The impact of SAP on the utilisation of Business Process Management (BPM) maturity models in ERP projects

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Abstract

The SAP Enterprise Resource Planning (ERP) system is a leading software solution for corporate business functions and processes. Business Process Management (BPM) is a management approach designed to create and manage organisations' business processes. Both promise an improvement of business processes in companies and can be used together. In conjunction with the SAP ERP system and BPM approach, BPM maturity models can be used as diagnostic tools that allow an organisation to assess and monitor the maturity of its business processes. This research analyses the complex relationships between the three topics of SAP, BPM and BPM maturity models and the impact of SAP on the use of BPM maturity models.

This study is based on eleven personal interviews that were conducted with participants with many years of practical experience within the three subject areas. Four maturity models, which feature in the interview statements, are examined in more detail. The results of the interviews are then compared with the documentation of the four BPM maturity models for possible dependencies.

The connections between SAP and BPM maturity models have not yet been discussed in the literature. This research illustrates that SAP ERP is a dominant system in many companies and has an impact on the utilisation of the BPM approach. To identify and improve the dependencies within an organisation, this research develops ten principles which any organisation can use as management guidelines to use the SAP system in a more optimised way.

Collecting data from multiple sources strengthens the validity of the data. For this reason, a web survey is used to examine whether the ten developed principles are supported by SAP users and process consultants. More than 150 participants took part in this web survey and evaluated the developed principles.

This research uses the method of triangulation from various data sources to examine the relationship between BPM and BPM maturity models from the point of view of a SAP ERP system, and to develop principles that enhance collaboration.

Author's declaration

I declare that the work in this thesis was carried out in accordance with the regulations of the University of Gloucestershire and is original except where indicated by specific reference in the text. No part of the thesis has been submitted as part of any other academic award. The thesis has not been presented to any other education institution in the United Kingdom or overseas.

Any views expressed in the thesis are those of the author and in no way represent those of the University.

Signed …….. Date ……..21 February 2018..…….

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Glossary of terms

BP	Business Process
BPM	Business Process Management (BPM) is a management approach to create and manage the company's business processes (Snabe et al., 2008)
BPM maturity model	BPM maturity models are a specialisation of maturity models that focus on the field of business process management. BPM maturity models measure and aggregate the capabilities and present a road map for an improved use of business process management at organisations.
BPMO	Business Process Management Organisation
BPMM	Business Process Maturity Model (BPMM) is a maturity model designed to improve the quality of the organisation's business processes (Object Management Group Inc., 2008).
BPMN	A Business Process Model and Notation (BPMN) provides a graphical notation to describe business processes in an understandable way to all business process users (Object Management Group Inc., 2011).
BPMS	Business Process Management System (or Suite) is an IT based software tool that helps to accomplish BPM (Harmon, 2007).
CMMI	Capability Maturity Model Integration (CMMI) is a collection of 'best practices that help organisations to improve their processes' (CMMI Product Team, 2010b).
ERP	Enterprise Resource Planning (ERP) is a business process-specific software to manage business processes across a company in fields like accounting, human resources, manufacturing and logistics (Poston & Grabski, 2001)
IS	Information Systems
IT	Information Technology

KPI	Key Performance Indicators measure the success of a task, an activity or an organisation.
Maturity model	Maturity models analyse the quality of company processes and classify the quality into different levels (Humphrey, 1988).
PEMM	Process Enterprise Maturity Model by Michael Hammer
SAP	SAP AG is a business software company. Their main product is called SAP ERP (Enterprise Resource Planning). This SAP ERP application provides software solutions for business behaviour and in the German business practice is typically called SAP
SAP CO	SAP ERP consists of different modules. SAP Controlling (CO) is the financial control module within the SAP ERP system
SAP FI	SAP ERP consists of different modules. SAP Finance (FI) is the financial accounting module within the SAP ERP system
SOA	Service Oriented Architecture

1 Introduction

For several decades, information technology (IT) has been an important and flexible platform for processes and people in their business management (Seethamraju & Seethamraju, 2009). One of the most common IT business systems was developed by the German company SAP and provides a wide range of business functionality. This research considers the impact of the SAP business software as part of a particular management approach.

1.1 General background

Business Process Management (BPM) is an approach to defining and operating company business processes and can be used without any IT systems or infrastructure (Tscherwitschke, 2011). In practice, companies often use IT software tools to administer the BPM of an organisation. Additionally, standard software such as SAP Enterprise Resource Planning (SAP ERP) assists a company in standardizing and automating processes to make them as efficient as possible (Heilig & Möller, 2014).

One way that organisations can achieve a comprehensive BPM maturity, and search for IT opportunities in companies, is the use of BPM maturity models, which have increased in significance in recent years (Van Looy, De Backer, Poels, & Snoeck, 2013). BPM maturity models offer a step-by-step guide, with goals and best practices, towards a more advanced use of BPM (Van Looy, 2013). Furthermore, BPM maturity models provide a concept and set of tools for measuring the effectiveness of BPM usage in companies and organisations (Snabe et al., 2008).

Van Looy (2010) states that most BPM maturity models favour the use of IT to improve the BPM approach of an organisation. This may include the use of SAP ERP which is used to support a company's business processes (Aeppli, 2012). The main focus of this research is BPM maturity models and their limitations and related implications if SAP ERP is used as the central IT system of an organisation.

1.2 Research motivation

Many companies use an SAP ERP system and depend on it for a BPM approach. Neubauer (2009) explains that, generally, ERP systems can

influence the business processes of companies. However, there is a limited body of literature that addresses the relationship between SAP, BPM and BPM maturity models from an SAP point of view. Van Looy et al. (2013) propose that further research should be done regarding the relationship between BPM maturity models and IT business systems at the strategic, tactical and operational level. Such a relationship is specifically examined within this research, and considers the influence of SAP ERP as a special IT business system.

SAP ERP systems and BPM promise an improvement of business processes in companies and are used together in organisations. This aligns with the researcher's personal experience, but in contrast, BPM maturity models are less frequently used. Based on the researcher's commitment as an SAP consultant, the aim of this research project is to establish how these three topics are interdependent and how other experts judge the complexity of the topics. The findings regarding the SAP ERP system are particularly interesting personally, because SAP has been the main professional focus of the researcher for more than 15 years.

1.3 Research aim and objectives

The overall aim of this thesis is to show the relationships between SAP, BPM and BPM maturity models from an SAP point of view. For this purpose, ten principles are developed within this research, which sensitise a company to recognise and improve the relationships between the three topics. These principles can be used as management guidelines in any organisation to enable it to use the SAP ERP system in a more optimised way and to identify dependencies between the three main themes SAP, BPM and BPM maturity models.

Heilig and Möller (2014) highlight the fact that standard software such as SAP ERP helps organisations to standardize and automate processes. A variety of companies deploy SAP ERP as a leading IT system for their business operations. SAP claims that optimal, effective and flexible business processes can be achieved with their ERP system. In addition, BPM has a focus on the design, optimisation and management of a company’s business processes (Panagacos, 2012). For a better BPM maturity, an IT system can help with the

appropriate tools and functions to analyse and improve the design and the use of flexible business processes. IT can also be used to automate business processes and to make them more efficient and qualitatively better. A large number of organisations still use SAP ERP, and this research explores the relationship between SAP ERP deployment and the utilisation of BPM.

Furthermore, how can a company identify the quality of their BPM usage? BPM maturity models promise the possibility of reaching short, medium or long-term BPM goals towards an organisation's better BPM usage. These BPM maturity models classify the BPM usage of organisations into different levels and identify possible organisational and process improvements for a more efficient BPM usage. In addition, the use of IT business systems is mostly mentioned as a basic component to reach a higher BPM maturity level (Van Looy, 2010). Moreover, successful ERP software implementation is the backbone of the company in respect of many core organisational activities and helps to improve the management of business processes (Aladwani, 2001). Does the planning and implementation of ERP software projects influence the decision making process in the utilisation of BPM maturity models? Furthermore, could SAP improve the maturity of BPM to the model's highest possible maturity level?

According to the aim outlined at the beginning of this section, this research is done from the SAP point of view, and examines the complex relationship of the topics. In order to analyse these relationships and influences, the following two research objectives are set:

1. To investigate the decision making process in the utilisation of BPM maturity models within the planning and implementation of ERP software projects.
2. To assess the impact of SAP on the use of BPM maturity models, and to evaluate the requirements for, and the restrictions to, BPM maturity models when used with SAP.

The interaction of SAP ERP, BPM and BPM maturity models is the prime focus of interest. The aim of the research is to investigate and analyse the interaction between the use of the SAP software package and the deployment of BPM maturity models. This will entail a comprehensive mapping of different maturity

models to SAP processes and required changes in SAP implementation if specific BPM maturity models are used. The motivation is to analyse in detail the practical experience which companies have received with different BPM maturity models if SAP ERP is used, and to ascertain whether SAP needs individual software development for the applied BPM maturity models.

This focus on the interaction between the three main themes leads to the third research objective:

3. To develop a classification of BPM maturity models that indicates their suitability for use with business standard SAP processes.

