which also influences the person's way of thinking and its interpretation of the world (Nyström & Dahlberg, 2001). For this reason, both authors will present their personal experiences in the following paragraphs.
Janice Wrobel has gained practical experiences within the field of project management throughout her academic career by undertaken internships. Within the internships, the author has gained practical insights as well as deeper knowledge in managements practices, techniques and methods. Further, by working in a digitalisation project within the public sector the author acquires a deeper understanding of the processes and special practices within a public agency. Moreover, the issues arising within a major digitalisation projects have been partly visible for the author and arouses interest to research in this field.

Jacqueline Taschek’s experience are mainly acquired through internships within the banking sector. Throughout these internships the author got a deeper understanding and practical experience in the field of project management. The project the author was allocated to, was a digitalisation project, with the aim to make the internal banking process more efficient. By working within this project, different processes and techniques were applied, which gains to a general deeper understanding. Therefore, the potential and interest for projects with a focus on digitalisation cause and build the basis for the research topic.

Since both authors have gained experience within the field of project management with a special focus on digitalisation projects, it was obvious to choose a related topic regarding their working background. Further, the interest arises due to the issues identified in their internships to research for opportunities, which may minimise major issues like posterior changes or a resources overrun. Therefore, both authors have decided to write the master thesis together and in this field to explore useful approaches for the project management of digitalisation projects. Moreover, since both authors have seen the major impact of communication and knowledge sharing within teams, it arouses their interest to research on connections between project management and knowledge management to improve a performance of a digitalisation project.
3.3 Overview about chosen Theoretical Approach

The theoretical methodology represents a comprehensive picture of theories and judgements, which delivers the underpinning idea of the study. Therefore, it is essential that the researchers firstly identify their framework by having a look into their understanding of reality, common knowledge and their own role in the research. These considerations are covered in depth in the fundamental assumptions (Creswell, 2007, p. 16). After identifying the researcher’s world view and their representing role within the study, it is necessary to define the fitting research design and research strategy. Based on this, the study can be done by fulfilling both its research purpose but also the philosophical stances of the researchers. For visualising the chosen approaches within the methodology of this thesis Figure 10 is presented.

*Figure 10. Research Methodology*

*Source: O’Gorman & MacIntosh, 2015, p. 69 (Adapted from Figure 4.1, “Methods Map”)*
3.4 Fundamental Assumption

3.4.1 Ontology
The ontological assumption is covering the question what the nature of reality is about (Collis & Hussey, 2013, p. 47). Therefore, the focus of this assumption relies on the controversial view if reality is even objective quantifiable or subjective observable. Moreover, this assumption has a look into several abstract contradictions like general and specific, purpose and accident, and abstract and concrete (Collis & Hussey, 2013, p. 47). In general, there are two different alignments: objectivism and constructivism. The objectivistic stance is based on the opinion that social entities are considered as external actors from reality. That means that every subject need to be studied on its own without taking its surrounding into consideration and can be objectively measured. In contrast, constructivism is based on the stance that social entities are social constructions built up from perceptions. Therefore, they are influenced by their surroundings since both are interacting. That emphasis that every object needs to be studied including its environment by using a subjective observation to generate a full picture (Bryman & Bell, 2011, p. 21).
For the authors the stance of constructivism is more fitting since they do not belief that human interaction can be studied external from the environment. The research question of this thesis has the aim to explore opportunities to generate knowledge sharing within a project team and therefore, having also a look on the environment is essential to understand the underlying social construct of this case.

3.4.2 Epistemology
The epistemological assumption concerns the question about how to study reality and includes the theory of knowledge by providing assumptions about the validity of knowledge (Collis & Hussey, 2013, p. 47). For researchers, this approach is important to generate an understanding of what method should be used in their work. There are two oppositional alignments a researcher can refer to: positivism and interpretivism. The positivistic stance is grounded on the view that the social world can be studied with the same measurements and procedures as in natural science. Therefore, credible data is needed to be produced, which is generalizable and repeatable, to enlighten the phenomenon in the study (Saunders et al., 2012, p. 134). By taking this stance a quantitative method is normally used. In contrast, interpretivism represents the assumption that the social world is fundamentally different from natural science and therefore, need to be studied by using a different logic. In this stance knowledge is unique and not generalizable since it is based on subjective meanings and therefore, the researcher needs to interpret the created data (Saunders et al., 2012, p. 136). Normally a qualitative approach is used when the researcher represents this stance. Further, knowledge is something unique for everyone because it is always being influenced by personal experience and therefore, hard to generalize. Of course, there is general knowledge shared in the society, which can be generalized like “the grass is green”. But what nuance of green everyone is experiencing can be differ between the individuals. The focus of this thesis is to generate recommendations for social interaction within a digitalisation project and therefore, the authors do not belief that knowledge can be generalized in this context. The authors believe that not everyone in the project team has the same base of knowledge, which makes the knowledge individual. For generating a bigger picture, it is necessary to see which different expertise is needed within the project
team to find the best balance. Therefore, the authors will use the interpretivism as the philosophical stance in this thesis for presenting a wider view on different expertise and knowledge.

3.4.3 Axiology

The axiological stance is covering the assumption of values within a research. There are two approaches researcher can choose from: the value-free approach and the value-laden approach (Collis & Hussey, 2013, p. 48). The value-free approach represents the view that the study and the gained knowledge within it need to be independent from the researcher. Accordingly, there should be no influence on data collection, data analysis and the findings taken by the researcher which implies also no interpretation of the findings. Thus, exclude a qualitative method since the findings are set in a context by an interpretation of the researcher itself. In contrast, the value-laden approach represents the point that the research and the gained knowledge is dependent on the researcher. Accordingly, the researchers influence, implicit or explicit, the process of data collection and analysis and therefore they are unable to observe the study unbiased since they are somehow of the study (O’Gorman & MacIntosh, 2015, p. 69). The authors have chosen a value-laden approach as their axiological assumption because they need to interpret the collected data to generate the full picture including non-verbal signs, body language and the environment.

3.5 Research Design

By designing a study issues arising regarding the choice of different approaches like quantitative or qualitative and deductive or inductive. According to Saunders et al. (2007) none of these approaches is better than another but rather suits better for the study based on the research question and the overall context or aim.

3.5.1 Inductive vs. Deductive

Trochim (2006) introduced a system of logic based on two streams: inductive and deductive. This choice is essential for a study because it significant influence the chosen strategy as well as the data collection and analysis processes of a research (Saunders et al, 2007). For this reason, a number of researchers (Graziano & Raulin, 2007; Trochim, 2006; Saunders et al, 2007; May, 1998; Taylor & Bogdan, 1998) are covering the issues regarding the choice between the inductive and deductive method to build a deep understanding of both approaches. Generally, it can be said that the procedure of a deductive approach differs fundamentally from the procedure used in the inductive approach.

The deductive approach is developing theories and concepts about the topic first and after that they are hypothetical verified. This testing is done through empirical observation and ends finally with even a confirmation or refutation of the proposed theory (Graziano & Raulin, 2007; Trochim, 2006; Hussey & Hussey, 1997). Moreover, May (1998) and Trochim (2006) describe this as a ‘top-down’ structure because the theory comes before the research. Therefore, the deductive approach is narrowing the study down from a more
general to a more detailed perspective. Normally, the deductive approach is done in the quantitative strategy for testing and evaluating theories. In contrast, the inductive approach begins with the empirical part by observing and measuring the objectives. Further, tentative hypotheses are explored based on the collected data and subsequently a connection or inference to theory elaborated to add new insight to an existing research topic (Hussey and Hussey, 1997; Trochim, 2006). Therefore, the inductive method can be defined as a 'bottom-up' (May, 1998; Trochim, 2006) structure because the research comes before the theory. The aim is to develop a new theory or to generate new insights to an existing research topic. Moreover, the inductive approach is characterised by its open-ended and explorative nature. The authors have chosen the inductive approach because they want to generated a new insights and assumptions based on the collected data.

3.5.2 Quantitative vs. Qualitative

Some researchers declare the quantitative and qualitative approach significant contrary strategies (Taylor & Bogdan, 1998), whereas other researcher disagree with this point of view (Bryman & Bell, 2007; Creswell, 2003; Bryman, 1999). Moreover, Hammersley (1999) critiques the strictly separation of both approaches based on an outstanding distinction of their limited usage. However, this dichotomy leads to fundamental different methods and data analysis used in the quantitative and qualitative approach.

Bryman & Bell (2007) characterised the quantitative approach as a strategy focusing on the quantification of the data process including collection and analysis. Further, this approach is normally targeting theory testing rather than developing new theory. Based on its positivism assumption, the quantitative approach is grounded on an objective view on reality and excluding mostly the social view on reality (Bryman & Bell, 2007; Bryman, 1999; Taylor & Bogdan, 1998). In contrast, the qualitative approach focusing more on words and meanings to generate a theory by producing rich and deep data (Keegan, 2009; Remenyi et al, 1998; Bryman & Burgess, 1999). Therefore, the individual and its interpretation of the world is in focus, which is in line with the interpretivism assumption. A summary of the most important differences is concluded by Bryman (1999) and is shown in Table 4.

Further, Bryman & Bell (2007) highlighting the differences between the quantitative and qualitative strategy regarding their linkage of theory and research as well as in their epistemological and ontological stances. As seen in Table 4, the quantitative research is close to the objectivistic and positivistic consideration whereas the qualitative is following the stances of constructivism and interpretivism. Nonetheless, research highlighting that the differences are not ‘written in stone’ because of their interconnections. This view is supported by Bryman (1999) by arguing that the characteristics of both approaches can be easily adapted to another, which may be beneficial for the result.
Table 4. Differences between Quantitative and Qualitative Research

Source: Bryman, 1999

<table>
<thead>
<tr>
<th>Role of qualitative research</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relationship between researcher and subject</td>
<td>Preparatory</td>
<td>Means to exploration of actor´s interpretation</td>
</tr>
<tr>
<td>Relationship between researcher and subject</td>
<td>Distant</td>
<td>Close</td>
</tr>
<tr>
<td>Researcher’s stance in relation to subject</td>
<td>Outsider</td>
<td>Insider</td>
</tr>
<tr>
<td>Relationship between theory and research</td>
<td>Confirmation</td>
<td>Emergent</td>
</tr>
<tr>
<td>Research strategy</td>
<td>Structured</td>
<td>Unstructured</td>
</tr>
<tr>
<td>Scope of findings</td>
<td>Nomothetic</td>
<td>Ideographic</td>
</tr>
<tr>
<td>Image of social reality</td>
<td>Static and external to actor</td>
<td>Processual and socially constructed by actor</td>
</tr>
<tr>
<td>Nature of data</td>
<td>Hard, reliable</td>
<td>Rich, deep</td>
</tr>
</tbody>
</table>

In view of the fundamental assumptions (discussed in the previous chapter) and the exploratory attributes of the research question, a qualitative and inductive approach is taken to generate a new theory. With this strategy rich and deep data can be collected by interviews, which provides a foundation for answering the research question. The authors’ choice is also theoretical supported by Strauss & Corbin (1998, p. 10-11) who characterised the qualitative approach as “any type of research that produces findings not arrived at by statistical procedures or other means of quantification. It can refer to research about person’s lives, lived experiences, behaviours, emotions and feelings as well as about organisational functioning, social movements, cultural phenomena, and interactions between nations. Some of the data may be quantified as with census or background information about persons or objects studied, but the bulk of the analysis is interpretive.” Since the authors stated to generate a general research question, which is followed by choosing a specific subject to narrow down the topic. After that the data collection process as well as data analysis is conducted. Based on this process, a qualitative study seemed to be more applicable for answering the explanatory research question.
3.6 Research Strategy

3.6.1 Key Characteristics of Research Strategy

By defining the research strategy, the aim is to find a method of generating empirical data and to define a tool to analyse them. It is important to take into consideration, that different research strategies exist. Therefore, it is essential to define if the research applies a qualitative or quantitative approach and further if the study is an explanatory or exploratory one to find a suitable research strategy. In general, every research strategy is usable for either descriptive, exploratory or explanatory research, however some of the strategies are strongly related to deductive or inductive approach (Saunders et al., 2009, p. 141). Other influencing factors of the choice of the strategy are availability of resources, time and the level of existing knowledge, in connection with the researcher’s philosophical point of view. The philosophical standpoint is defined by the research question and needs to be considered by choosing a suitable research strategy.

To answer the defined research question, a single case study is chosen as the research strategy, which enables to collect qualitative data and analyse them, with the aim to generate a conclusion based on the qualitative analysis. For collecting the needed data, a case study with semi-structured interviews will be applied.

3.6.2 Case Study

A case study is normally used in order to understand complex contexts and to gain deeper insights into a research topic, where little prior knowledge exist (Ghauri & Gronhaug, 2010, p. 109). Within this thesis complexity is present, since many different perspectives are needed to answer the research question. Therefore, the case study is selected as practicable empirical method. Robson (2002, p. 178) defines a case study as “a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence.” The case designs can be divided into two categories, single case designs or multi case design. A single case study is a used method by exploring a single organisation and to identify factors, behaviour and collaboration within small units (Ghauri & Gronhaug, 2010, p. 110). However, the research question mainly specifies which case approach should be used (Yin, 2014, p. 31). For this reason, a single case study is chosen as the used research strategy.

Further, it is useful to conduct a single case study when the phenomenon is difficult to investigate outside of its natural environment, because otherwise the phenomenon might not be understandable anymore without its social context (Ghauri & Gronhaug, 2010, p. 109). That often occurs in cases of business studies, since a “case study is a description of a management situation […] and often involves data collection through sources such as verbal reports, personal interviews and observation as primary data sources (Ghauri & Gronhaug, 2010, p. 109).” Additionally, a case study has the ability to answer ‘what’, ‘why’ and ‘how’ questions (Saunders et al., 2009, p. 146), which is a category the thesis research question can be classified. Generally, as mentioned by Eisenhardt & Graeber (2007, p. 30) case study is a common empirical approach within operation and management research.
The project eAkte is used as a single case study within this thesis, because all the needed sources are provided by the instructing governmental authority. Moreover, the eAkte project shows a complex context, since different parties are included to fulfil the defined project purpose. Due to the fact of the project’s complexity it is essential to research it within its natural environment. Since the project eAkte can be seen as a pioneer regarding a digitalisation project in the public sector, it is obvious to apply a single case study instead of a multiple case study.

3.7 Literature Search and Source Criticism

Johansson-Lindfors (1993, p. 88) highlights assumptions for criticising theories, which are used for grounding a study. Accordingly, these principles are: newness and empirical ground. The assumption of newness assesses how current the literature is by considering the validity of the source (Johansson-Lindfors, 1993, p. 89). Further, Johansson-Lindfors (1993, p. 89-90) suggests that the usage of older sources can be done when no recent studies are available of the field of study. Within this thesis some fundamental theories from nineties are used to present a general understanding of knowledge management and project management, for instance the theory of implicit and explicit knowledge from Nonaka & Takeuchi (1995) is seen as well-grounded and still relevant in the research field. The next principle is empirical grounded, which is referring to the usage of primary and secondary sources. Accordingly, the usage of secondary sources should be minimised or avoided because it can misrepresent the origin meaning behind the primary source (Johansson-Lindfors, 1993, p. 89). The evaluation of the used theories and concepts of this thesis are based on these three principles. For generating a proper balance between the three principles, the authors used older sources as well as new ones. Nonetheless, the authors have used as much new sources as possible to touch the contemporary view of the research field. This ensures a fulfilment of the idea behind the principles and enables the study to present a full and deep framework of literature.

The theoretical framework of this thesis is mainly grounded on peer-reviewed journals and books. For generating a wider picture, the authors have used different sources to present different opinions on the topic of interest. Therefore, relevant sources are selected from the database of google.scholar and university library in Umeå. To find the adequate fitting literature the authors have used keywords, which are closely related to their research topic as well as to the research question. The used keywords are project management, complexity, project life cycle, knowledge management, knowledge management life cycle, knowledge sharing, public sector and digitalisation.

By choosing mostly peer-reviewed literature the quality and trustworthiness of the sources are ensured, which makes the created theoretical framework of this thesis more reliable. Further, the authors have tried to use only articles from approved journals since the quality and relevance in such journals is proved by academics. For sources, which are published in not well known journals or have not been labelled with 'peer-reviewed, the authors have verified the quality critical to ensure the same standard than the other sources. The books used in the thesis are representing general and grounded theories to provide a fundamental understanding of the theoretical framework used in this study.
Moreover, books written by Bryman and Bell (2011, 2015) are used in the methodology part to explain fundamental point of views.

The usage of internet sources was prevented as good as possible by the authors. However, some internet sources were used in context with the case study. These sources are provided by governmental agencies, which ensure a standard of quality of the presented information.

3.8 Summary
The purpose of the chapter theoretical methodology is to present the chosen theoretical point of view. An important aspect within this chapter is the chosen research paradigm, which biases the research.

The authors have chosen the stance of constructivism as their ontological assumption for this thesis as it is essential to research the human interaction within its environment. Further, as the epistemological assumption of this thesis, the stance of interpretivism is taken because it enables the authors to include different perspectives of knowledge and the expertise behind it. To answer the research question of this thesis an interpretation of the data set seems necessary for the authors and therefore, a value-laden assumption is taken as the axiological assumption.

Based on the chosen fundamental assumptions and the exploratory characteristics of the research question, the authors have used a qualitative and inductive approach to generate a new theory. To generate experiential evidence, data interviews were chosen as the research strategy. Moreover, a single case study is used to elaborate the research question within a practical environment.
4 Practical Method

Chapter overview

The practical methodology represents a comprehensive picture of the used method of the thesis by providing a deeper understanding of the data collection procedure. This qualitative study is using interview transcripts as their primary data. Further, this approach is essential to generate a deeper understanding of the complexity of the personal environment by taking personal experience, emotions and opinions into consideration (Suter, 2011, p. 364). Moreover, an overview of the ethical issues and considerations are given.

4.1 Data Collection

Generally, interviews are a common method to collect primary data within a qualitative research (Bryman & Bell, 2011, p. 465; Cooper & Schindler, 2014, p. 152). Defined by Kahne & Carnell (1957, p. 9) “an interview is a purposeful discussion between two or more people.” Further, it is possible to differentiate between three forms of interviews: structured interviews, semi-structured interviews and unstructured interviews (Bryman & Bell, 2011, p. 467; Saunders et al., 2009, p. 318). Structured interviews normally allow a direct comparison of the given answers, since the data are normally generated through a survey which contain the same questions (Cooper & Schindler, 2014, p. 153). This form of interviews is suitable for positivist research because the answers are measurable (Saunders et al., 2009, p. 320). Unstructured interviews on the other side enable the possibility to get an unrestricted answer from the participant, with the aim to get better and deeper insides of the field of interest (Bryman & Bell, 2011, p. 467). Therefore, unstructured interviews are the exact opposite of structured interviews because there are only a few given questions (Cooper & Schindler, 2014, p. 153).

The approach of semi-structured interviews is characterised by defining topics which include pre-defined questions. This document is called interview guide (Bryman & Bell, 2011, p. 467) and will be further describe in the following chapter. Depending on the participant, the questions can vary in terms of their relevance and order (Saunders et al., 2009, p. 320). Moreover, questions which are originally excluded from the interview guide line can be ask if the research sees the relevance and necessity for it, which leads to flexible answers throughout the interview process (Bryman & Bell, 2011, p. 467). Due to the interpretive character of the thesis, the semi-structured interview design is appropriate, to change the depth of the data which generates new insights.

4.2 Sampling

Collis & Hussey (2014, p. 131) defined “a sample is a subset of the population.” Due to the short time and monetary horizon, the authors used a specific sampling method and further, narrowed down the scope of the thesis to a certain criterion, which is shown in the research question. Generally, the purpose behind sampling is to reduce the amount of
collected data by considering the accessibility. Therefore, the aim is to collect data from a specific sub-group rather than from the census to generate a well-founded answer to the research question (Saunders et al., 2009, p. 242). Additionally, the sub-group is more likely to fulfil the criteria because it ensures the validity and reliability of the data due to the fact that the selected samples have specific similarities. Furthermore, researcher emphasise the sample selection technique used in a qualitative study shows a lack of detailed descriptions, whereas within the quantitative approach a rigid sampling framework exists. Accordingly, Coyne (1997, p. 623) highlighting this as the main difficulty by defining the saplings for a qualitative study. To overcome this lack of framework, the authors will describe in detail the underpinning sampling method and techniques to ensure a result, which is easier to interpret and replicate.

Generally, there are two different sampling techniques recognised by the literature: probability and non-probability samplings (Saunders et al., 2009, p.211; Ghauri & Gronhaug, 2010, p. 139). The probability technique is mainly used to create statistical inferences by including participants, who are normally familiar with the case. Further, no individual, which representing the sampling characteristics, is excluded from the start. That makes this technique suitable for surveys or questionnaires (Saunders et al., 2009, p. 242). In contrast, the non-probability sampling is used to include a specific and not representative group of samplings within a study to generate for instance deeper insight in a topic. Therefore, both techniques can be seen as opponents since they are representing different approaches by choosing samples. The probability techniques are randomly selecting individuals of the sampling group, which gives every sampling group member the same change to be included. Whereas, the non-probability technique is specifically picking individuals of the sampling group (Yin, 2014, p. 81).

For this thesis the non-probability sampling method of purposive or judgmental sampling is chosen to generate a sampling group. According to the literature, purposive or judgmental sampling is applied to use the researcher’s personal judgment to choose the samplings rather than to evaluate them in an objective manner. By taking this method the research question can be answered in a proper and valuable way (O’Gorman & MacIntosh, 2015, p. 162; Saunders et al., 2009, p. 268). Moreover, this technique is often used in a case study because it emphasis the best fitting samples to generate a deep understanding of a specific case (Saunders et al., 2009, p. 268; Bryman & Bell, 2011, p. 442).

The interview samplings chosen by the authors are based on their specific experience regarding the case study eAkte and their well-founded knowledge regarding project management, knowledge management and digitalisation within the public sector. Moreover, all of the participants were directly involved in the creation process of the scope statement. Therefore, they have all significant insights and practical experience in these topics, which is need to answer the research question is an adequate and valuable way. In the following Table 5 the interviewees are introduced and their relevance for the thesis presented. Further, all the interviewees are anonymized by giving them pseudonyms to ensure their privacy.
Correspondingly, the authors have designed an interview guide and questions needed to conduct the semi-structured interviews. As explained by Bryman & Bell (2015, p. 486) an interview guide is “somewhat more structured list of issues to be addressed or questions to be asked in semi-structured interviews.” Accordingly, a connection to the research question is created, whereas at the same time it creates a flexibility regarding further topics mentioned by the interviewees (Bryman & Bell, 2015, p. 486). Before defining the interview guide, the authors have studied the existing literature carefully since it is necessary to develop a grounded knowledge in the research field (Collis & Hussey, 2014, p. 135). Consequently, the elaborated interview questions are partly based on theoretical issues covered in the literature framework like the MODeST framework by Maylor et al. (2008) and the knowledge management life cycle by Wiig (1993), whereas some questions are designed to get new insights by following the intuition of the authors. In the following, the procedure of creating the interview guide as well as the purpose of the questions are explained.

Firstly, the authors developed themes or topics, which should be covered throughout the interviews. These main categories are covering the theoretical issues of the thesis and provide a foundation for answering the research question. Therefore, these main categories are created:

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard</td>
<td>Project Leader</td>
<td>Contracting authority of the digitalisation project within the public sector (eAkte). Richard is responsible for the planning, controlling and success of the project</td>
</tr>
<tr>
<td>Simon</td>
<td>Senior Manager - Consultant</td>
<td>General overview of the project with special knowledge in the defined research fields.</td>
</tr>
<tr>
<td>Mathew</td>
<td>Senior Manager - Consultant</td>
<td>Responsible for defining the scope statement and responsible for the implementation of the processes</td>
</tr>
<tr>
<td>Jacob</td>
<td>Manager - Consultant</td>
<td>Project manager which is responsible for the implementation of the digitalisation process</td>
</tr>
<tr>
<td>Benjamin</td>
<td>Senior Manager - Consultant</td>
<td>Responsible for defining the scope statement and responsible for the implementation of the processes</td>
</tr>
<tr>
<td>Finn</td>
<td>External supplier on the technical side (German Post AG)</td>
<td>Responsible for defining the scope statement from a supplier view and responsible for processing the processes (organisational)</td>
</tr>
<tr>
<td>Adam</td>
<td>External supplier on the technical side (German Post AG)</td>
<td>Responsible for defining the scope statement from a supplier view and responsible for processing the processes (technical)</td>
</tr>
<tr>
<td>Tobias</td>
<td>Director of the Consultants</td>
<td>General overview of the project and primary contact person for the project leader</td>
</tr>
</tbody>
</table>

**4.3 Interview Question Formulation**

Correspondingly, the authors have designed an interview guide and questions needed to conduct the semi-structured interviews. As explained by Bryman & Bell (2015, p. 486) an interview guide is “somewhat more structured list of issues to be addressed or questions to be asked in semi-structured interviews.” Accordingly, a connection to the research question is created, whereas at the same time it creates a flexibility regarding further topics mentioned by the interviewees (Bryman & Bell, 2015, p. 486). Before defining the interview guide, the authors have studied the existing literature carefully since it is necessary to develop a grounded knowledge in the research field (Collis & Hussey, 2014, p. 135). Consequently, the elaborated interview questions are partly based on theoretical issues covered in the literature framework like the MODeST framework by Maylor et al. (2008) and the knowledge management life cycle by Wiig (1993), whereas some questions are designed to get new insights by following the intuition of the authors. In the following, the procedure of creating the interview guide as well as the purpose of the questions are explained.