1.4 Achieving research objectives

In order to address the research objectives, a triangulation method was used based on different data sources. This triangulation is the main research method for this research. In a first step, individual face-to-face interviews were conducted to interview people about their personal knowledge of the topics and the relationships between them. This procedure offers an in-depth insight into organisations which use SAP, BPM and BPM maturity models. In addition, the research examines documentation from various BPM maturity models, which are primarily mentioned in the interviews. This second step determined to what extent terms such as SAP are mentioned in the documentation. Both methods are used to identify the first two research objectives.

The results of both research steps were then compared and examined to establish the similarities and differences between the examined topics. The insights gained from this were used to define the third research objective and to develop a classification of the BPM models to their SAP suitability.

Finally, for the third data collection step of the triangulation, a web survey was carried out, for cross checking the findings from the first two data sources and their conclusions. A more detailed definition of the individual process steps for the data collection in this research is given in chapter 3.

1.5 Structure of the thesis

Remenyi, Williams, Money, and Swartz (1998) define an academic research process by eight specific phases. The following sections follow these phases and use this structure for this thesis. This means that this work is created

according to their diversification and uses their structural steps in the next sections, as follows:

- reviewing the literature

Chapter 2 is a critical literature evaluation about the field of BPM, BPM maturity models and SAP. It starts with general research about the topics in the existing literature and ends with the combined research of the three major terms SAP, maturity model and BPM in the literature.

- formalizing the research questions and developing a conceptual framework

At the end of chapter 2, the literature review leads to the formalizing of the research questions for this research. Following on from the literature analysis, chapter 3 presents the conceptual framework.

- establishing the methodology

Also chapter 3 establishes which methodology the researcher chooses and gives reasons why it is preferred for this research.

- collecting evidence

Chapter 3 describes the way in which the evidence is collected and why. It describes the selected techniques and questions which are then applied to the research.

- analysing the evidence

After the evidence has been collected, chapter 4 presents the findings, and chapter 5 analyses the results in a qualitative manner according to the researcher's methodology. Chapter 6 shows how the results of the interviews were validated again.

- developing conclusions

The end of chapter 5 presents the new body of knowledge which arises from the research and offers some advice for the practical handling of BPM maturity models within an SAP environment. These new developed practical principles are re-checked in chapter 6 before chapter 7 presents an overall conclusion.

- understanding the limitations of the research

In addition to the conclusion, chapter 7 also analyses and demonstrates the limitations of the research as part of the research process.

- producing management guidelines and recommendations

Finally, chapter 7 also presents as a contribution to theory and practice, the developed management guidelines and recommends some possible further research avenues.

2 Literature review

This chapter critically reviews the existing literature regarding SAP, BPM and maturity models, and describes their contextualization in ERP projects in order to achieve the objectives of the research.

The first section outlines the basics of how IT and business processes are linked together and explains the three major topics of SAP, BPM and maturity models. As this document deals with technical terms, the first section discusses these terms in the context of this research.

The second section outlines the general definition of BPM and maturity models and demonstrates the interdependence and diversity of BPM maturity models. An analysis of their unique structure and behaviour concludes this section.

The third section presents the contextualization of BPM maturity models and the SAP IT system and explores the current state of research in this field. This is followed by the final section, in which the research questions are developed as a result of the literature analysis.

The fourth section establishes a provisional conceptual framework and is based on the literature review and the developed research objectives.

2.1 IT and business processes at companies

This section first discusses the technical terms - SAP, Business Process Management (BPM) and maturity model - in the context of this research. Additionally, this section discusses the business management and IT systems dependencies for BPM usage. It further evaluates the historical development of BPM, which is based on management concepts and IT innovations developed in recent years.

2.1.1 IT business systems

Essentially, IT systems support the business transactions and activities of a company and are used to align its business expectations, goals and objectives (Li, 2010). More generally, Dechow, Granlund, and Mouritsen (2006) explain that IT is involved in almost all business affairs. A company's IT supports the business analysis, information, presentation and storage of information and knowledge for management control purposes. Moreover, an enterprise could have a need for an IT system platform 'to achieve improved efficiency and

effectiveness of internal process and system operations, timely procurements and fast product delivery, easy and instant access to all required job-relevant information by staff members, and enhanced reporting and monitoring facilities at the administrative level' (Vernadat, 2007).

The articles of Hammer (1990) and Davenport and Short (1990) demonstrate the historical view that IT was initially used to speed up operations and business requests within a company. The IT and business processes were viewed separately and organisations did not consider how these tools could work together to maximise the potential of both. Davenport and Short (1990) further demonstrate that IT could have a stronger role in, and support, business processes as well as process improvements, and they developed a recursive relationship between IT capabilities and business process (re-)design. The authors explain that IT is the key to thinking about business process design. In fact, a Business Process Redesign (BPR) can be the main impetus for reconsidering the use of IT within an organisation:

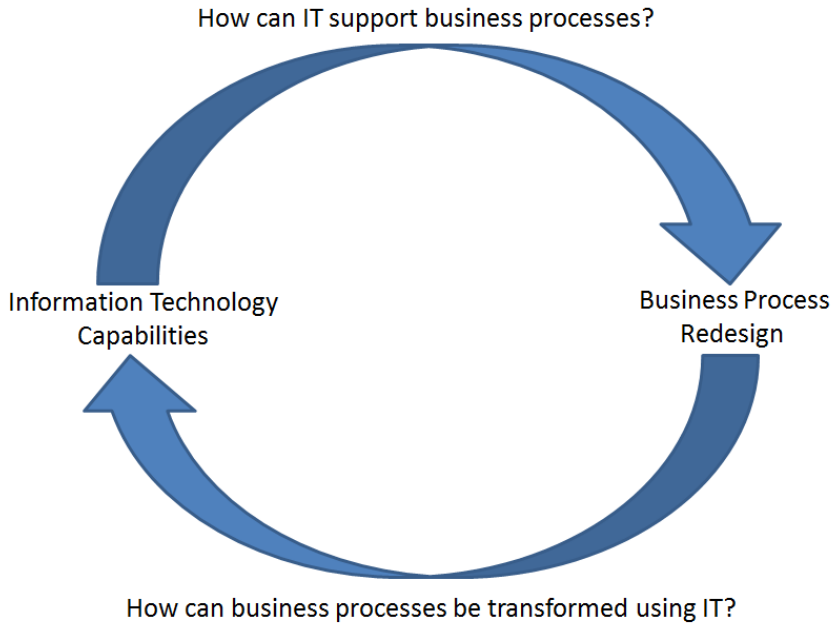

Figure 2.1: The recursive Relationship Between IT Capabilities and Business Process Redesign (Davenport & Short, 1990)

Davenport and Short (1990) further point out that the capabilities of IT can influence the design of a process. For example the graphical possibilities of IT based workflow software can influence the design and development of a

workflow, because dependencies in workflow steps cannot otherwise easily be specified and designed as a company would like.

In more general terms, Carr (2003) started a debate over the role of IT in companies with his publication ‘IT Doesn’t Matter’ in the Harvard Business Review. He maintains that IT had only three core functions at the beginning: data processing, data storage and data transporting. Carr further points out that the strategic importance of these IT business functions has nowadays diminished. He argues that most of the business functionality is supported by IT and that IT nowadays is highly replicable, standardized and generally available to all business industries. Furthermore, he recommends that companies manage IT as a commodity input at the lowest possible cost and risk, because technology is generic and the IT functionality can be copied easily and quickly. In his opinion, IT needs no special consideration because it does not matter anymore. IT can be used flexibly and has no dependencies on special functionality.

After Carr published his article, there were a variety of reactions. IT specialists like Bill Gates (Kedrosky, 2004) and technology research companies like Gartner (Broadbent, McGee, & McDonald, 2003) participated in the discussion, leading to a general debate over the question of whether IT matters or not.

Two general perspectives can be concluded as a result:

- On the one hand, Carr emphasises that the strategic importance of IT is diminished because IT is now standardized, cheaper and generally available. Additionally, the Harvard Business Review features many reactions to Carr’s article in their magazine, for example a letter from Paul A. Strassmann, executive advisor of NASA and former CIO of Kraft General Foods, who agrees with Carr and doubts that IT is strategically irrelevant to business behaviour.
- On the other hand, Smith and Fingar (2003b) argue that IT can affect a company’s business process behaviour. Dechow et al. (2006) emphasise that different information systems (IS) produce different procedures for how and what can be modelled, and lead to different calculations and accounting information.

Historically there are two positions identified in the literature regarding IT and general business processes:

1. IT does not matter
2. IT does affect business processes.

Based on Carr's publication, Van Looy (2010) explores these two positions through a literature review of business process maturity models and concludes that 'IT does not matter, but it enables higher process maturity'. In general, IT implementations, like SAP ERP, give an organisation the ability to automate and standardize core business processes (Heilig & Möller, 2014). To assist the development of an organisation's IT strategy and objectives, an organisation may choose a business process maturity model to analyse its IT applications (such as the one used by SAP ERP) (Van Looy, 2010). This research uses the previously mentioned literature as a background context and considers a more specific area than the general IT discussion. The focus is on how BPM maturity models are used in ERP projects and in particular their interaction with the implementation of SAP ERP.

2.1.2 SAP as an ERP system

Many organisations already use SAP ERP in their company as a IT business system. This section describes briefly how SAP is used as an ERP system in enterprises.