Firstly, the authors developed themes or topics, which should be covered throughout the interviews. These main categories are covering the theoretical issues of the thesis and provide a foundation for answering the research question. Therefore, these main categories are created:
Every theme includes main questions and sub-question for generating a deeper understanding, whereas spontaneously following-up questions, which are not previous defined, are also allowed during the interviews. For generating significant data, specific questions regarding the case study are asked as well as more general questions, which provides evidence knowledge and experience of the interviewees. By using both types of questions the data set will be deep and rich, which is essential to answer the research question properly. Moreover, the following-up questions are used to create an everyday experience and to avoid an usage of a rigid and abstract concept to conduct the interviews. By clearly formulating the interview questions based on daily situations, it enables the interviewees to present their experiences and knowledge regarding the main topics of the research (Magnusson & Marecek, 2015, p. 57).

Generally, the interview guide goes from background questions to more specific questions and ends with the possibility for the interviewees to reflect about their answers or to add thoughts, which they have missed to present during the interviews. Afterwards the interviewees have the opportunity to ask questions regarding the research to ensure transparency. For a deeper understanding of the asked question, Appendix 1 is presenting the interview guide.

### 4.4 Conducting the Interviews and Location

Within a qualitative study face-to-face interviews are seen as one of the most valuable approach (Saunders, et al., 2009, p. 349) because non-verbal signs like body language, facial expression and tone are also important in order to avoid misunderstandings (Shuy, 2003, p. 181). Thus, “there is an implication that a lack of visual cues can impact upon the quality of the data generated” (Irvine et al., 2012. p. 90). Therefore, face-to-face interviews are seen as an effective way of generating deep data. For this thesis all interviews have taken place in the German city Nuernberg between the 27th March and the 11th April 2019. Further, the duration of the interviews varied between 50 and 65 minutes, which is visualised in Table 6. As explained in the literature (Saunders et al., 2009, p. 329) the location of the interviews should be private, comfortable as well as convenient for the interviewees. For this reason, all the interviews have been conducted in the offices of the interviewees. This increase the comfort of the interviewees since they do not have to leave their office and moreover, the interviews are done in their usual environment. Thus, creates a trustworthy, positive and safe base for the interviews. Based on the favourable environment the interviewees are more likely to talk about their experiences and private objectives, which will enrich the collected data.

Since our case study has taken place in a German governmental agency and both authors as well as the interviewees are from German speaking countries, the authors have decided to conduct the interviews in German to avoid potential language barriers. Generally, all the interviews have been recorded in German by permission of the interviewees and after
that English transcripts have been created from all the interviews. Although this procedure is generating additional value for the data collection, it also causes extra effort for the transcription. Even when the process of switching between two languages could be challenging for analysing the data later on (Bryman & Bell, 2011, p. 488), the authors represent the point of view that the additional effort is worth it because the interviewees can speak fluently and free without potential fear of using another language in a wrong way. In order to avoid misleading influences by translating the interviews, the authors translated the interviews word by word with a focus on transferring the sense of the sentence. For generating the best output in the short time horizon given, the authors decided to split up the work. Therefore, one of the authors is conducting the interviews, while the other author is transcribing them afterwards.

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
<th>Interview duration</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard</td>
<td>Project Leader</td>
<td>55 minutes</td>
<td>29.03.2019</td>
</tr>
<tr>
<td>Simon</td>
<td>Senior Manager - Consultant</td>
<td>50 minutes</td>
<td>11.04.2019</td>
</tr>
<tr>
<td>Mathew</td>
<td>Senior Manager - Consultant</td>
<td>65 minutes</td>
<td>27.03.2019</td>
</tr>
<tr>
<td>Jacob</td>
<td>Manager-Consultant</td>
<td>65 minutes</td>
<td>27.03.2019</td>
</tr>
<tr>
<td>Benjamin</td>
<td>Senior Manager - Consultant</td>
<td>50 minutes</td>
<td>27.03.2019</td>
</tr>
<tr>
<td>Finn</td>
<td>External supplier on technical side (German Post AG)</td>
<td>60 minutes</td>
<td>28.03.2019</td>
</tr>
<tr>
<td>Adam</td>
<td>External supplier on technical side (German Post AG)</td>
<td>55 minutes</td>
<td>28.03.2019</td>
</tr>
<tr>
<td>Tobias</td>
<td>Director of the Consultants</td>
<td>50 minutes</td>
<td>10.04.2019</td>
</tr>
</tbody>
</table>

4.5 Data Analysis

Based on the nature of research, the research design, the research approach, the research question as well as the authors’ philosophical stances data analysis methods must be carefully selected (Ritchie et al., 2003, p. 274-275). Regarding these requirements, the authors have chosen the thematic analysis as the used data analysis tool because it offers a certain degree of freedom by allowing interpretation. The thematic analysis belongs to the qualitative analysis methods and is used to categorise the data into themes. These themes assist to identify, analyse and collect shared denotations and experiences among the data set. Consequently, it enables the authors to see relations between the data and to make a comprehensive and understandable picture from the data set (Braun & Clarke, 2006, p. 82). Further, it is possible to build a connection between the defined themes and the theory as well as the research question (Braun & Clarke, 2019, p. 57).
analysis can be applied to almost every qualitative study, it is classified as a neutral analysis and used very often. This is grounded in its characteristics because it relies on a high degree of accessibility and flexibility based on the theme coding mechanisms (Bryman & Bell, 2011, p. 571-572; Braun & Clarke, 2019, p. 58). In general, the collected date needs to be firstly categorised into sub-themes and afterwards summarised in main themes. By applying this technique, a structural analysis of the data is possible, which leads to a reduction of missing information. For these reasons, this method seems to be a good chose for the authors to analyse the collected data.

4.5.1 The First Step – Categorising Sub-Themes

Firstly, the authors need to get familiar with the provided data set. Within this thesis the authors have read the prior created transcripts of the interviews and have listened to the audio files of the interviews again to get a sense of the setting as well as atmosphere of the interview. After that the most important aspects and quotes were highlighted in an analytical and critical way to avoid misunderstandings. According to Braun & Clarke (2006, p.61) questions like “What assumptions do they make in interpreting their experiences?” or “What kind of world is revealed through their accounts?” can support the understanding of the data set. After highlighting all interesting aspects keywords are created for summarising the aspects into a short term. The aim of this step is to categorise similarities of the data set within a sub-theme to obtain a first picture based on a variety of fragments. The researchers have done this process firstly individually to minimise the risk of interpretation and misunderstandings. Further, by viewing and categorising the interviews firstly, individually a wider variety of keywords can be found. After the individual analysis the authors discussed their keywords and analysed the interviews a second time together, which minimised the risk of losing or forgetting important insights. After a catalogue of keywords was defined the authors started to summarise them again into sub-themes. The second summarising process has the aim to collect all the similarities but also differences about a certain aspect among the interviewees into one sub-theme to create a synthesis of the themes. The Table 7 presents the defined sub-themes. To understand the selection of the 22 sub-themes, it is essential to know that the analysis started with 45 potential sub-themes. Since this amount seems too broad for creating a representative picture of the data set, the authors have excluded some potential ones based on several aspects. The first aspect can be seen in the nature of the sub-themes where not every potential sub-theme represents the full data set in an adequate matter. Other potential sub-themes are excluded because they were misleading or not fulfilling the purpose of the research. To visualise which interviewee is highlighting which sub-theme a table is presented in the Appendix 2. It is recommended by the literature to use an accurate classification (Saunders et al., 2009, p. 439), which can be ensured by using a representative number of sub-themes. Since the next step is summarising sub-themes into main themes it is essential to keep interdependencies between sub-themes and themes in mind. For this reason, it is useful to choose sub-themes, which are correlated to others, to generate meaningful findings.
Table 7. Sub-Themes

<table>
<thead>
<tr>
<th>Sub-Themes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agile</td>
<td>Keep overview of tasks</td>
</tr>
<tr>
<td>Ascertainment of requirements</td>
<td>Managing teams</td>
</tr>
<tr>
<td>Changing teams</td>
<td>No reference project</td>
</tr>
<tr>
<td>Coordination meeting</td>
<td>Organisation</td>
</tr>
<tr>
<td>Dividing into sub-projects</td>
<td>Prototypes</td>
</tr>
<tr>
<td>Employees</td>
<td>Public attention</td>
</tr>
<tr>
<td>Estimates</td>
<td>Stakeholder</td>
</tr>
<tr>
<td>Identification of parties</td>
<td>Usage of digital tools</td>
</tr>
<tr>
<td>Interface</td>
<td>Waterfall</td>
</tr>
<tr>
<td>Internal processes</td>
<td>Working group</td>
</tr>
<tr>
<td>IT-System</td>
<td>Workshops</td>
</tr>
</tbody>
</table>

4.5.2 The Second Step – Categorising Main-Themes

Since the purpose behind coding is to define groups, which are on the one side meaningful but on the other side not too wide or too narrow defined, it is essential to find a good balance (Tuckett, 2005). For this reason, the authors have decided to summarise the sub-themes again into main themes to generate a full picture based on themes. These main themes are based on the underpinning literature and research question of this study but also on the generated sub-themes. This approach ensures the credibility of the findings by on the other side also ensure answering the research question (Braun & Clarke, 2006, p. 89). Consequently, the overall aim from the second step is to connect the rich and deep data with the research question.

Based on the aspects explained above the authors have defined four main themes. The allocation of the sub-themes into the main themes is visualised in Table 8.
The authors have chosen Complexity as their first main theme because it enables the understanding of the foundation process behind the creation of the scope statement and moreover, it highlights the environment the project is taking place. Therefore, it supports the understanding of the used case study.

The second main theme defined by the authors is Scope Statement, which generates an understanding of the purpose of the research. This main theme is highlighting all the aspects of the creation process of the scope statement and enables the reader to see the connection between different project management methods and the different influencing factors.

The third main theme defined by the authors is Knowledge Management. This main theme is highlighting all the aspects arising by the knowledge management process with a special focus on knowledge sharing and used techniques.

The last main theme defined by the authors is Project Challenges. The reason behind this classification was to divide the explicit challenges arising in project management, scope management and knowledge management from general aspects of this topics. Further, it highlights the risks and problems arising in the creation of the scope statement.

### 4.6 Ethical Issues and Considerations

The academic world has designed several ethical codes to ensure shared standards in collecting data among its members. Therefore, “a set of socially defined ways of doing
things in a specific domain” (Wenger et al., 2002, p. 38) was created. Moreover, national and international ethical standards were invented from several international ethic committees, like the Council of Industry and higher education, to generate a shared ethical view for the whole academic world (Bell & Bryman, 2007). This movement of creating a shared international ethical understanding among the management academics is expressed by Harris (2000, p.298) as “the globalisation of ethics.” But creating a catalogue with ethical principles is just one step, it is also important that every academic understands the ethical dimension of their work. The following Table 9 is highlighting the main categories of ethical principles identified in several ethical codes around the world.