SAP AG is a German company created in 1972 and the world's largest provider of enterprise software that, in 2017, served more than 345,000 customers in over 190 countries (SAP AG, 2017b). The Enterprise Software division of the company has developed industry-specific characteristics in the software for over 25 industries to manage business operations and customer relations for companies (SAP AG, 2017a). This enterprise software is, in practice, called SAP. (The official name is SAP ERP). The SAP ERP application provides software solutions for the full range of business functions in companies – such as a leave request process for employees for human resource management or a requirements planning process for material planning (SAP AG, 2012). There are many other ERP packages available on the market, notably from Oracle or Sage, but SAP is generally seen as the market leader in recent years (Colombus, 2013).

Snabe et al. (2008) position ERP as a standardized software package to manage the business data of an organisation in real time. Light, Holland, and Wills (2001) describe ERP software as a 'dominant strategic platform for supporting enterprise-wide business processes'. SAP ERP is generally based on a database that handles several business functionalities within different modules like manufacturing, sales, finance and human resources. Figure 2.2 illustrates the fundamental structure of the ERP business system:

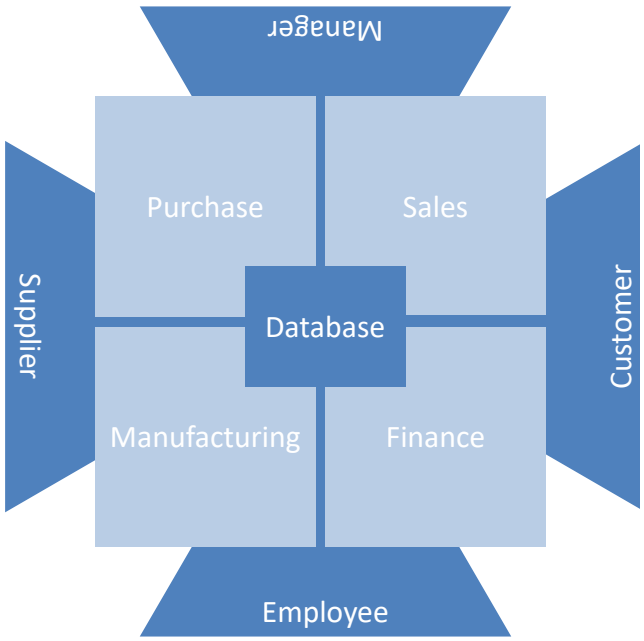

Figure 2.1: The ERP concept
(Snabe, Rosenberg, Møller, & Scavillo, 2008, p. 68)

Dechow et al. (2006) suggest that the target of many common management theories is the optimisation of the business system and / or the optimisation of business processes within an enterprise. SAP ERP is a business system designed to support this optimisation and associated process management activities (SAP AG, 2012).

The literature demonstrates that for over 20 years, industry leaders such as Cisco have implemented ERP systems (D. E. O'Leary, 2009). All ERP vendors promise, through the use of this special kind of IT technology, better company coordination with accurate and on demand enterprise-wide information and lower transaction costs. In general ERP systems 'typically cover 80 per cent of an organisation's business processes' (Kelly & Holland, 2002).

Companies have since recognized the benefits of ERP. A working paper of Ross (1999) gives six reasons for a company to implement an ERP system:

(1) need for a common platform
(2) process improvement
(3) data visibility
(4) operating cost reductions
(5) increased customer responsiveness
(6) improved strategic decision making

However, there is also a study that shows that the use of ERP software leads to no administrative improvement or cost reduction within three years after the implementation of the ERP system (Poston & Grabski, 2001). However, most authors view the use of an ERP system as offering an advantage to enable the integration of business processes within one system which is used company-wide (Neubauer, 2009). In addition, a standard ERP system can show synergies between systems and processes (American Productivity & Quality Center, 2005b). For example, an ERP system can hold all documents in relation to an invoice number or purchase order and shows the document flow or action log for data changes that directly belong to a business transaction.

D. E. O'Leary (2009) describes how a technology change can affect the maturity lifecycle of IT. The implementation of an ERP system is a form of technology innovation for business success and plays a part in the technology maturity of a company. This means that the capabilities of a company are improved by the implementation of an ERP system.

Through the use of computer based ERP systems, companies are expected to reduce costs by better efficiencies and company-wide accurate and fast business information with improved firm performance (Poston & Grabski, 2001). But Harmon (2007), amongst others, illustrate that the usage of standard systems and their processes reduces IT costs but does not give an organisation a competitive edge over their business process.

The basic business idea behind an ERP system is the implementation of different modules and processes within a company and the demonstration of

how they could be linked together (Harmon, 2007). From a technology point of view, Antonucci, Corbitt, Stewart, and Harris (2004) indicate that ERP systems are the basis for business decisions and strategies, because they produce the data and information for management decisions. Furthermore, ERP is the foundation for the next form of innovation, the exploitation of BPM as process innovation.

ERP systems support the BPM operation, because the ERP system still has a process structure, forcing automatic existing processes and replacing existing ones through the usage of the standard ERP processes, contrary to processes not supported by ERP (Harmon, 2007). In addition, an ERP system can be used to monitor the execution of processes within a BPM behaviour (Mettler, 2010). The use of a standardised ERP application is also an example of automation, which demonstrates a core benefit of using BPM (Harmon, 2007).

This research deals with the ERP market and focuses on the software tool of the market leader SAP. An IT application like SAP ERP can enable higher process maturity (Van Looy, 2010). In the purchasing process the SAP application provides, for example, the documents and functionality which are needed for the process. This means that the application creates the inventory changes during the purchasing process and provides, for instance, an IT based sequence with requesting quotations, purchase orders, goods receipt and the registration of invoices.

As described previously, the SAP application automates and standardizes the business process and supports the process flow of an organisation. The aim of a business process maturity model is to analyse the business process of companies. That means in this example, the business process maturity model analyses the purchasing business process. As long as the organisation has made no adjustment to the SAP software, the maturity model analyses the standard SAP purchasing process behaviour. This leads to the question of how SAP impacts upon the use of specific maturity models for BPM. Does a BPM maturity model accept the process behaviour which is provided by SAP? In addition, are special adjustments to the SAP software needed to obtain a better process maturity for the maturity model? How are SAP software and BPM maturity models used in practice? Moreover, this research assesses the impact

of SAP on the use of BPM maturity models, and evaluates the requirements for, and the restrictions to, BPM maturity models when used with SAP. This is due to the fact that customers want to know if the use of SAP affects other applications.

2.1.3 BPM evolution

Overall, the focus for this research is the use of BPM maturity models within an SAP environment. This section demonstrates the evolution of BPM and shows that the use of ERP can also affect the application of BPM. Finally, it is explained that the usage of operational or strategic BPM is the basis for the use of BPM maturity models in organisations.

Historically, authors have viewed BPM as the further development of existing techniques. For example, De Bruin and Rosemann (2004) assert that BPM consolidates objectives and methodologies of the previously developed Business Process Reengineering (BPR), Process Innovation and Workflow Management concepts. Furthermore, Becker, Ortbach, Plattfaut, and Niehaves (2013) see BPM as derived from the prior developed BPR and Total Quality Management (TQM) methods and as combining aspects from both approaches. More generally, authors like Ravenstein & Batenburg (2010) refer to two areas that BPM was developed from:

- Historical management concepts like the use of TQM and Business Process Reengineering (BPR)
- IT innovations like ERP systems, Workflow Management (WfM) and Enterprise Application Integration (EAI)

TQM and BPR are management concepts established between the late 1980s and the mid-1990s. The main objective of the TQM concept is company-wide continuous improvement, development and maintenance in a quality manner to offer consistently better products and services to the customers. This includes the participation of employees and customers at all levels and groups within an organisation (Lorente & Rafael, 1998). In addition, BPR has the aim of changing the business processes of a company to improve the cost, quality, service and speed in a radical way (Hammer & Champy, 1993).

Both concepts offer a framework for radical process change but they have fundamentally different approaches: BPR requires a radical process redesign, whereas TQM offers an incremental improvement procedure to change the company processes (Puah & Tang, 2000). Since the late 1990s, the term BPR has become unpopular and is no longer applicable for practical use, and TQM has also been replaced. With BPM (Business Process Management) a new quality control methodology was born. (Harmon, 2007). Since that time ‘process management has established itself as the foremost technique for managing an effective, efficient and competitive firm’ (Weerakkody, Currie, & Ekanayake, 2003).

The second area arises from different IT innovations. Workflow systems became very popular in the 1990s to automate applications and document-based processes (Harmon, 2007). Traditionally, workflow management systems are used for the control of processes and the coordination of the services and systems involved (Masak, 2007). But mostly, these workflows were limited by the boundaries of the individual enterprise and could not connect different IT systems. The EAI (Enterprise Application Integration) tool offered the possibility of moving information between different applications and companies if they integrated their IT systems (Harmon, 2007). The central component of an EAI application is a message broker who controls the communication between systems. Each IT system needs only a connection to the EAI message broker and this tool handles the connection of the in- and output streams.

The further development of this historically established management concept resulted, from a technical viewpoint, in the genesis of BPM suits or BPM systems (BPMS). These BPMS applications are developed to manage and improve business processes via information systems (Becker, Rosemann, Röglinger, & zur Muehlen, 2012). The BPMS does not aim to replace existing systems and concepts, but aims to support more flexible processes within an organisation and to make the business more agile (Ravenstein & Batenburg 2010). More information about BPMS is provided in section 2.2.2.

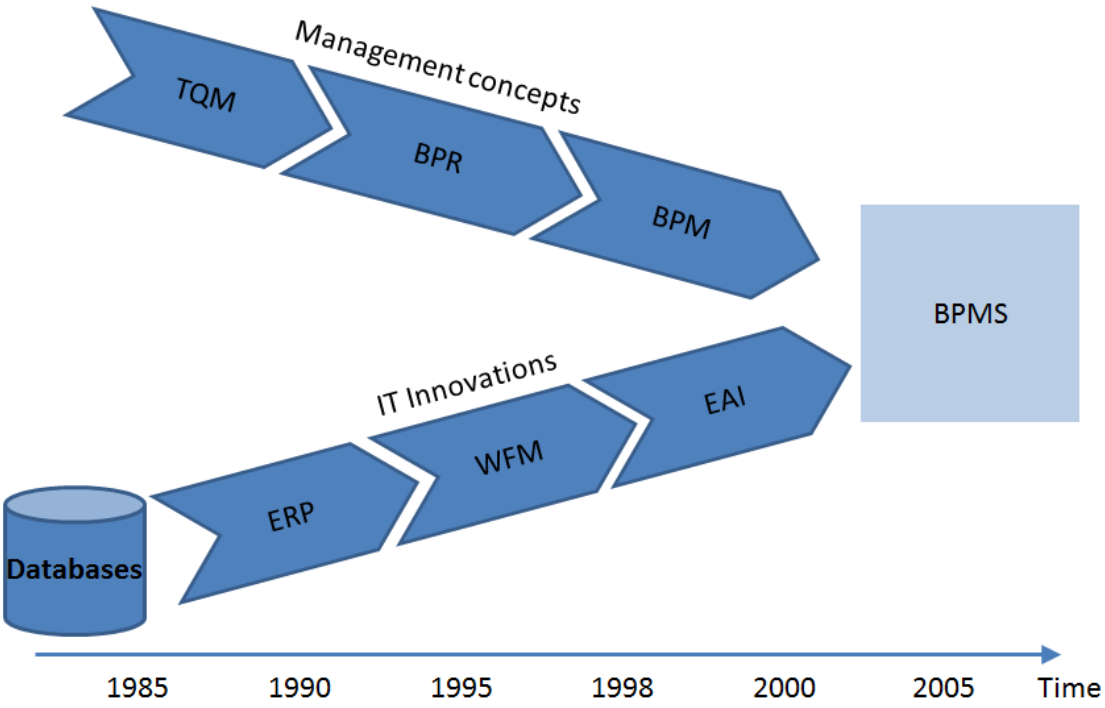

Figure 2.3: Historical Roadmap
(Ravesteyn, Batenburg, & de Waal, 2008)

Farrance (2013) illustrates in more detail how, since the beginning of the 19th century, BPM has developed and emerged from much more different business process behaviours and technology concepts. In addition to Harmon (2007), he notes how Henry Ford was one of the first who studied and organised these processes when he founded the Ford Motor Company in 1903. Both authors depict Ford as the first person who specialised business processes to reduce costs and form a background for business process operations.

Henry Ford's aim was a more effective management and optimisation of business processes. He analysed the manufacturing of the Ford T motorcar and rationalized the production process (Döppler, 2011). His goal was to split the car production at his motor company into activities with simple and quick steps for each worker at the assembly line. This basic concept is also one of the main approaches of BPM: processes should be split into sequential activities (Maier et al., 2012).

Since Henry Ford established business process development, the different process approaches described above - TQM and BPR - were generated to control a company's business and its processes in a statistical manner

(Hammer, 2010). Six Sigma is another example of the historical evolution of BPM.

Conger (2010) describes Six Sigma as an established technique at Motorola to measure their process quality. The concept of Six Sigma is a statistical error measurement that only accepts a certain number of errors. The aim is to eliminate unnecessary or inefficient process steps through the analyses of given six sigma techniques like check sheets, diagrams and analysis tool sets. In contrast to the BPM technique developed later, the Six Sigma approach does not provide much guidance for given phases or project situations. Six Sigma was more a toolbox with hundreds of different techniques which can be useful in identifying and changing process behaviour. The IT provided applications to support these statistical investigations. Some BPM approaches developed later use Six Sigma as an added technique to demonstrate how they can be used for process improvement.

As described above, the early developed business concepts only used IT to further speed up the processes and to improve the business process affectivity of a company. Techniques developed later, like the development and construction of Six Sigma in the mid-1980s and the construction and distribution of ERP packaged applications, use the full range and diversity of IT as a strategic tool.

This chapter highlights how the foundation of BPM results from different IT techniques and management concepts. Workflow management and Six Sigma techniques can be used in a company for BPM behaviour.

After this brief historical perspective on the development of BPM, the following section outlines BPM and maturity models in general before the specialisation of BPM maturity models is clarified.

2.2 BPM & maturity models

This section examines the existing descriptions and definitions of BPM and maturity models. Generally, the section not only covers the definition of BPM, but it additionally considers some available BPM IT tools and specifies the term ‘maturity models’. Finally, this section explores the positioning of a BPM maturity model as a special kind of maturity model.

2.2.1 BPM

Business process management does exactly what the name suggests (Busch & Fettke, 2011): it is a management approach to create and manage a company's business processes (Snabe et al., 2008). Hill, Pezzini, and Natis (2008) stated that 'Business Process Management (BPM) is a process-oriented management discipline. It is not a technology'. The basic idea is to think in terms of processes and to deal with the following questions: who does what, when, how and whereby? (Tscherwitschke, 2011).

An explanation of the improvements of the BPM approach begins with a process analysis of the actual business processes (Busch & Fettke, 2011) by the usage of methods, techniques and tools (Bekele & Weihua, 2011).

BPM deals with organisational aspects and technical issues for the identification, designing, documentation, controlling, implementation and improvement of business processes in companies. 'In fact, BPM is a comprehensive system for managing and transforming organisational operations, based on what is arguably the first set of new ideas about organisational performance since the Industrial Revolution' (Vom Brocke & Rosemann, 2010, p. 3).

Some authors like Komus (2011) describe BPM as a collective tool for management and emphasise that one aspect of a useful BPM utilisation is the successful combination of technology and business concepts in the company. Furthermore, Wähner (2012) asserts that the combination of IT and business functionality makes for a good BPM usage. But IT or software tools exist only to support the BPM (Ko, Lee, & Lee, 2009). It is possible, in fact, to conduct business process management without any IT operations (Tscherwitschke, 2011).

Snabe et al. (2008) outline a bigger separation between the BPM concept and BPM implementation. They explain that 'BPM does not require a specific IT platform …, BPM can be implemented without any IT tool' (p. 29). The technology of BPM is only one part of the core idea of BPM. The other parts are the organisation and its people. But authors like Vom Brocke et al. (2014, p. 12) argue that the use of IT boosts 'the efficiency and effectiveness of business processes.' A Business Process Management System (BPMS), which is

mentioned in the chapter before, is a tool set of integrated technologies, such as document management, portals and application servers for process handling by the usage of process stakeholders and users (Hill, Sinur, Flint, & Melenovsky, 2006). For these BPMS, the management and the improvement of business processes is the core objective (Becker et al., 2012). The BPMS exists to support the functioning of BPM, but the general implementation of BPM within an organisation can be difficult because of the inflexibility of existing IT applications of the company processes (Hill et al., 2006).

The main reason for the development of BPM is the continuous improvement of business processes and, as mentioned above, this can be done with or without IT tools (Wähner, 2012). A company also uses BPM technology for better organisational efficiency and effectiveness (Bekele & Weihua, 2011) and it is also used by process analysts as a good starting point for process documentation. Additionally, BPM can be used as a systematic knowledge base for activities within a company or between ERP systems (Corallo, Margherita, Scalvenzi, & Storelli, 2010). Overall, companies expect better business positioning for future success from their BPM infrastructure and BPM tools (American Productivity & Quality Center, 2005a) and to make processes more competitive and save money and offer new services (Harmon, 2007).

The literature demonstrates that the BPM management approach can be explained by a graphical view of a lifecycle (Busch & Fettke, 2011). This research adopts the view from Snabe et al. (2008) which uses a BPM life cycle as a conceptual framework for BPM. At best, this view demonstrates the core elements of a BPM model and clearly shows the never-ending process review.

Figure 2.4: Conceptual Framework for BPM
(Snabe et al., 2008, p. 27)

Figure 2.4 presents the three key elements of organisation, people and technology which are influenced by BPM. Around these core elements is a lifecycle with four phases (Snabe et al., 2008):

- Design
  With the data and information of the process analysis a new or optimised approach for business processes can be designed for the company's improvement.
- Implementation
  The design of the processes has to be prepared and executed into a company's business processes. That means that the new process must also be integrated into the IT system of a company. Additionally, a process measurement system could be considered and implemented to check and report on the process performance.

- Run/Monitor.

  After the implementation the process flow should be continually executed, measured, guided and monitored. This monitoring can also identify potential opportunities for the next process improvement.
- Analysis

  New and existing business processes are reviewed and analysed in support of the company's goals and strategy.