Table 9. Ethical Principles
Source: Bell & Bryman, 2007

<table>
<thead>
<tr>
<th>Categories of Ethical Principles</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Harm of Participants</td>
<td>Ensuring that participants have a physical as well as mental wellbeing</td>
</tr>
<tr>
<td>Dignity</td>
<td>Respecting dignity of participants in order to avoid anxiety states</td>
</tr>
<tr>
<td>Informed Consent</td>
<td>Describes the right that participants get all information about the research</td>
</tr>
<tr>
<td>Confidentiality</td>
<td>Ensuring to deal with the research data sensitively</td>
</tr>
<tr>
<td>Anonymity</td>
<td>Ensuring the protection of anonymity i.e. anonymising interviews</td>
</tr>
<tr>
<td>Deception</td>
<td>Describes inappropriate behaviour through lies, which could mislead the research</td>
</tr>
<tr>
<td>Affiliation</td>
<td>Ensuring to avoid that not any party is leading the study into a specific direction</td>
</tr>
<tr>
<td>Honest and Transparency</td>
<td>Includes an open and trustworthy communication with the participants</td>
</tr>
<tr>
<td>Reciprocity</td>
<td>Describes the idea of mutual benefit</td>
</tr>
<tr>
<td>Privacy</td>
<td>Protecting the privacy of participants</td>
</tr>
<tr>
<td>Misrepresentation</td>
<td>Ensuring to avoid the creation of false reports and misunderstanding</td>
</tr>
</tbody>
</table>

Generally, the formulation of an ethical code is essential for an academic institute because it ensures that every member understands and follows the expected standard. Therefore, this study is precisely following the ethical guideline from the Umeå university. In order to cover the societal concerns, the thesis is offering a value-free place to the interviewees where they can talk freely, comfortably and anonymously about the topic of interesting without judgements. After the participants have been fully informed about the purpose of this study as well as the procedure, they have agreed to be part of this study. Further, the thesis is providing openness in relation to the case study and the authors declare the usage of the collected data is limited to the purpose of this study (USBE, 2018). As a consequence, this is creating trust between the interviewees and the authors and avoid
harming them in any way. Since confidentiality is of great importance to this thesis, the authors have protected the collected data by ensuring the anonymity, safety and privacy (O’Gorman & MacIntosh, 2015, p. 203).

By conducting the interviews, the authors ensured that all the eight interviewees felt comfortable and the dignity were respected. Further, the authors informed the participants about the content and the purpose of the thesis to ensure that all information are given to them. This leads to a honest and transparent relationship between the authors and the participants. After conducting the interviews, the authors handled the data set confidential and ensured the anonymity as well as the privacy of the participants by using pseudonyms within the thesis.
5 Empirical Findings

<table>
<thead>
<tr>
<th>Chapter overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>The chapter about empirical findings is presenting the findings, which are generated from conducted interviews. The themes are created by conducting the thematic analysis and applying it in line with the theoretical framework. The purpose of this chapter is to show the data set by summarising the content. Further, quotations are used to highlight significant statements of the interviewees within a theme. The produced outcome of this chapter is presenting the foundation for the structured analysis and discussion in the following chapter.</td>
</tr>
</tbody>
</table>

5.1 Case Study Description: eAkte

For many years, the idea of paperless administration was considered as a "mission impossible" - a project that cannot be realised. Technical boundaries, but also the daily work practice within the governmental authorities, have argued against the possibility of a completely electronic file processing. So far, clerks use files as a physical work equipment, provide them with notes and memos. Moreover, customers communicate with the Federal Labour Office almost exclusively in paper form. But in the meantime, the framework conditions have changed: thanks to the advanced digital development. The technological prerequisites have been met to establish an electronic filing system (Bundesagentur für Arbeit, 2014, p. 8).

The Federal Labour Office was the first German federal agency to act. Three and a half billion documents in the unemployment insurance and the family fund as well as 1.4 million pages of paper, which are produced daily, are reason enough to take on the role of the pioneer in the "paperless administration mission". In September 2011, the Federal Labour Office launched the project to introduce an electronic file, the so-called eAkte, which has been declared at this time as the world's largest digitalisation project. The trend towards e-government - a fully electronic administration - is as powerful as it is transnational. Being fast and time cost-effective at the same time is the goal of each governmental agency, since this ensures the efficiency and customer proximity (Bundesagentur für Arbeit, 2014, p. 9-10).

When the changeover to the electronic filing system became necessary, the Federal Labour Office was particularly interested in one thing: the new e-file should include exactly the same characteristics as the paper file. The eAkte system therefore digitally depicts the classic paper file and all the processes that are related to it. Stacked folders on desks and rows of folders on shelves are now belonging to the past. Instead, virtual mail baskets and icons in the PC provide an overview and quick access. The entire file processing runs in this electronic system - from the inbox to the filing. This requires the complete digitalisation of all documents. Forms, applications and correspondence must be scanned and accurately assigned. Due to the Federal Labour Office, this scanning process will be outsourced to the Deutsche Post AG as an external service provider. In seven regional scanning centres, the incoming documents are read in electronically, whereby the quality of the documents is constantly monitored by internal staff of the
Federal Labour Office. Subsequently, each page is assigned via a text recognition program. The scanned documents will automatically send to the corresponding case file, which is so-called ‘routing’. Accordingly, this routing of documents and files to the responsible clerk can be determined flexibly (Bundesagentur für Arbeit, 2014, p. 11). The electronic file management is made possible by a document management system, which was designed especially for the processing and archiving of files. This IT-system forms the core of the eAkte. It allows the search, creation, viewing, editing and forwarding of documents in the Federal Labour Office. Employees can scroll through the file, highlight pages, note notes, and more. This ensures that the eAkte is not significantly different in handling from the paper file. The breadth of uses is immense, and once the users have become familiar with the system, the shift from paper to pixel takes place without compromising on day-to-day business (Bundesagentur für Arbeit, 2014, p. 12-13).

Figure 11. Process of the eAkte

Rather, the new system speeds up the editing process and even increases the quality of file editing. Because of the high level of transparency, the e-file discloses all responsibilities, enables double-checks and four-eye checks, thus helping to understand, correct and avoid new mistakes. By the eAkte, the skilled workers not only gain more security in their actions, but also greater freedom in the organisation of their daily work. Therefore, the work becomes more flexible in terms of time and space. In addition to the advantages for the employees of the Federal Labour Office and the authority itself, the switch to electronic file management protects the environment by eliminating the need for paper (Bundesagentur für Arbeit, 2014, p. 16). The administrative management benefits from the openness of the electronic system because the view of workflows and processing statuses ‘in real time’ allows a much more precise control of the day-to-day business. This was apparent shortly after the start of the eAkte project: Samples of the Operative Services had shown that the paper files after completion of a case often not immediately, as actually planned, were fully digitalised immediately. With the rapid migration of all files, however, the success of the entire system change stands or falls. Thanks to the new level of transparency, the omission could be detected early on and...
quickly followed up. In the meantime, differentiated specifications, which control the proportion of files to be scanned, ensure a continuous digitalisation progress in the overall files of the individual departments (Bundesagentur für Arbeit, 2014, p. 22). With the plan to fully digitalised their file management, the Federal Labour Office has faced a Herculean task. In the largest authority in Germany 32 million customer files are processed, almost 4,000 tons of paper had to be scanned and digitized, 939 sites were switched to electronic management (Bundesagentur für Arbeit, 2014, p. 23).

The eAkte project exceed in its complexity everything that has ever been done in Germany for the modernisation of administration (Bundesagentur für Arbeit, 2014, p. 27). The complexity of this project is based on several factors and a summary of some are given in Table 10 in connection to the theory presented of IPMA Competence Baseline, Version 3.0 (IPMA, 2006), which is highlighting factors only arising in a complex project.

Table 10. Complexity factors of the project eAkte

<table>
<thead>
<tr>
<th>Complexity factors according to IPMA Competence Baseline (2006)</th>
<th>eAkte</th>
</tr>
</thead>
<tbody>
<tr>
<td>interrelated subsystems</td>
<td>✓</td>
</tr>
<tr>
<td>interrelated sub-projects</td>
<td>✓</td>
</tr>
<tr>
<td>interrelated elements</td>
<td>✓</td>
</tr>
<tr>
<td>Involvement of different units in the same organisation</td>
<td>✓</td>
</tr>
<tr>
<td>Involvement of different disciplines</td>
<td>✓</td>
</tr>
<tr>
<td>Managing several different overlapping phases and tasks</td>
<td>✓</td>
</tr>
<tr>
<td>Application of many project management methods</td>
<td>✓</td>
</tr>
<tr>
<td>Application of many project management tools</td>
<td>✓</td>
</tr>
<tr>
<td>Application of many project management techniques</td>
<td>✓</td>
</tr>
</tbody>
</table>

However, a transformation project like the eAkte is not only a challenge because of its size but rather because of the profound changes to be implemented. Work processes are changing, office environments and internal structures have to be adapted, new application techniques have to be learned and changed processes have to be practiced. This not only means a huge changeover for those who need to work with the new system – it is a massive cultural change in traditional processing. It is more important that such a ‘revolution’ is supported and promoted by the entire organisation. In order to accomplish this, all responsible persons and contributors must be involved in the project development at an early stage. This initially involves intensive coordination processes, both within the administration and with external committees and suppliers (Bundesagentur für Arbeit,
Further, within the Federal Labour Office, it was decided from the start to inform and update the employees about everything which is happening within the project eAkte. Even when some information is not yet ‘set in stone’ when communicated. This open communication has led to an acceptance of the employees, which is crucial for a transformation project such as the eAkte (Bundesagentur für Arbeit, 2014, p. 43).

5.2 Interview Findings

Within this chapter the authors present the data set conducted through eight interviews. By codifying the interviews, the authors have used the thematic analysis as explained in Chapter 4.5. Accordingly, the authors codified the interviews firstly into sub-themes and afterwards summarised them into main themes. Therefore, a strong dependency between the sub-themes and the main theme can be seen. Nonetheless, some sub-themes are overlapping, which leads to a strong interrelation between the main themes. Based on this, the main themes are presented independently of each other, but in order to generate a general understanding of the findings it is necessary to keep the relationship between main themes in mind. Especially, the main theme ‘Project Challenges’ shows a strong linkage to the other main themes. For a better understanding of the data set, the interviewees are presented again in Table 11.

<table>
<thead>
<tr>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Richard</td>
<td>Project Leader</td>
</tr>
<tr>
<td>Simon</td>
<td>Senior Manager - Consultant</td>
</tr>
<tr>
<td>Mathew</td>
<td>Senior Manager - Consultant</td>
</tr>
<tr>
<td>Jacob</td>
<td>Manager- Consultant</td>
</tr>
<tr>
<td>Benjamin</td>
<td>Senior Manager - Consultant</td>
</tr>
<tr>
<td>Finn</td>
<td>External supplier on the technical side (German Post AG)</td>
</tr>
<tr>
<td>Adam</td>
<td>External supplier on the technical side (German Post AG)</td>
</tr>
<tr>
<td>Tobias</td>
<td>Director of the Consultants</td>
</tr>
</tbody>
</table>
5.2.1 Complexity
Based on the question about how the complexity of the project eAkte can be explained, the interviewees highlighted several complexity drivers, which have to be managed during the creation of the scope statement and generally in the defining phase of the project eAkte. In general, all the interviewees shared the same view about the complexity of the project eAkte. Benjamin summarised it as: “There is an incredible complexity in this project, I never had that before to this extent.” The identified complexity drivers are presented in the following.

The first complexity driver can be defined as organisational complexity mentioned by all the interviewees except the external suppliers, Adam and Finn. Benjamin and Simon explained that the main issue of the organisational complexity is based in the variety of internal processes, which are independent from each other but need to be managed together. Furthermore, Mathew and Benjamin were highlighting the functional complexity based on the organisational structure because many specialist fields are involved and need to be managed. Since the internal work processes changed from analogue to digital, a complexity mentioned by Mathew, Jacob, Tobias and Richard was that the employees need to get used to the new processes.

The next complexity driver mentioned by all the interviewees is based in the technical complexity given in the project eAkte. Benjamin, Mathew and Richard pointed out that the complexity is based on the challenge to develop a new IT-system which needs to harmonise and to fit perfectly in the existing IT-infrastructure of the Federal Labour Office. Another perspective about the same complexity driver is given by Jacob and Simon, who mainly highlighted that interfaces are necessarily needed within an IT-project. Simon explained this as: “The complexity is higher mainly because of the coordination between the different specialised fields.” Tobias goes one step further than the others by combining both aspects and highlighted this by saying: “The new solution must harmonize with the existing IT structure and fit together, and this can only be achieved if interfaces are included.” However, the external suppliers presented another view of this complexity driver. Adam explained that the complexity for them was to provide an exclusive IT-infrastructure for the Federal Labour Office.

The last complexity driver was mentioned by Jacob, Benjamin, Tobias and Richard and can be characterised as complexity arising by public attention. Jacob explained it like: “The project has a very high level of public pressure and public perception which, of course, massively increases its complexity.” This statement is in line with Tobias, who explained that the public expectations increase the complexity and need to be managed intensively. Furthermore, Jacob and Benjamin explained that not only the expectations of the public need to be managed but also the variety of stakeholders need to be handled. Both factors increase the complexity of the project eAkte according to them.