Each process runs through these four phases and continuously repeats the business process analysis for a continuous improvement of the business process (Vom Brocke & Rosemann, 2010).

Finally, all phases of the life cycle act with 'Process Governance' and 'Process Ownership'. Process ownership defines the central person who is responsible for the business process in a BPM (Snabe et al., 2008). Conventional organisations do not have a single person responsible for an end-to-end process. This is different to an organisation with a BPM approach. One single person, such as a senior manager, is the process owner and has the process authority and responsibility across the whole organisation (Hammer, 2010). 'In addition to process owners, enterprises need a process office that plans and oversees the program as a whole and coordinates process efforts' (Hammer, 2010, p. 10).

Process governance has a similar meaning to a conventional framework and provides the rules, technique, tools and measurement activities for all process related operations within a company to manage business processes (Snabe et al., 2008). Process governance also selects responsible project leaders and process participants and identifies the process ownership of each defined business process (Hill et al., 2006).

On the basis of the literature research, the following definition of BPM was developed for this research:

Business Process Management (BPM) is a process-oriented management approach to create, support and analyse an organisation's business processes.

For an optimum BPM outcome, an organisation can use an IT tool to analyse and support BPM behaviour.

2.2.2 Business Process Management Systems (BPMS)

IT tools which are used for the administration of BPM in organisations are called Business Process Management Systems (BPMS) (Hill et al., 2006).

The aim of the BPMS is to support the flow of business processes through organisations (Reijers, 2006) and to visualize, operate, monitor and improve business processes (Smith & Fingar, 2003a). BPMS assist in creating descriptions of processes for design efforts, process analysis and process simulation (Hammer, 2010).

Allweyer (2014) explains that some authors also use the abbreviation BPMS for 'Business Process Management Suite'. Such 'BPM-Suites' always contains a 'pure BPM system' as a core element and have some additional software components on top. Allweyer describes that the core element of a BPMS consists at least of a process design tool and a process engine to execute and analyse the designed processes.

Based on the previously described BPM lifecycle and according to Heilig and Möller (2014), a BPMS should cover also the four requirements in the different stages of a business process for design, implementation, run/monitor and analyse. Heilig and Möller (2014) further explain two additional requirements for a BPMS. First of all, BPMS supports the automation of processes. This means in particular, that tasks or process steps can be designed efficiently and be done automatically. For example, notifications about status changes within a process or other process information can be sent via emails through to the BPMS directly to process participants (De Bruin & Rosemann, 2004). Flexible adaptation to different circumstances is the second requirement. Changes in the environment should be made as quickly as possible if an organisation recognizes other market requirements or new legal requirements (Gatling, 2010). To provide the necessary flexibility, a BPMS should allocate, for example, interfaces to other systems or to mobile devices. This means that a process change can be made directly via a mobile device or between different systems.

Existing literature reveals that there may be discrepancies between the process mapping capabilities of the deployed BPMS and the reality of business processes in practice. Freund (2010) further concludes that certain BPMS can have inherent restrictions that make it problematic to accurately map and analyse real world business processes (Neubauer, 2009).

BPMS can be a new, additional software application which is introduced in the organisation (Ravesteyn & Batenburg, 2010) or it can be part of an operational software system like SAP ERP which is already used at the organisation (Heilig & Möller, 2014). SAP provides, with various technologies, the ability to use SAP as a BPMS and supports business processes in SAP and non-SAP systems. For example, SAP NetWeaver BPM and SAP NetWeaver BRM (Business Rules Management) offer the technologies for the development of processes and rules. In addition, processes and tasks can also be monitored with these tools. Therefore, SAP can be used as a BPMS with no additional BPMS software. But it is also conceivable that an additional BPMS is used, and SAP is not used for BPMS functionality.

2.2.3 Maturity models & BPM

Another tool to support the practicability of BPM - and the main context of this research - is the usage of BPM maturity models. Therefore, this section evaluates in general how the maturity models are described in the literature, and then the following section illustrates what BPM maturity models in particular, and how to use these terms within this research.

In general, the term ‘model’ can have several meanings. The Oxford English Dictionary defines the term ‘model’, in a system or procedure environment, as a thing to use as an example to follow or imitate (2010). Thomas (2006) adds that the colloquial and the scientific use are not identical. The word has different meanings, because a model can be an image of something or an example for something, but on the other hand it can be a real, material construction or an imaginary one.

Wendler (2009) explains that two model concepts are established in business sciences: mapping-oriented and construction-orientated models. The mapping-oriented model reflects some real structures into a model: critics say that this kind of modelling can lead to different models, because each model is based on

the developer's understanding of the subject. Two modellers can never develop the same model from the same subject, because they have different sense perceptions, experience and knowledge (Ahlemann, Schröder, & Teuteberg, 2005). Perhaps the different sense of the developers is one reason for the existence of hundreds of different maturity models on the market.

The construction-orientated model concept focuses on the problem definition of a subject. The problems are the perceived discrepancies between the achieved and the desired subject (O. Thomas, 2005). This subject focused modelling tends lead to an intensive consultation process between developer and users of a model (Vom Brocke, 2003). Wendler (2009) and Ahlemann et al. (2005) outline how maturity models use a construction-orientated model idea.

Most of the literature does not define the phrase 'maturity model'. Instead, many authors describe the benefits, concept and the operation of a maturity model (Ahlemann et al., 2005). Saco (2008) explains a maturity model as a diagnostic tool for an organisation to improve their company and processes. Additionally, the literature asserts that maturity models provide a framework to test, analyse and improve the business quality of a company or process (Ericsson, Gustafsson, Höök, Marcks von Würtemberg, & Rocha Flores, 2010).

Authors like Röglinger, Pöppelbuß, and Becker (2012), Leber (2010) and Urwiler and Frolick (2008) present Maslows 'Hierachy of Needs' as the first known maturity model. This hierarchy model outlines the psychological maturity levels of humans through a progressive step-by-step satisfaction (Urwiler & Frolick, 2008). Maslow (1954) defines five levels of human needs, which are often represented as a pyramid, because each higher level can only be reached if the lower level is totally completed:

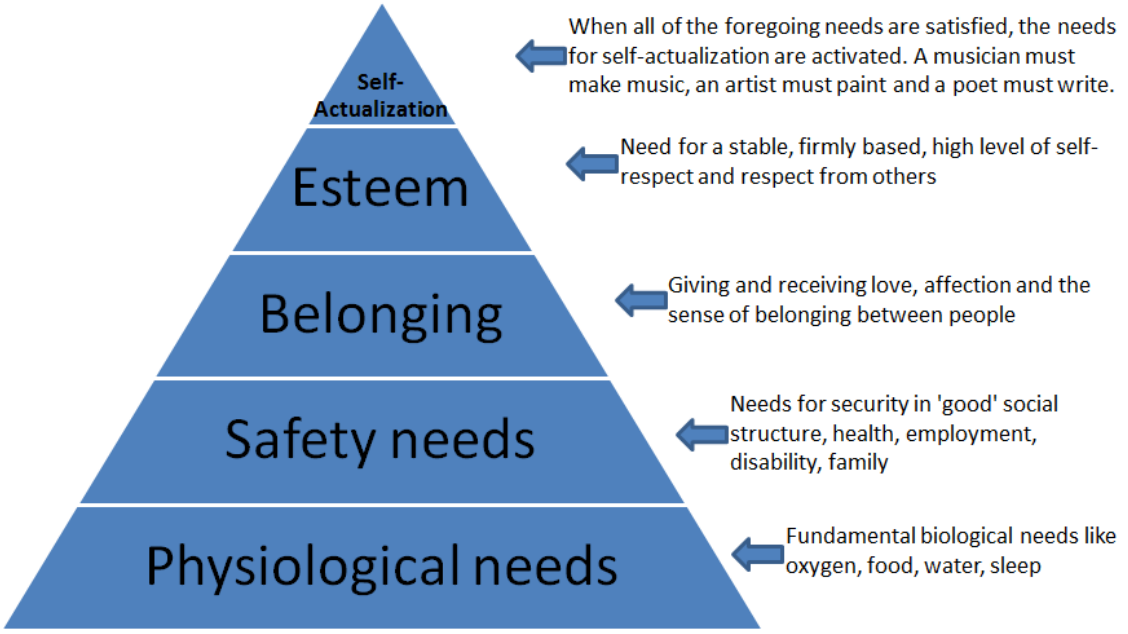

Figure 2.5: Maslow's hierarchy of needs
based on Simons, Irwin, and Drinnien (1987)

Maturity models have the same basic concept as Maslow's pyramid. If an organisation controls its fundamental needs such as the storage of goods, it will think about its storage processes in general. If it considers the process and changes some behaviours, then the level of the maturity will progress to the next level (Jedd, 2008).

A maturity model analyses the quality of a company or processes and classifies the business quality into different levels such as 'Initial', 'Repeatable', 'Defined', 'Managed' and 'Optimizing' (Humphrey, 1988).

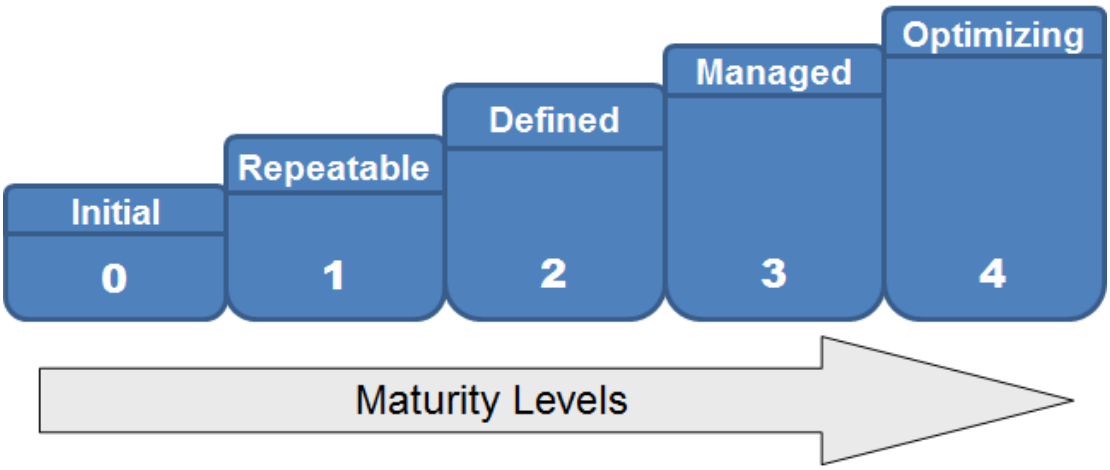

Figure 2.6: Levels of maturity

Each maturity model has formal descriptions to reach the next level of a maturity. As an example, a BPM maturity models classifies the use of IT Systems into different levels. Level 1 can be achieved when 0-20% of the processes use software that incorporate vendor and customer interfaces. Level 5 requires that more than 80% of the processes use software which involves vendor and customer interfaces (De Bruin & Rosemann, 2004). The purpose is to reach the highest maturity level for the whole organisation processes (Markovic, 2010). There exist different maturity models to analyse the maturity for different focuses and specialised fields, such as software development, product manufacturing or the business process management of a company (De Bruin, Freeze, Kaulkarni, & Rosemann, 2005, Von Wangenheim et al., 2010).

Moore (2011) argues that a maturity model can be described as a guide for companies to change things like IT behaviour in a methodical manner. Overall, there are several hundred different maturity models for various technology areas. De Bruin, Freeze, Kaulkarni, and Rosemann (2005) list over 150 different maturity models in a conference paper. Saco (2008) illustrates in his paper that the quantity of maturity models has increased to up to 200 different models and Snabe et al. (2008) indicate more generally that hundreds of different models exist. Mettler, Rohner, and Winter (2010) explain that no classification system for maturity models exist to catalogue the rising number of maturity models. A first step could be to distinguish the several maturity models into specialised groups corresponding to the diverse areas and task fields which they are developed for. Examples of this diversity could be maturity models for IT Management, Process Management or Project Management (De Bruin et al., 2005), Software Process Capability (Von Wangenheim et al., 2010), Open Source (Ven, Verelst, & Mannaert, 2008), Testing (Rana & Ahmad, 2005), Human Resources Management, Business Intelligence, Business Management and Business Process Management (Becker, Knackstedt, & Pöppelbuß, 2009a).

The Capability Maturity Model (CMM) which was developed at the Software Engineering Institute (SEI) of the Carnegie Mellon University in Pittsburgh is described in the literature as the most famous maturity model and was designed to analyse and compare software development processes in the American

industry (Harrach, 2010). In particular, the classification into five levels, which features the CMM, was copied by many other maturity models (Becker, Knackstedt, & Pöppelbuß, 2009b). The literature presents the CMM as the basis for a variety of other maturity approaches for different kinds of focuses, such as IT Infrastructure Management and Knowledge Management (De Bruin & Rosemann, 2005).

2.2.4 BPM maturity models

As illustrated in the section above, maturity models exist for different fields. Each week sees even more new maturity models being produced in different specialised fields by individuals, enterprises, federations and organisations (Becker, Knackstedt, & Pöppelbuß, 2009). BPM-related maturities are one kind of specialisation and focus on the field of Business Process Management. These models measure the maturity of BPM in companies and organisations and this section describes in more detail the meaning of BPM maturity models.

Snabe et al. (2008) assert that the effectiveness of the BPM used in organisations can be measured by using BPM maturity models. De Bruin and Rosemann (2004) expound that these models simply measure the maturity of Business Process Management. Van Looy (2013) summarises that BPM maturity models present a step-by-step guide with goals and best practices towards more advanced use. In addition, Scheer and Brabänder (2010) outline the usage of a BPM maturity model as a roadmap for the BPM usage within an organisation. The process starts with an ‘as-is’ evaluation and assessment for each process of BPM and results in actual BPM maturity levels for the processes of an organisation. The analysis can take place through a (software based) questionnaire and modelling tool to draw the existing organisation processes. The given questions investigate the potential for improvement and identify weak points within the process management, and can show the activities necessary for better process maturity.

Section 2.2.1 discusses how a BPM management approach can be used as a life cycle with different steps of a process review. Therefore, it does not matter at which phase of that life cycle the maturity model is used to analyse the BPM processes, because a model can be used at each level of the life cycle. Van Looy (2013) discusses that all BPM maturity models measure and aggregate

the capabilities and present a road map for better business process management, but there exist three variations of BPM maturity models. BPM maturity models can be distinguished by the number of business processes which are considered during a maturity assessment. For example, there exist BPM maturity models which can only consider one process of a company. Other models can observe more business processes and as a third subdivision, there exist only a few models which combine both focuses and could regard all existing business processes of an organisation.

A further variation could be that BPM maturity models also require the use of a BPM tool like BPMS (section 2.2.2) to reach a higher, or the highest, level of BPM maturity (Patig, Casanova-Brito, & Vögeli, 2010). Overall, BPM maturity models can be handled as a diagnostic tool to identify strengths and weaknesses in different dimensions like design, configuration, culture, management or IT (De Bruin & Rosemann, 2004).

The literature analysis found various numbers of specific BPM maturity models, from nine (Brocke & Rosemann, 2010) to fourteen (Harmon, 2009) and eighteen (Röglinger et al., 2012), all the way up to 69 (Van Looy et al., 2013).

Concerning Van Looy's (2012) research which outlines 69 different models, a condition must be added, because her sample could be classified into different capability areas, not only BPM maturity models. She subdivided the maturity models into different types and collected 37 business process maturity models for generic business processes (13 academic, 24 non-academic), 24 maturity models for supply chains (9 academic, 15 non-academic) and 8 maturity models for process collaboration (6 academic, 2 non-academic). For this research, the businesses process maturity models are the most interesting ones.

Moreover, these 37 maturity models can be narrowed down further. Van Looy (2010) describes, from a general IT point of view, how the business process could be divided into academic and non-academic types. Of more interest for this research is a different means of classification, as an alternative IT categorisation of four different groups:

1) IT-neutral

   These maturity models do not mention any IT tools or IT behaviour necessary to reach a higher, or the highest, business process maturity level.

2) General IT

   These maturity models suggest some general IT, like hard- or software tools or databases, to reach a higher, or the highest, maturity level.

3) Specific IT

   These maturity models recommend specific IT technologies to reach a higher, or the highest, maturity level. A maturity model expects the use of any customer relationship management system to manage the interaction with customers, for example (Aouad, Kagioglou, Cooper, Hinks, & Sexton, 1999).

4) Specific tools

   These maturity models recommend specific tools to reach a higher, or the highest, maturity level. For example, a maturity model requires a special IT tool like the ARIS modelling tool from the German company Software AG to draw business processes (Rohloff, 2009).

At the conclusion of Van Looy's (2010) research, she states that IT can be a prerequisite to reach the higher maturity levels in a BPM maturity model. A perfect BPM usage not only has a manual process design, for instance, but it usually has a BPMS which provides graphically designed software to perform a whole organisation process overview. As a result of her study, she illustrates that BPM maturity models require IT behaviours for some of their components to reach the highest levels of maturity. In other words, BPM maturity models can be affected by IT. Thus, the research must also consider the question of how and why BPM models are influenced by SAP IT Systems.

For this research, maturity models could be classified into 'General IT' and 'Specific IT' groups, which are the most interesting models. If a maturity model is specified as 'IT neutral' and the model mentions no IT tools, it should not matter if SAP is used or not. But SAP is one of the main focuses of this research. Furthermore, if 'specific tools' are expected, it does not mean that it must be SAP. There also can be other tools restricting the use of SAP.

But other classifications could also be used. In the context of BPM, some authors distinguish between BPM and Business Process Organisation (BPO). One frequently cited definition in the literature comes from McCormack and Johnson (2001) who define that an organisation uses BPO as a 'level at which an organisation pays attention to its relevant (core) processes,' For example, the SAP company established a BPO process team with the 'overall tasks of establishing company-wide process governance and consulting in process management related topics' (Snabe et al., 2008, p. 99). This team had the challenge to drive the culture of process thinking within the organisation, to manage process initiatives, to update BPM methods and to prioritise BPM projects.