5.2.2 Scope Statement
The question about the creation process of the scope statement brought up insights about how the process have been done in the project eAkte. Accordingly, the interviewees highlighted several aspects and influencing factors, which are decisive for creation of the scope statement. These issues are summarised in the following paragraphs.
Based on the question on how to ensure that all the necessary parties are included in the creation process of the scope statement, the interviewees mentioned different approaches. The first approach highlighted by Tobias, Jacob and Mathew is the usage of a stakeholder analysis, which has the aim to identify in the first step who is in general involved and in the second step to determine the key stakeholder. Jacob explained further: “From the key stakeholders it goes down in the criticality, so you have everyone in a boat.” Accordingly, a stakeholder analysis helps to identify internal as well as the external parties needed for the creation of the scope statement. Another approach to identify the key stakeholder is presented by Simon, who mentioned that they have used a preliminary project and a preliminary study to get an impression about which party is missing and which are the key stakeholder. For determining suitable external supplier, Richard, Mathew, Finn and Adam emphasis the usage of a market analysis to generate an overview of potential suppliers. This builds the foundation to identify one external stakeholder.

For identifying the internal parties two different approaches are presented. Jacob and Mathew state that the identification of the internal parties have been done through the organigram of the governmental agency to see which specialist fields are needed to create the scope statement. Whereas, Benjamin and Richards identified the internal parties by drawing the process of the eAkte. Richard explained their approach as following: “You basically build a customer journey. In case of the eAkte, no customer goes on the journey, but rather a piece of paper and there you can see exactly where the paper is at a certain time and which person is processing the paper, and these are exactly the persons you need to talk with.”

Adam and Finn as the external supplier, presented a new approach for identifying the needed parties. Finn explained their approach as: “We looked at the project itself and then split it up into 10 subprojects. And for these ten sub-projects we named sub-project managers who had to manage and to know their own sub-project at any time.” Accordingly, the ten sub-managers were responsible to identify the stakeholder of their sub-project, which enables an easier mapping of all the stakeholders.

By asking the question about how the change request within the project eAkte could be prevented or at least reduced, some interviewees highlighted different aspects regarding project management methodologies and their impact on change requests. In general, this aspect about the different types of project management methodology was covered by Tobias, Benjamin, Jacob and Simon, whereas Richard, Mathew, Adam and Finn did not mention this idea. Overall, all the interviewees, who stated this point agreed on the advantage of integrating agile methods within the project eAkte. Benjamin and Tobias have especially highlighted the importance of agile elements like prototyping and the agile tool Scrum to generate a common understanding between the functional and technical side. Nonetheless, Jacob and Benjamin agreed on the fact that only the usage of an agile approach would not be feasible in the context of the project eAkte. This point of view is in line with the statement done by Tobias, who stated: “In my opinion, the waterfall method is needed as the umbrella function to define and plan all the framework parameters, whereas the agile method helps to create more effective working steps internally.” Moreover, he explained that the usage of the waterfall method is needed to create milestones and to ensure a good working collaboration with the suppliers.

For the question about how the content of the scope statement was created, all the interviewees except of Simon mentioned the aspect of ascertainment of requirements as
essential for the creation of the scope statement. As explained by Mathew, Finn and Richard as a condition to generate requirements for the project eAkte the usage of a document analysis, an analysis of the needed technical and functional requirements as well as a scenario analysis is helpful. Additionally, Mathew highlighted that the scenario analysis was the basis for the make or buy decision, which in the end lead to the decision to involve an external supplier. All of the interviewees agreed that the creation process of a scope statement takes time to be precise enough. This point of view of the interviewees is summarised in a statement done by Mathew, who says: “In general you will be forced to a higher degree of precision in IT projects. Often I have to be very specific how something has to work in the end, which takes time.” Even when all the interviewees agreed that the scope statement should be precise enough, it does not necessarily mean that the degree of itemisation is completed. Richard supported that point of view by saying “You just have to accept that there is no perfect and complete description of the scope statement because it is normal to forget some details, this is especially the challenge.” This is also in line with the aspect mentioned by Benjamin, who explained that missing details pop up during the whole project life time and this is a normal process.

5.2.3 Knowledge

The questions about knowledge sharing and knowledge management have brought several insights about how the process have been done in the project eAkte, which are summarised in this main theme. By asking the question how knowledge sharing can be handled within the project in the defining phase, the interviewees mention different approaches.

One approach to share knowledge is the usage of workshops, which was mentioned by seven interviewees. According to Simon the aim by the usage of workshops was to create the requirements for the scope statement together within a team. This point of view was also supported by Tobias, Benjamin, Jacob, Adam, Finn and Richard. Tobias highlighted this shared point by stating: “We have done many workshops where we have developed the frameworks and parameters we needed to create a rough concept of requirements.” Jacob, Adam, Finn and Richard went one step further by presenting also more general insight how workshops can be beneficial for a project. They stated that workshops are helpful to share knowledge with other team members and to build up further know-how. Moreover, the approach of workshops helps to generate a shared understanding of specific knowledge since it is generated and exchanged within the group, as explained by Richard.

Another approach to share knowledge is the use of working groups, which was highlighted by the interviewees. According to Simon, Jacob and Benjamin it is useful to generate a mixed working group where external and internal knowledge can be shared in order to develop the project goal and define the further procedure. Jacob for example state: “What has proven to be successful is to get someone who may have even more experience on specific topics than yourself and who can provide inputs especially in the defining phase.” This opinion is also in line with the view of Richard and Mathew, who explained the inclusion of employees in the creation of the scope statement for generating an understanding of the working processes. According to Mathew, the main task of a working group is on the one side to conceptualise knowledge but on the other side to spread the new generated knowledge within the organisation. Further, Jacob stated that it is important that the core team is constant over the project life time because by changing
the members within the working group knowledge may get lost. The interviewees shared the opinion that working groups are beneficial for knowledge sharing but Jacob on the one side state that knowledge within the group need to be split to avoid a single point view within the whole team whereas Finn argues that splitting knowledge within big project teams reduce the value of knowledge since it is divided into little parts.

A further factor to share knowledge is the usage of appropriate digital tools like ‘Confluence’, which is pointed out by the interviewees expect from Adam, Finn and Tobias. Simon is summarizing the shared opinion by stating: “Tools to exchange information facilitates communication. How closely are people connected and how do they work together as a team, that is very important.” Moreover, the interviewees explained that to generate a shared understanding between all the team members firstly a glossary and afterwards a WIKI was implemented in the project eAkte. Besides the concept of knowledge sharing, the storage of knowledge is another important aspect mentioned by the interviewees. Mathew highlighted that through a short description of files it was possible to create a project document storage system like a SharePoint. Simon shares the same opinion of the importance of a document storage system because otherwise the risk of losing information can occur.

The last aspect in the field of knowledge, which is mentioned by all interviewees except Adam and Finn, is covering coordination meetings. To generate knowledge sharing between the different departments regular meetings so called ‘Jour-Fix’ were implemented to generate a knowledge flow. Tobias is highlighting this shared opinion by saying: “There are many facets of the project to keep in mind, therefore regular Jour-Fixes and ballot meetings need to be hold in which all the essential points have to be discussed.” Mathew added to this point of view that the knowledge exchange gets even more intensive in smaller groups. This opinion is also in line with Jacobs answer since he highlighted the importance of a right group size. Further, all interviewees agreed that within smaller groups the sharing of tacit knowledge like experiences and explicit knowledge increase. Richard highlighted that through the exchange of tacit and explicit knowledge, new knowledge can be created.

### 5.2.4 Project Challenges

Based on the question about challenges arising within the defining phase of the project eAkte, the interviewees mentioned several aspects. These aspects are mainly grounded in the topics complexity, knowledge management and scope management. However, the authors have defined this main theme as an independent one because it highlights the issues occurring by the creation process of a scope statement, which is a main component of the research question.

By asking this question the first challenge every interviewee mentioned that there was no reference project and reference knowledge available. More precisely, the issue was based on the enormous scale of the project, which was totally new up to this date. Mathew summarises this shared point of view by saying: “Such a project has never been done on this scale and therefore there was no reference knowledge, and that was exactly the challenge.” Richard in the next step explained that in general it is good being the first but under such unknown conditions it could also be difficult to manage a project because a
lot of things are uncertain and unclear. All the interviewees explained that they have used different kinds of analysis tools to overcome this gap in knowledge.

As no reference project exists, three of the interviewees explained that they have estimated certain variables, which could not be defined exactly in the defining phase. Richard, Benjamin and Mathew talked quite deeply about this issue. For example, Richard says: “Due to the fact that there is no referral project, estimates had to be assumed and decisions are made according to the instinct.” Further, Richard, Benjamin and Mathew explained that they have estimate the variables by using their own experience and empirical data. Furthermore, Benjamin also highlighted that based on the estimation of variables the definition of requirements in the scope statement was sometimes too vague. He pointed out: “The scope statement contained the biggest requirements, but after a while it turned out that certain requirements were not described detailed enough.”

Another factor pointed out by five of the interviewees is based on the complexity of the project. According to them, it was difficult to maintain an overview about the tasks based on the project scale. This factor is highlighted by Richard, who explained: “The more complex a system is, the more difficult it is to keep the overview.” Besides that, the five interviewees have different foci in their answers. Jacob and Benjamin were mostly highlighting the missing homogeneous processes as the most complicated issue to overcome because it takes time to create and implement them into the overall solution. Richard was pointing out the technical complexity of the project and the issues arising with it. According to him: “In a project with a longer duration you cannot catch up with the rapid speed of further IT-development, at least in most cases.” As a consequence, it is possible that changes regarding the IT-system may occur. For Finn and Adam as the external suppliers it was generally difficult to understand the internal processes of a governmental agency. Additionally, the biggest issue for them was to maintain the needed safety and availability requirement since they have to create an exclusive IT-infrastructure, which needs to fulfil both requirements.

A further aspect, which is stated by some of the interviewees, is dealing with the challenge of managing the team. Jacob and Simon highlights the issues arising when the project members are changing. Accordingly, Jacob highlights this by saying: “If the project team changes frequently, the view of the details is different, the networking changes and priorities are set differently.” Further, it is critical when the team members are changing because knowledge get lost and the communication between the members may be disturbed. Another challenging factor of the communication process between the different parties was given by Benjamin. He stated that communication only based on regular meetings is leading to less ad hoc communication, which is needed to clarify issues.

The last challenge mentioned by the interviewees is based on the communication within the interfaces of the project eAkte. All the interviewees except Mathew spoke about the challenge and also the importance that the interfaces are well communicating. John summarised the shared opinion by stating: “The main challenge is this translation performance: What does the specialist field want to be done and to transfer this into a technical language that the developer knows what to developed.” Tobias supported this point of view by highlighting: “What is important here is that you carry a functional and technical target on an ongoing and cross-border basis in order to have a common understanding of what someone is talking about.” Benjamin pointed out that a regular face-to-face communication is as important as sharing information via a digital platform.
Another view is presented by Richard, who explained that it is enough that only the interface is communicating in an adequate manner since a project as the eAkte is complex and broad that the employees of each side should be involved in the communication.

5.3 Overview of the Findings

Since many different findings are presented, Table 12 gives an overview about the most relevant ones. The theme complexity gives an overview about different complexity drivers, emphasised through the findings. Further, the theme scope statement includes several essential aspects about its creation process. The findings of the theme knowledge show possible meeting formats within a complex digitalisation project in order to define a precise scope statement. The findings of the last theme project challenges are presenting the main challenges arising in the complex project eAkte.

Table 12. Summary of the Findings

<table>
<thead>
<tr>
<th>Themes</th>
<th>Summary</th>
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<tbody>
<tr>
<td>Complexity</td>
<td>• Organisational complexity is based on the variety of internal processes and on many specialist fields</td>
</tr>
<tr>
<td></td>
<td>• Technical complexity is based on the need to harmonise the existing IT-infrastructure with the new developed one</td>
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<tr>
<td></td>
<td>• Complexity is arising by public attention</td>
</tr>
<tr>
<td>Scope Statement</td>
<td>• To ensure that all needed parties are included stakeholder analysis, analysis of the organigram or customer journey can be used</td>
</tr>
<tr>
<td></td>
<td>• Importance of agile elements are presented</td>
</tr>
<tr>
<td></td>
<td>• Ascertainment of requirements can be done through different analysis tools</td>
</tr>
<tr>
<td></td>
<td>• Scope statement takes time to be precise enough</td>
</tr>
<tr>
<td>Knowledge</td>
<td>• Knowledge sharing can be done through workshops, working groups and usage of digital tools</td>
</tr>
<tr>
<td></td>
<td>• Coordination meetings are implemented to generate a knowledge stream</td>
</tr>
<tr>
<td>Project Challenges</td>
<td>• No reference project available</td>
</tr>
<tr>
<td></td>
<td>• Difficult to estimate uncertain variables</td>
</tr>
<tr>
<td></td>
<td>• Difficult to maintain an overview about the tasks based on the project scale</td>
</tr>
<tr>
<td></td>
<td>• Challenge when the project team members are changing</td>
</tr>
<tr>
<td></td>
<td>• Communication within the interfaces of the project</td>
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</table>
6 Analysis and Discussion

<table>
<thead>
<tr>
<th>Chapter overview</th>
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<tbody>
<tr>
<td>The purpose of this chapter is to analyse the empirical findings and to connect them with the theoretical framework of the thesis. Furthermore, the empirical findings are presented and discussed in context with the research question. The defined main themes are analysed regarding their impact on the scope statement.</td>
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6.1 Structural Complexity

According to the findings the interviewees have mentioned that the complexity has been very high based on several complexity drivers. Further, these complexity drivers needed to be managed and controlled actively in different ways. This is in line with the theory invented by Baccarini (1996, p. 203), who explained that complexity within a project needs to be coordinated, communicated and controlled. Based on the data set, the impression is raised that the interviewees have handled the complexity within the project eAkte well because they identified a variety of complexity drivers, which can be found in the literature. This impression is generated through the fact that the communication within this identification process of complexity was well established within the project team, but besides the communication, no other tools or techniques were mentioned to control the complexity. Therefore, the data set is perhaps too weak to build a full picture of the identification and control process of complexity.

Furthermore, the complexity drivers identified by the interviewees are all located in the term of ‘structural complexity’, which is part of the model of complexity invented by William (1999, p. 269). According to Williams’ (1999, p. 269) model, a project becomes complex if advanced technology is used, the functionality increases or a higher inter-connectivity between the single elements is created. This is in line with the data set since the interviewees explained the complexity of the project eAkte is mainly based on technical and organisational complexity drivers, which are all characterised by a high inter-connectivity between each other. In contrast to the theory, uncertainty as one pillar of Williams’ (1999, p. 270-271) model is not covered by the data set. The interviewees have not mentioned any complexity drivers arising based on uncertainty rather their main focus is on structural complexity. This can be explained because neither the goal nor a general uncertainty was given within the project of eAkte. The goal was clearly communicated at the beginning and the general framework parameters were prescribed. However, even if the component of uncertainty is not given, based on the main findings of the interviews, it is undisputed that the project eAkte is a complex one.

As described in the theory, Maylor et al. (2008, p. 18-19) presented a way of investigating structural complexity by implementing the MODEST model. On the basis of the interview findings, some elements of the MODEST model are identified and will be further described. The variety of internal processes can be seen as part of the element ‘organization’ because it represents the organisational setting of the Federal Labour Office. According to the data set, the complexity is grounded in the challenge to interlink and harmonise the variety of internal processes due to the big size of the Federal Labour
Office. The underpinning problem was that internal processes have been mainly based on analogue working routines of employees without implementing a homogeneous framework. Therefore, an analysis of the existing internal processes has been done in order to show similarities and differences between the single processes. This analysis is essential for the creation of the scope statement since it offers the underpinning understanding of the needed features and process elements of the project eAkte. This whole process of identifying and creating the requirements for the scope statement would have been easier if a reference project existed since an already proofed approach could help to identify and manage critical factors.

The shift from a high variety of internal processes to a standardised digital process leads to another complexity driver, which can also be linked to the element ‘organisation’ of the MODeST model. The main complexity thereby has been to explain the new process to a huge number of employees and how they use the new implemented system, since the functioning of the employees had strongly changed. To handle this kind of complexity within a project, it is essential to perform the changing process as early as possible to prevent resistance from the employees against the new working routine.

The complexity driver technical complexity can be linked to the element ‘delivery’ of the MODeST model since it is covering the characteristics of the deliverable of the project eAkte (Maylor et al., 2008, p. 21). The complexity thereby is to integrate the newly developed system into the existing IT-infrastructure since it interferes deeply in the functioning. Therefore, the complexity is conditioned in identifying, managing and controlling all the needed partial aspects arising by the interlinkage between the existing IT-infrastructure and the new developed IT-system. Due to the fact that both need to harmonise, it is essential to be precise in analysing the prescribed requirements for the new developed IT-system. Consequently, if the prescribed requirements are not detailed enough the harmonisation process between the existing IT-infrastructure and the new developed IT-system will fail and lead to a dysfunction or delay. If this occurs, all the citizens would be affected negatively, since the work processes would not operate properly. For this reason, the public as one external stakeholder has a major interest and expectations on the project. Accordingly, the expectations and interest need to be managed and coordinated within the project team, which is in line with the key message of the MODeST model element ‘stakeholder’ (Maylor et al., 2008, p. 23).

Based on the high complexity regarding the technical as well as the functional side of the project eAkte, sometimes it can be difficult to maintain an overview about all the needed tasks within the project. This point of view is presented in the data set and represents one big challenge in such a complex project as the eAkte. To overcome or to handle this challenge it is essential to plan detailed the single phases of the project, to set milestones and to integrate a coordination role like a project management office, who is maintaining the overview.

By analysing the data set, it is obvious that not all aspects mentioned in the theory are applied. One explanation for that is that not all aspects are perceived because the interviewees as they may focus more on the structural dimension rather than on the dynamic dimension. Another explanation for the missing elements of the MODeSt model by Maylor et al. (2008, p. 23) is that the structural complexity of the project eAkte does not exist in the prescribed elements mentioned in the theory, or the interviewees have not perceived them.
The analysis of the findings shows that it is essential to identify the complexity drivers by using fitting analysis techniques. Generally, it can be said that the more complexity drivers that can be identified, the more complex the project is. Therefore, it is necessary to manage and control these complexity drivers in order to finish a project successfully. Further, by identifying the complexity drivers the basic conditions for the project are created and determined, which helps to understand the project environment in a more precise way. This approach is especially important in the defining phase of a project because it helps to generate a more careful and thoughtful strategy for the creation process of the scope statement.

6.2 Identification of Parties to create the Scope Statement

As explained in the previous chapter aspects about including the needed parties, using different project management methods and ascertaining the requirements are explained by the interviewees. Moreover, the interviewees agreed that these aspects are highly important since they are necessary to create a precise scope statement. This is in line with the theory, since the management of the scope is seen as one of the essential responsibilities within a project and therefore requires highest attention (Khan, 2006; Al-Rubaiei et al., 2018; Khan, 2010).

Regarding the focus of this thesis, not all the phases included in the project scope management are presented in the analysis. The main focus is on the second and third phase of the concept where the ‘planning’ and the ‘definition’ of the scope is covered. Within the planning phase of project scope management rough defined requirements are created with the focus to generate a shared understanding of the project framework. The outcomes of this phase are building the basis for the definition phase of the project scope management, where the previous roughly defined requirements become even more precise (Kahn, 2006, p. 13-14). The aim of the definition phase is to generate a scope statement (Shrivastava & Hariharan, 2015).

As explained by Ward (1995) a common understanding of the project scope among the involved parties is of the highest importance. This theoretical point of view is in line with the empirical data set, but the statements of the interviewees go even one step further by highlighting the importance of including different parties in the creation process of the scope statement. The first step in the creation process of the project eAkte have been a stakeholder analysis where the internal and external, as well as the key stakeholders, have been identified. The identification of the external stakeholder is especially important, because it represents the external view of the project which needs to be integrated in the creation process of a scope statement (Maylor, 2010, p. 38). This is in line with the empirical data set since the interviewees mentioned that managing the public as one external key stakeholder have been done carefully not only in the defining phase rather than throughout the whole project life cycle. Moreover, all requirements and specifications of the product need to be defined in close cooperation with the stakeholders. It is essential for preventing future issues to define these specifications and requirements clear, significant and complete (Usmani, 2018; Janiendarkumar, 2015; Mirza et al. 2013). Based on the empirical findings, as well as on the theory, it can be said that a stakeholder analysis is essential for the creation of the scope statement because the opinion of the key stakeholder may influence the requirements. Without a prior
stakeholder analysis changes regarding requirements can occur in a further step of the project.

For creating the requirements for the scope statement it has been essential to include the employees of the Federal Labour Office in order to get a deep underpinning understanding of their working routines. As McElory (2003) mentioned, by interpreting influences and different perspectives in an employee’s environment, it can help to precise a scope statement, which may be decisive if the project is successful or not. Baldry (1998, p. 35-36) shared the same view by mentioning that it is normal to include internal employees to enlarge the needed expertise in the planning process of the scope statement. Within the project eAkte the different perspectives of the employee’s environment have been shared through interviews. First, the post office employees of the Federal Labour Office were asked to describe their daily routine in detail. After that, the individual descriptions were merged to generate a consistent description of the analogue mailing route. Then the clerks were also interviewed to describe their daily routine and these descriptions were also summarised in a uniform description. These descriptions ultimately led to a detailed understanding of the analogue process and built the basis which aspects are essential for developing the digital process. Based on this approach the main aspects are identified, which are needed to ensure the same standard for the digital process as the analogue process had. Moreover, by including the employees a shared understanding about the working routines but also about the new digital process is created, which lead to more commitment. By including employees into the creation process of the scope statement a strong connection to the practical routines is given, which minimize a lack of information and increases the value of the defined requirements.

As explained in the technical complexity driver, the main complexity within the project eAkte has been to ensure the harmonisation between the new developed IT-system and the existing IT-infrastructure of the federal labour agency. Therefore, the next step was to include the IT department of the Federal Labour Office into the creation process of the scope statement. This was seen as valuable since an understanding of the required technical framework was imparted. This approach is also supported by the literature where the importance of analysing the existing technical infrastructure and utilities is highlighted as a condition to ensure technical feasibility (Khan, 2006, p. 13). As a result, it is possible to plan the technical framework for the project eAkte.

After completing these three aspects mentioned above, the planning phase of the project scope management of the project eAkte is completed and the generated outcomes are further developed in the following definition phase of the project scope management. The shift between the planning phase into the definition phase is done through including the external supplier into the creation process of the requirements for the scope statement. By including the external supplier in the definition phase, new expertise is brought into the creation process of the scope statement. During several meetings between the project team and the external supplier, the requirements for the project have been defined quite precisely. Consequently, many issues are prevented in advance based on this high level of detail.

Another aspect in ascertaining the requirements seems to also have a big impact on the creation process of the scope statement, according to the empirical data set. One essential point within this aspect is that enough time needs to be scheduled to create the scope statement. That is necessary because it is time consuming till a shared understanding of
the project goal, scope and framework is created among the included parties, which is crucial for the scope statement. Therefore, from the beginning on a realistic time specification for the definition of the scope statement must be set, otherwise the scope statement might be incomplete or shows significant gaps. Furthermore, it essential to understand the difference between the degree of detail and the degree of precision. For the scope statement it is necessary to be as precise as possible to ensure that all needed requirements as well as the required frameworks are included and feasible. However, the degree of detail can only be done to a certain point since some details will not be foreseen. According to the data set, it is normal to have some missing details within the scope statement as long as the requirements are described precise enough.

6.3 Agile and Waterfall Elements in the Project eAkte

Another aspect regarding the creation process of the scope statement is covering different project management methods. As explained in the previous chapters the project eAkte has been planned according to the traditional management method. Accordingly, by using the waterfall approach a systematic denomination into the phases of project life cycle was done. The aim was to generate a structured approach for handling such a major project based on the scale as well as the variety of included parties. Therefore, not only the project itself have been broken into phases but also the phases further have been split into clearly defined tasks, which enables the definition of the requirements for each task to be more detailed. This is in line with the theoretical point of view, which stated that the waterfall method is used for managing a major project a certain formality is needed in order to structure requirements clearly (Cadle & Yeates, 2008; Fitsilis, 2008). Further, the advantage of using the approach of the waterfall model is that all the framework parameters can be defined and planned. One example of that is that milestones can be set, which are essential in such a complex project as the eAkte. Moreover, this structural approach ensures a clear coordination between the external supplier and the project team. Furthermore, by breaking down the whole project into phases and tasks it is possible to see the progress and to track the resources more easily. This assumption is supported by Cadle & Yeates (2008), who highlighted the benefits of the waterfall model as the ability to increase quality management by confirming and auditability of project processes.