Researchers who distinguish between both definitions in more detail, specify BPM as a framework for the implementation within process orientation (Škrinjar, Vukšić, & Štemberger, 2010) and BPO as an overall view of process thinking within a whole organisation. Van Looy, De Backer, and Poels (2011) discuss a distinction between BPM and BPO maturity models, based on the six main capability areas which are examined within a maturity model. They explain that a BPM maturity model evaluates four business process areas. These areas are often specified in the literature as:

- modelling and/or design
- deployment and/or configuration
- optimisation and/or analysis
- management and/or administration

In addition, some models analyse two more areas:

- Process-oriented culture
- Process structure

Models which also measure the cultural and structural capability areas could be defined as BPO, but not all maturity models make that clear distinction between BPM and BPO. For example, De Bruin and Rosemann (2004) developed a BPM maturity models which also include a cultural area but was explicitly described as a BPM maturity model.

Van Looy et al. (2012) create a very detailed typology for business process maturity with six named main capability areas and three maturity types. Three areas cover the business process lifecycle with modelling, deployment and optimisation. The other three areas cover organisation management theories with management, culture and structure. Van Looy et al. (2012) introduce this in more detail, with 17 sub capability areas, 6 main capability areas and 3 maturity types:

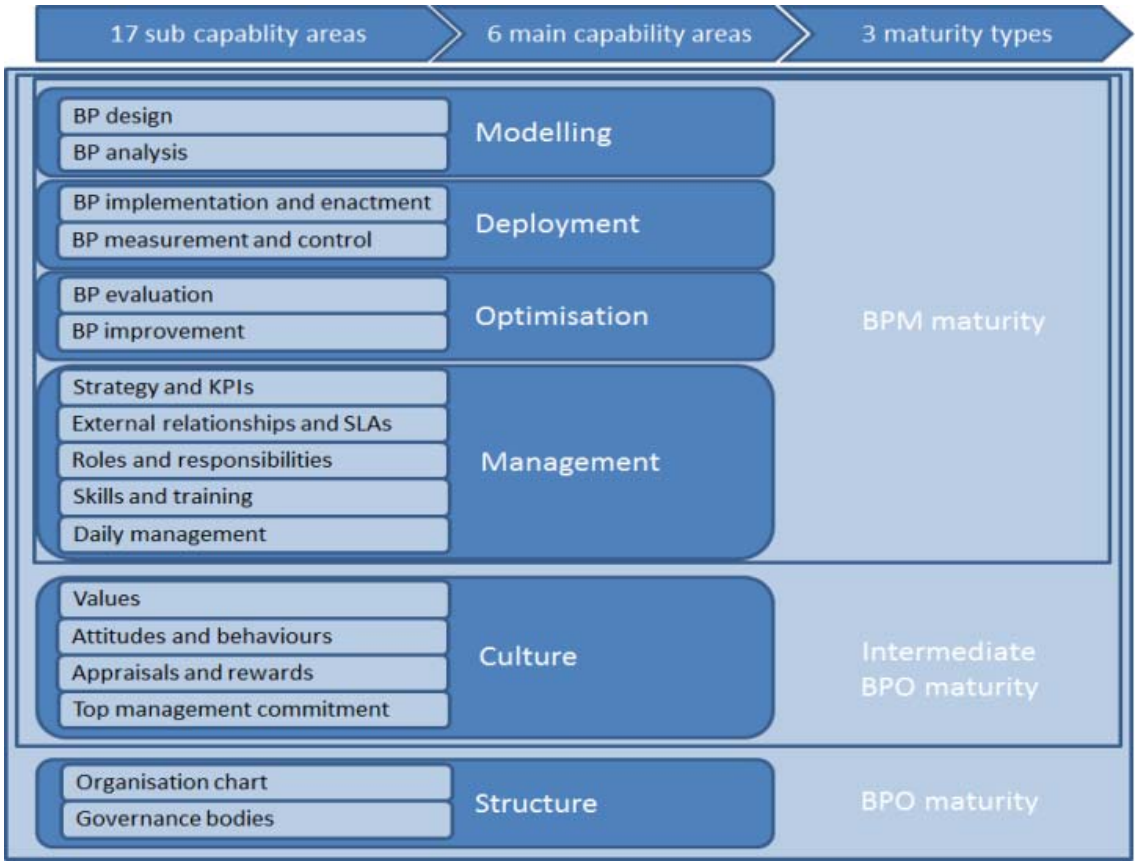

Figure 2.7: Typology for business process maturity
(Van Looy et al., 2012)

As a conclusion, some authors classify explicitly between BPM and BPO. In terms of this research, it is considered whether this distinction and the impact of SAP must be made here, in addition to the investigated BPM maturity models. It can be evaluated during the research process whether the companies are referring to BPM or BPO or if the distinction between BPM and BPO does not in fact matter in practical terms for an ERP project with SAP. Furthermore, one can examine whether the BPM maturity models could be used within a BPO founded organisation structure or if the distinction between BPM and BPO does in fact matter in practical terms for a BPM maturity model and its IT business

system. Van Looy, De Backer, and Poels (2010) also suggest investigating how general IT could influence each of the six main capability areas. It would be more desirable if BPM maturity models measure the maturity of Business Process Management and not only the maturity of business processes (De Bruin & Rosemann, 2004).

As a further step, this research will not explore general IT behaviour. Rather, this study investigates if SAP provides the necessary IT conditions to reach the highest maturity levels or if SAP affects the usage of BPM maturity models. In addition, this research considers whether SAP has restrictions which do not allow a BPM maturity model to reach the highest levels. The intention of this research is not to present a new BPM maturity model which supports special SAP behaviours.

On the basis of the literature research, the following definition of BPM maturity models was developed for this research:

BPM maturity models are a specialisation of maturity models and focus on the field of business process management. BPM maturity models measure and aggregate the capabilities and present a road map for the improved use of an organisation's business process management.

A practical investigation about the usage of general BPM was made in a survey of the management consultancy BPM&O GmbH and BearingPoint GmbH, which investigate organisations in Germany, Austria and Switzerland (Höhne, Schnägelberger, & Vogel, 2015). That report of 'Business Process Management 2015' examines the current state of the implementation of business process management in the economy and public sector. One question of this study deals with the use of BPM maturity models at companies and asks whether companies use maturity models. From 278 participants, 57% denied this question, and 15% indicated they use an existing maturity model. Another 22% use an individual developed maturity model for their organisation, and the last 6% use a combination of existing and individually developed maturity models.

On the question of which existing maturity model they used, the following answers where given from the 15% who answered that they use an existing maturity model:

- 34% use CMMI
- 20% use eden
- 14% use PEMM
- 8% use Spice
- 24% use other models like EFQM, IPP Process Playbock or Cobit.

Consequently, this study demonstrates that BPM maturity models are certainly used in practice but still not by many companies. If an established BPM maturity model is used, then over 50% of the companies in this study use eden or a CMMI BPM maturity model. The purpose of this research now turns to finding these organisations that are using established BPM maturity models.

2.3 BPM, maturity models and SAP

So far, BPM, maturity models and SAP have been mainly considered in isolation. This section assesses how the three terms are used together in the existing literature and how this can support the research.

BPM and Process integration are known topics in the literature. They have been discussed for over 25 years (Corallo et al., 2010), but the literature analysis indicates only a few articles regarding whether IT does or does not matter in general for maturity models. Van Looy (2010) published an article about IT matters for business processes maturity and agrees with Carr that 'IT does not matter, but it enables higher process maturity'

The literature above discussed the relationship between general IT and the use of business processes, but there exists also literature specifically about the relationship between ERP systems and business processes. For example, Allweyer (2014) describes quite generally that a BPMS can contain connectors or adapters between their business process engine and an external system like SAP or other ERP systems. In addition, Vom Brocke et al. (2014) explain that the selection, acceptance and use of IT is a fundamental part of BPM. Business and IT need to connect with each other in order to realize better business value.

Holland and Light (2001) describe a maturity model that can be used for the application and development of ERP systems in organisations. Their model examines in a simple three-step stage model how far the ERP system and its

processes are used strategically in a company. They explain that ERP systems cannot support all IT requirements in organisations, but such ERP systems support most of the core functionality needed. Neubauer (2009) mentions in his research paper that ERP systems can influence the companies' business processes in general. Patig et al. (2010) support this in their empirical study about the IT requirements of business process management maturity.

These studies focus on the general company level and IT systems as a whole, but do not address the question of which business process maturity model could be used if SAP is the central IT business system in the company. Additionally, Van Looy (2013) puts forward the 'BPMM Smart Selector ' - a decision tool to choose the 'best fit ' maturity model for an organisation. However, this tool does not consider which IT system or ERP application is used in the organisation – and this could be relevant to achieve higher process maturity. In an additional article, Van Looy et al. (2013) highlight that further research could investigate the question of whether maturity models could be selected on the basis of IT business system alignment. This would require investigation of the relationship between BPM maturity models and IT business systems at a strategic, tactical and operational level.

This research deals with the special behaviour if SAP is used as IT business system in conjunction with BPM maturity models. Therefore, the question arises how SAP is dealing with BPM maturity models, or on the impact of SAP on the utilisation of BPM maturity models.