Nonetheless, the empirical findings as well as the theory (Thomsett, 2002, p.137; Collyer & Warren, 2009) agreed that the sole usage of the waterfall model is not leading to an effective workflow, therefore some agile elements were implemented in the project eAkte to prevent this issue. The usage of agile elements on one side helps to facilitate the communication between the functional and technical side because the agile method enables that the included project members have frequently meetings. Thus, the advantage of this approach is that the project members have the possibility to communicate regularly to each other and further eliminate discrepancies, which leads to a better cooperation within the project. This is supported by the theory, which highlights that continuous cooperation between all project participants is an essential feature of agile project management to achieve an optimal understanding of business and technical requirements for subsequent iterations (Cadle & Yeates, 2008). Moreover, through the regular conversations a better knowledge exchange occurs between the included parties, which leads to more detailed requirements, and consequently, to a more precise scope statement. This view is generally supported by the theory of Griffiths (2007) but he goes one step
further and explains that also the contextual environment is taken into consideration by creating the requirements together with the whole project team. However, even when the interviewees have not explicitly mentioned that they have taken the contextual environment into consideration, on the basis of the data set it is obvious that the contextual environment had an underlying impact on the creation of the scope statement.

On the other hand, the method of agile management helps to create more effective working steps because the planning is more flexible. Moreover, based on the variety of short planning intervals a learning effect is created, which increase the overall quality and performance of the project. Another agile element used in the project eAkte to be more effective have been the utilisation of prototypes. The idea behind this is to reveal discrepancies of the new developed process, with the aim to improve the process in order to minimize posterior change requests. The usage of prototypes helps to visualising the new developed process, which generates an overall and shared understanding between the different involved parties.

In general, there is no right or wrong in choosing one of the two project management methodologies, which is also supported by the theory and the empirical findings. It depends on the underlying focus and the project itself which type of project management methodology fits better (Frey, 2009) since both methodologies offer different advantages. Therefore, a mixture between both methods seems suitable for a complex project because it creates perfect balance, rigid and flexible elements. The rigid elements based on the waterfall method is needed to create a structural approach for planning the project and to define framework parameters, like milestones or fundamental requirements. On the other side the flexible elements based on the agile method are increasing the communication between the included parties and creates a shared understanding of the project goal, scope and framework among the parties. Further, a mixture of both methods is supporting the handling of the interfaces because the waterfall model approach helps to identify the needed interfaces whereas the agile approach supports the communication between them. Therefore, a mixed method is necessary since the communication and collaboration of interfaces can be challenging. Accordingly, it is essential to include, manage and support the interfaces, especially within a complex digitalisation project as the eAkte because it ensures the coordination and cooperation between the functional and technical side of the project. As a consequence, by implementing both methods, the creation process of the scope statement is gaining an added value since the requirements can be defined more precisely based on the higher degree of used information.

### 6.4 From Knowledge Sharing to Knowledge Storing

The theory as well as the empirical data set mentioned the importance of knowledge sharing within a project, since a lack of knowledge sharing may lead to a degree of uncertainty (Pavlak, 2004; Hällgren & Maaninen-Olsson, 2005). In general, knowledge sharing is important within a digitalisation project such as the eAkte because the project team as a whole is split into a functional and a technical side. As a result, challenges could be that understanding issues and communication boundaries between the two parties occur, since the functional and the technical sides have different ways of thinking. To overcome these issues, it is necessary to create a comprehension of the working tasks from individual parties. Therefore, the overarching goal is to create a common
understanding of the project among the parties. Furthermore, communication and trust are building the fundament of effective knowledge sharing. If a trustworthy environment does not exist, project team members are not willing to share their knowledge with others (Ma et al., 2008, p. 100). Therefore, it is the responsibility of the project leader to create a trustworthy environment where every team member feels comfortable to communicate their knowledge in order to ensure that knowledge sharing is conducted. As highlighted by the data set both aspects are needed to shift from the ‘I-perspective’ to the ‘We-perspective’ within the project. As soon as the ‘We-perspective’ exists, a trustworthy basis and a commitment to the team is generated. Thus, this perspective shift helps to finish a project successfully by moving knowledge from an individual level to a team level (Ma et al., 2008; Mueller, 2015).

As a condition for a trustworthy environment it is also important that the project team members are not continually changing over time. Otherwise established knowledge gets lost and the trustworthy environment needs to be build up again, which lead to decreased working efficiency. Generally, this approach is necessary within the whole project life cycle, but especially in the defining phase since this phase is essential for creating a precise scope statement where all the needed information as well as needed knowledge needs to be included.

Further, to generate trust and shared understanding, face-to-face meetings are important (Annadathe, 2012, p. 3). As explained by the interviewees, two types of face-to-face meetings have been conducted within the project eAkte. The first type of face-to-face meetings have been workshops and workgroups. The aim of these meetings is to develop topics within a group, where every member can include their ideas, knowledge and experience. Especially the sharing of experiences is important, since it generates an exchange of tacit knowledge, which is normally hard to share. Grant (1996, p. 111) goes one step further by saying that the sharing of tacit knowledge takes more time, but it is necessary for a project to run successfully. As mentioned in the previous chapters for defining the requirements precisely it is essential to refer to a variety of knowledge presented by different people. Therefore, using workshops and working groups is one approach to generate requirements for the scope statement. Within such face-to-face meetings the functional and technical side should be included to obtain a wider view. Further, it is essential that technical terms as well as functional abbreviations are avoided during the meetings to generate a homogeneous communication flow. However, technical terms cannot always be avoided and to prevent confusion it can help to use metaphors as well as other imagery. The second type of face-to-face meetings are coordination meetings or so-called ‘Jour-Fix’ according to the data set. The aim of coordination meetings is to discuss certain topics regarding the project but also to exchange and transfer knowledge through the participants. As a consequence, all the participants are on the same level of information and a permanent flow of knowledge is created. For a successful project, both types of face-to-face meetings are necessary in order to share and transfer knowledge.

Beside the face-to-face communication it is useful to have alternative digital tools included in the project. Especially when several parties are involved in the creation of the scope statement, a digital communication tool, where real-time conversations are possible, seems to be essential. Such a digital communication tool is supporting the needed flow of communication as well as the flow of knowledge within the project team. However, not only knowledge sharing but also the holding of knowledge as it is called in
the knowledge management life cycle by Wiig (1993, p. 59) is important since this built the basis for a knowledge architecture within a project. Thus, by implementing reference material like a WIKI, all the project members have the possibility to look up terms or information. Therefore, it builds the basis for a shared knowledge among the project team members. Further, by implementing a knowledge archive all needed documents and concepts for writing a final project report are already stored. In general, after finishing a project it is useful to summarise the occurred challenges, issues and problems in order to generate lessons learned of the closed project. These lessons can support subsequent projects as well as increase the learning curve for the project team members since they have a document for their own reflection. Further, it is important to create a final project report because otherwise the knowledge get lost at the end of a project, which is a serious problem according to Liu & Liu (2008, p. 425).

To conclude, it does not matter if it is a digitalisation project or not, it is essential for every project to implement an effective knowledge management. Knowledge management builds the basis for a successful project and due to that not only knowledge sharing should be taken into consideration - also the other steps of the knowledge management life cycle are important. Without the overall view of the steps of the knowledge management life cycle, knowledge and the learning effect would get lost at the end of a project. That would be disastrous because this knowledge is needed for subsequent projects to assist in defining their scope statements.

6.5 Support of Knowledge Sharing to precise the Scope Statement

As written previously, to generate a full picture of a complex digitalisation project, it is necessary to have a deeper look at the connection between the themes. Therefore, this section will present the relationship between the single topic’s complexity, scope management and knowledge management. These insights provide a deeper understanding of the research question and the underlying meaning of this study.

The first main finding for specifying the scope statement properly is to identify the necessary parties, which is the responsibility of the project leader. That can be done by the usage of different tools and analysis methods, which differ in the identification of internal and external parties. For the identification of the external parties, who need to be included in the creation process of the scope statement, the usage of a stakeholder analysis is suitable (Maylor, 2010, p. 38). On the other side, for identifying the internal parties it is advisable to have a deeper look at the companies’ organigram in order to see which departments are involved by implementing the new process. It is crucial to include the head of the department as well as the employees. Inclusion of the affected employees are essential for the creation process of the scope statement because they have the needed know-how of the functional requirements since it is their daily working environment and routine. By applying this procedure, it becomes obvious in what way knowledge sharing supports the creation process of the scope statement, since the knowledge from the employees is shared with the project team who determines the functional requirements. The same process is needed for the technical side to ensure that all requirements are gathered in order to precise the scope statement.
To generate this knowledge, it is essential to create a trustworthy working environment where everyone feels comfortable and supported to share their knowledge as well as their expertise. To be more specific, if a trustworthy environment exists, project team members are less hesitant to share their knowledge (Ma et al., 2008, p. 100). Therefore, the creation of a trustworthy environment can be seen as the second main finding to precise the scope statement. It is necessary to create such a trustworthy environment as soon as possible in order to ensure the ‘We-perspective’ within the team before starting the creation process of the scope statement. Since the overall basis of the whole project is set within the defining phase of a project, knowledge sharing should play an essential role. Due to the fact that all parties are involved, it is possible to evoke different points of view and different kinds of knowledge within the project, which helps all involved to understand the requirements of the project thereby enabling the formation of a more precise scope statement. Since this approach is the basis for the whole project and many different people are involved, it is important to take enough time into consideration otherwise knowledge gaps may occur, which could result in an insufficient scope statement.

The third main finding is not only generating a trustworthy environment through face-to-face communication but also supporting the knowledge sharing process. Through workshops and working groups it is possible to enable the project team members to interact intensively with each other and to share their knowledge, expertise and experience. By using such meeting formats, it enables the project team to create more detailed and precise requirements, which leads automatically to a more precise scope statement. On the other side coordination meetings on a management level enable to share knowledge for generating a common understanding in order to precise the scope statement. Besides the face-to-face communication, the usage of digital tools can increase the communication process, which leads to a better stream of knowledge. Digital tools like ‘Confluence’ are creating a real time communication and knowledge exchange among the project team members, which accelerate and support the project team interactions. Since complex digitalisation projects normally include interfaces between the single parties (e.g. between functional and technical side), fluent communication is essential to keep the single interfaces up to date but also to avoid misunderstandings in order to precise the scope statement. Even when complex projects follow the method of traditional project management, it is essential also to integrate agile elements because they are supporting the stream of communication and knowledge, which leads to a more precise scope statement.

The fourth main finding can be explained as, whenever a reference project can be found it is useful to take the lessons learned into consideration in order to learn from previous mistakes. Moreover, it may help to precise the scope statement because risk factors are easier to identify based on the stored knowledge from the reference project. Therefore, it is important to create a final project report at the end of each project to share the gained experience and knowledge with future projects.


7 Conclusion

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<th>Chapter overview</th>
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<td>The purpose of this final chapter is to present the answer of the research question. Further, theoretical, managerial and social implications are presented, which are based on the generated outcome of this study. Moreover, truth criteria regarding the thesis, limitations as well as future research are shown to ensure the quality of the study.</td>
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7.1 General Conclusion

The thesis aimed to explore the sensitive usage of knowledge sharing in order to precise the scope statement within the defining phase of a complex digitalisation project. More precisely, the authors wanted to investigate how knowledge sharing and project management can be interlinked to create a precise scope statement for a complex digitalisation project. In order to generate empirical data, a single case study of the project eAkte and eight interviews were conducted to answer the research question:

*How can knowledge sharing support the defining phase of a complex digitalisation project to precise the scope statement?*

Based on the findings and the subsequent analysis, four main findings can be made to answer the research question. Firstly, it is essential to identify and include all necessary parties who are directly and indirectly affected by the new developed processes. This can be done by applying a stakeholder analysis or having a deeper look at the organisations organigram. As a consequence, all necessary knowledge is available within the project to understand the underlying project framework and to create a precise scope statement.

As a second main finding explains that it is crucial to build a trustworthy environment where the project team members are less hesitant to share their knowledge. By establishing an effective knowledge sharing process throughout the project team members, knowledge gaps regarding the necessary requirements can be prevented or at least minimised. Consequently, this approach has a positive impact on the precision of the scope statement in the defining phase because all the needed expertise is included.

The third main finding is based on the usage of different communication formats in order to generate a well-established knowledge sharing. By integrating face-to-face meetings like workshops or working groups, an intense interaction among the project team members is created, which actively supports the stream of knowledge as well as the stream of communication. Face-to-face meetings are useful to create a common understanding of the project scope which actively lead to a trustworthy environment and to a precise scope statement. Further, the usage of digital communication tools like ‘Confluence’ supports knowledge sharing within the project team since permanent real-time communication is implemented. Moreover, such digital tools and face-to-face meetings simplify the communication between the integrated interfaces (e.g. between functional and technical side) in a complex digitalisation project by establishing a regular stream of communication and knowledge sharing between them. Such coordination
meetings between the interfaces are very important, since the requirements for the scope statement are determined from a functional as well as from the technical side. Consequently, the mutual expertise is included in the requirements, which leads to a more price scope statement.

The fourth main finding outlines the relevance of a reference project for defining a scope statement. By using prior lessons learned from reference project issues, risk factors and critical points can be minimised since these critical factors can be identified earlier. Further, the shared knowledge from a reference project may help to understand the project environment better, which lead to a more precise scope statement. To conclude, all four statements present different aspects of knowledge sharing, which are essential in a complex digitalisation project to precise the scope statement.

7.2 Research Implications

This section presents an overview of the implications generated within the thesis. Accordingly, implications regarding theoretical, managerial and social aspects are highlighted in order to underline the relevance of the elaborated findings.

7.2.1 Scientific Implications

Based on the findings of the thesis, several theoretical implication regarding the main topics are generated. In general, an overall contribution is done within the under-researched field of digitalisation projects within the public sector by presenting the findings of the project eAkte.

The first theoretical implication of this thesis is generated by combining the theory fields mentioned within the thesis. By including the theory of knowledge management and especially knowledge sharing to the theories of project management and scope management, totally new insight and theoretical contributions are created regarding the creation process of the scope statement. Due to the fact that many scope statements are weak defined (Dumont et al., 1997, p. 54) the thesis contributes an added-value to overcome this issue. Therefore, to create a precise scope statement the interlinkage and the consideration of the relationship between the different theories is necessary in order to generate a full picture. As a result, the interlinkage of the theories is the main theoretical implication provided by this thesis.

The second theoretical implication the thesis can provide is complexity. The researched project eAkte is a good example of a project with a high structural complexity. Therefore, it supports not only the concept invented by Williams (1999) about structural complexity, but also the MODeST framework invented by Maylor et al. (2008) since elements of the framework are identified within the eAkte project. For this reason, the findings of the thesis show the applicability of the theoretical concepts and adds value regarding the importance of their usage.

The third theoretical contribution the thesis shows is the mixture from traditional project management and agile project management. Therefore, this study is supporting the idea by Frye (2009), who stated that both methods can benefit from each other by mixing them.
The findings highlight the importance of the interaction between traditional project management elements and agile elements within the creation process of the scope statement. By applying a mixed method new insights are presented, which are valuable for the theory.

The fourth theoretical implication the thesis shows is based on scope management. The mere fact that research is done in the field of scope management provides a contribution since, research mentioned how little achievements have been on in this field and highlighted the importance of it (Mirza et al., 2013, p. 722; Al-Rubaiei et al., 2018, p. 1). The findings support the theory of the scope planning and scope definition phase of project scope management and further, highlight important issues and approaches within these phases. For this reason, this thesis is contributing some new insights for both phases generated from the creation process of the scope statement of the project eAkte.

7.2.2 Managerial Implications

Not only theoretical implications can be shown, the thesis provides also some managerial implications. One important managerial implication is that the generated findings can be applied and used for future projects with the same framework parameters. To be more specific, a forthcoming project can adapt the findings if it is a complex project in the public sector with the aim to implement a digitalisation process like electronic files. Further, critical factors are highlighted within the thesis, which can help future projects to prevent the same mistakes.

Another managerial implication is that the findings of the thesis indicates that the project manager has to take into consideration to build a trustworthy environment and regular project team meetings, like workshops and working groups to support knowledge sharing within a project. That is important because knowledge sharing is the indicator if a project will be finished successfully or not. Moreover, the managerial implications throughout the thesis show which meeting format can be used in order to generate an optimal stream of knowledge between all involved parties. Further, the thesis presents tools, like stakeholder analyse to identify the necessary parties, which is beneficial for other future projects.

7.2.3 Social Implications

The first social implication this thesis can provide is based on the finding of using a reference project. Based on the lessons learned from reference projects future project have the opportunity to learn from previous mistakes and minimise the risk to fail. Since many governmental agencies throughout the world are faced with digital changes, the experience gained from complex digitalisation projects can be seen as very valuable. Therefore, it is essential that the final project report is written carefully, understandable and complete in order to share it among other governmental agencies to prevent previous mistakes. This has an impact not only on the public sector but also on the society itself since it ensures a contemporary governmental agency with modernised and well working settlement processes.

All the findings are leading to the opinion that it is possible to run future projects successfully based on the precision of the scope statement. Consequently, another social
implication is that future complex digitalisation projects within the public sector are less tend to run over budget or time. This leads to a better allocation of tax money because the budget can be planned accurate.

7.3 Truth Criteria
To evaluate the value a study is contributing to the research field, the approach of quality criteria can be considered. In general, quality criteria are also named as truth criteria (Agostinho, 2005). Many academics are defining quality criteria for generating a shared understanding and view on the expected quality of a research. Since the quality criteria are differentiating between the qualitative and quantitative approach, it is essential to evaluate studies regarding their chosen approach rather than to universalise the evaluation (Agostinho, 2005; Lincoln & Guba, 1985). Bryman & Bell (2011, p. 395) highlight four quality criteria for a qualitative study: credibility, transferability, dependability and confirmability.

Credibility
Bryman & Bell (2011, p. 396) declare the purpose of criterion credibility as the “establishment of the credibility of findings entails both ensuring that research is carried out according to the canons of good practice and submitting research findings to the members of the social world who were studied for confirmation that the investigator has correctly understood that social world.” According to this definition, the authors have sent the interview transcriptions to the interviewees to review them. The aim of this procedure is to avoid misinterpretations, misunderstandings and mishearing by transcribing the interviews. Consequently, a validation of the transcripts is done from the interviewers as well as the interviewees. This ensures the credibility of the study and generates a transparent handling of the collected data. This approach is in line with the aim of the quality criterion credibility as explained by Bryman and Bell (2011, p. 396).

Transferability
“As qualitative research typically entails the intensive study of a small group, or of individuals sharing certain characteristics (that is, depth rather than the breadth that is a preoccupation in quantitative research), qualitative findings tend to be orientated to the contextual uniqueness and significance of the aspect of the social world being studied” (Bryman & Bell, 2011, p. 398). The empirical issue arising from this, is that the findings are never repeatable and therefore, also not generalizable (Lincoln & Guba, 1985, p. 316) because they are dependent on the social environment. For this reason, it is essential to offer ‘thick descriptions’ as devised by Geertz (1973), which ensure a deep and full description of the individuals, the social environment, the cultural impact as well as the time. To ensure transferability within this thesis, the authors are presenting deep information of the case study, the interviewees, the location and the data collection process with the aim to create a comprehensible understanding. Generally, the findings can be transferred to forthcoming projects with the same parameters (complex, digitalisation, public sector) and for organisations, which are generally interested in the usage of knowledge within a project.
Dependability

“As a parallel to reliability in quantitative research, Guba and Lincoln propose the idea of dependability and argue that, to establish the merit of research in terms of this criterion of trustworthiness, researchers should adopt an ‘auditing’ approach” (Bryman & Bell, 2011, p. 398). Accordingly, the authors present a full description of all steps within the methodology part of thesis, like the development of the research guide and selection of the samplings. Being as descriptive as possible ensures that other researchers understand the context of this thesis and this will ground the foundation for reviewing our findings. For this reason, an overall description of the case study is given to ensure that every reader understand the context of the study. This will enable other researchers to evaluate this study regarding its trustworthiness. Furthermore, offering detailed descriptions as much as needed to fully understand this qualitative approach will improve the quality of the study, which is in line with the assumption drawn by Bryman and Bell (2011, p. 398).

Confirmability

In general, it is essential for a researcher to maintain an objective view on his or her own study and “not overtly allowed personal values or theoretical inclinations manifestly to sway the conduct of the research and findings deriving from it” (Bryman & Bell, 2011, p. 398). Nonetheless, it is almost impossible for a human to be fully objective and therefore, also a researcher is not fully objective regarding the conducted research. More precisely, every researcher affects the study in some way with his or her philosophical stances. For this reason, the authors have detailed their pre-understanding and philosophical stances to ensure an overall transparency and to create a comprehensible way of understanding the interpretations done by the authors when analysing the data. In this way the authors show their good faith when conducting this study, which is in line with the point of view of Bryman and Bell (2015, p. 403).

7.4 Limitations

Even though complexity has an important impact on the thesis, some limitations regarding this topic are shown. Within this thesis the topic complexity is used to generate an understanding of the project context rather than to highlight other issues arising with complexity. Therefore, a weak picture is given on the identification and control process of complexity. Another limitation regarding the context of the thesis can be find in the knowledge management life cycle, since only the stages sharing and storing are covered within this study. Further, a limitation is shown regarding the context of the case study, since it is only presenting the perspective, routines and mind-sets of the public sector.

Within this thesis some other limitations are shown regarding the research methodology and the sampling. The interview partners participated were chosen deliberately in order to get an answers with a significant contribution to answer the research question. However, as written in the chapters above, the project eAkte is a very big and complex project and therefore, the limited numbers of interviews may not give full insight into the whole project. Due to the lack of time and access, only eight interviews were conducted.

Another limitation is shown by the chosen research methodology and further in the data analysis, because the chosen methodology implies a certain interpretation of the authors, with the resolution that the findings are not completely free from their own decisions and
awareness. Therefore, the authors cannot with say that the thesis assumptions are generalizable. Further, the interviews were conducted in German and translated into English. As a consequence, contextual meanings and phrases could be lost, even if the authors tried to translate it to the best of their ability. However, without the qualitative approach and the provision of interviews, the authors believe that answering the research question would not have been possible. Even if some limitations exist within the thesis, it is hoped that this research can be seen as a basis for future studies.

7.5 Future Research
For future research the authors suggest to repeat the study with more participants from different positions of the project with the aim to see if the theses assumptions and results are reproducible. Further, it would be interesting to compare the result from this thesis with the results of a project, which has the same parameters (digitalisation, complex, public sector), to see if the procedure and results within the project are the same or similar. The study is also repeatable in different countries provided that the public sector wants to implement a similar project. It would be interesting to see if different countries have different approaches to manage such big and complex digitalisation projects.

Another suggestion is to compare if future projects with the same parameters (digitalisation, complex, public sector) can learn from the thesis results in order to define the scope statement in a proper way in the defining phase with the aim to minimise change request during and at the end of the project. Further, to generate more generalizable results and to see the interaction between knowledge sharing and project management, the authors recommend for a future research to incorporate quantitative research methods.

Further, future research could investigate more identification and control process of complexity in order to find out how it can be managed within a project. Moreover, a specific focus can be set on the influence of uncertainty within a project to present insights in arising risks. The discussed topics within the study are already well researched as individual subject areas, therefore the authors suggest to have a deeper look between the relationship of the individual subject area.
Reference List


Appendix

Appendix 1: Interview Guideline

General Question
- Could you please introduce yourself and describe your position in the project?

Complexity
- How do you explain complexity of eAkte?
  - How do you specify your answer?
- Can you explain the biggest challenges within the project?

Scope Statement
- How was the content of scope statement created?
- How have you ensured that all needed parties are included within the creation process?
  - Which parties were they?
- Which were the most important change requests within the project?
  - In your opinion, how could the change requests be prevented?

Knowledge
- How have you handled knowledge sharing within the project in the defining phase?
- Have you exchanged personal experiences that could have a positive impact on the project?
  - If yes, which experiences have you exchanged?
- How can previous knowledge and experiences be used for defining the scope statement of the project?
- How can the collected knowledge and experiences be transferred to other projects?
- In your opinion, where do you see potential for improvement by sharing knowledge within the creation process of project scope statement?

Project Challenges
- What are the challenges for defining a scope statement in a digitalisation project, compared to other projects?
- Are there differences in knowledge sharing in a digitalisation project and non-IT-related project?
  - Can you specify your answer?
- What challenges have arisen within the creation of the scope statement?
  - How did you deal with non-predefined variables in the project eAkte?
# Appendix 2: Interview Findings

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|          |            | Workshops | Workshops | Workshops | Knowledge Management |
|          |            | Working groups | Working groups | Working groups | Knowledge Management |
|          |            | Interface | Interface | Interface | Project Challenges |
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