Scavillo (2008) reported that for the SAP AG, the usage of BPM is in general a cultural change and that SAP adopts these changes and transformations to reach better process efficiency. For the SAP wide cultural change, they use their own developed process maturity concept for their company. Therefore, a BPM maturity models was developed from SAP AG, called Process Maturity Analysis. This maturity model analyses the processes at SAP AG, which were then continuously enhanced and optimized (Snabe et al., 2008).

As in other BPM maturity models, SAP's own model is based on a questionnaire evaluation and each analysed process within the organisation

results in a maturity level. The model offers five process maturity levels, as the following figure demonstrates:

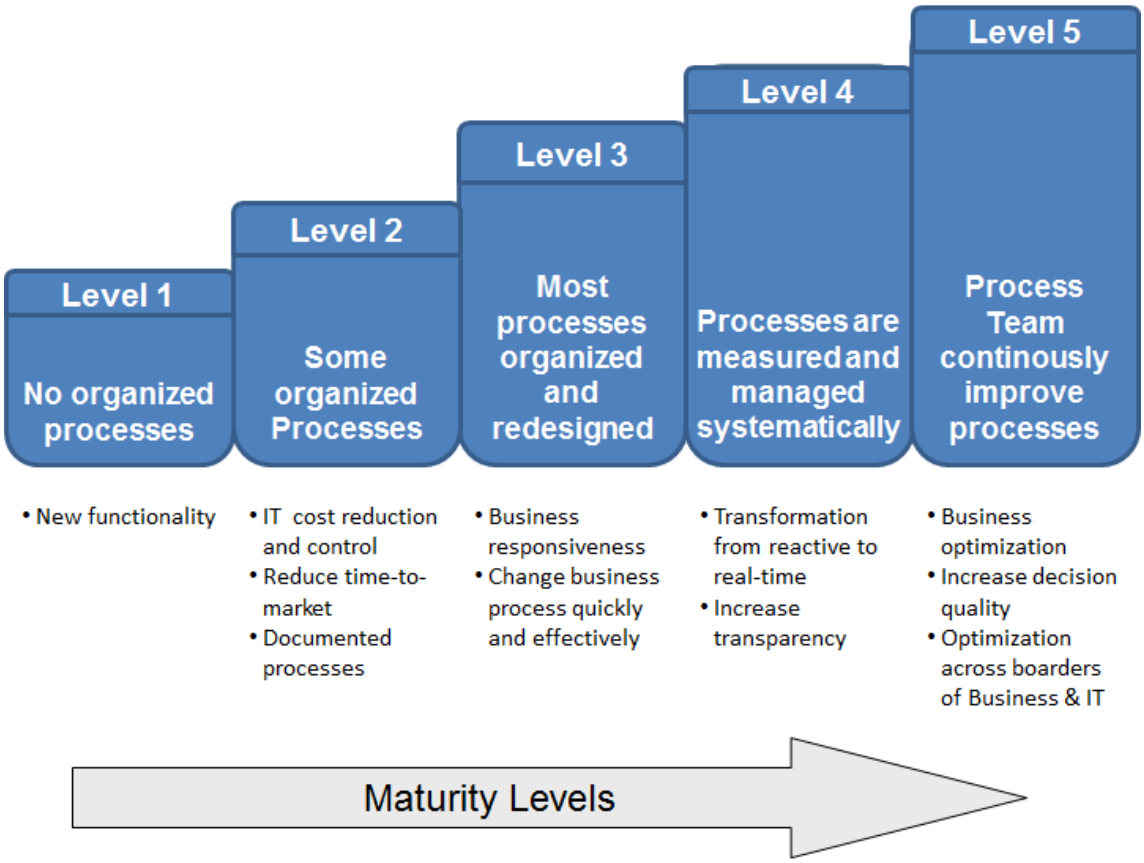

Figure 2.8: Process Maturity Levels
(Scavillo, 2008)

Van Looy (2010) demonstrates in her research that the SAP maturity model has the same behaviours as other models, having a special focus on SAP as a specific tool to model the business processes of their organisation. One aim for this research is to explore this SAP maturity model in more detail as well as the dependence on SAP ERP as a software system.

Overall, no paper or article was identified during the literature review which focuses on the question of whether SAP impacts on the utilisation of BPM maturity models. The best analogy is a paper from Van Looy (2010) about the IT usage for business process maturity. She outlines in her conclusion that most maturity models recommend IT to improve the process modelling, deployment and optimisation within a BPM maturity model. Summarising, she emphasises that general IT usage enables higher process maturity. This statement directly leads to this research on SAP as a more specific IT system and the question about the impact of SAP on the utilisation of BPM maturity models in ERP

projects. Could this research identify if the use of SAP perhaps promotes faster or higher maturity, in the same manner that the general use of IT systems does? This research will therefore help bridge the gap within the literature and will indicate if there exist dependencies between the use of SAP and BPM maturity models.

2.4 Research questions

This section leads to the formalizing of the research questions and summarizes which research questions arise from the previously conducted literature review.

A historical debate exists about the character of IT in general. Some researchers claim that IT does not matter. Some practitioners state that IT does matter and that it affects business processes. With SAP being a very common IT business system, this research considers a very special view regarding a used IT business system. On the basis of experts who have already gained practical experience in this area, this research analyses how SAP impacts on BPM maturity models in ERP projects.

The following figure illustrates that this work has been constructed from various literature sources and has been influenced by various statements.

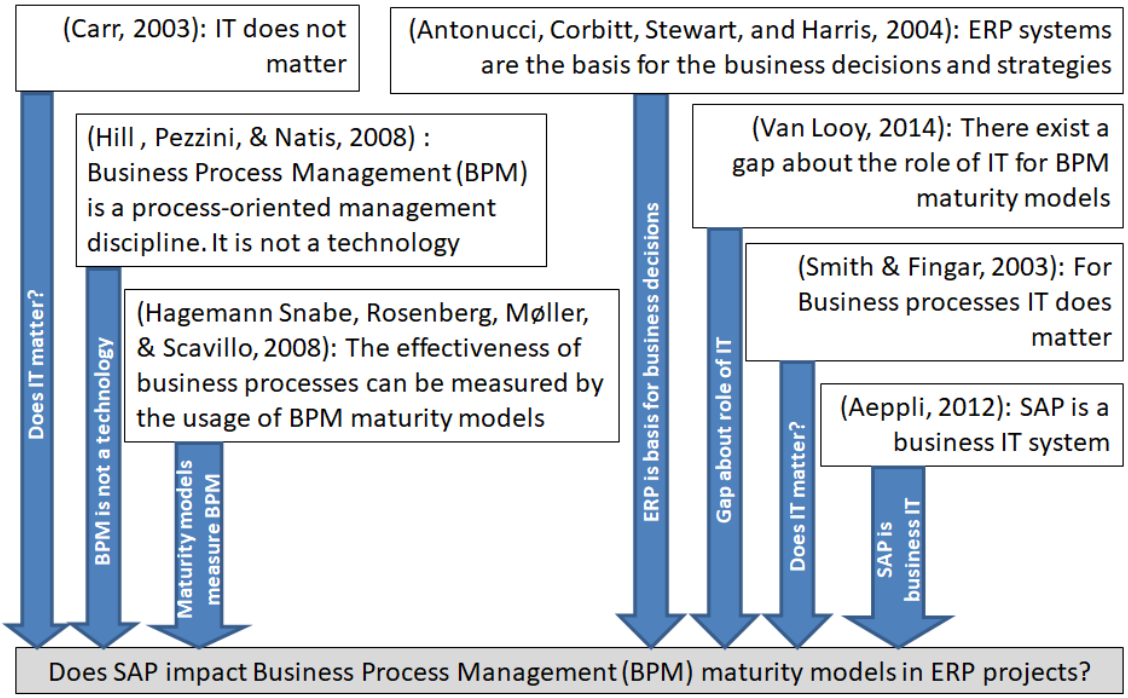

Figure 2.9: Literature influence for the overall research focus

The overall aim for this research is to establish if SAP - as a specific IT system - can influence BPM maturity models. In general, the research evaluates if SAP provides restrictions which do not allow a BPM maturity model to reach the highest maturity levels. In addition, this research examines the practical behaviour of SAP and BPM maturity models.

Historically, the BPM approach arises from different IT techniques and management concepts. The literature demonstrates furthermore that BPM can be combined with these historical techniques, for example with the Six Sigma approach (Harmon, 2007). It must therefore be evaluated whether restrictions on BPM maturity models are caused by a combined usage of different concepts or IT technologies. Further analysis will establish whether changes in SAP implementation are required if SAP is used for a BPM maturity model, and if implications for maturity models can be indicated for different SAP processes.

Building on the above assessment of existing literature review, the following research questions are developed:

Research Questions:

1) How are BPM maturity models used in the planning and implementation of ERP software projects?
2) How does SAP impact upon the use of specific maturity models?
3) To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

2.5 Conceptual framework

This section establishes a provisional conceptual framework drawing upon the literature review and in the context of developed research questions.

Miles and Huberman (1994) described a conceptual framework as an important aspect for showing a researcher's fundamental ideas about their research project. The development of this conceptual framework begins with a presentation of the main results of the literature review. It also demonstrates the possible interactions between the SAP, ERP, and business process management (BPM) maturity models before the research questions and objectives are presented. Finally, the last sub-section identifies the collectable

attributes and variables to answer each of the three research questions of this thesis (Saunders, Lewis, & Thornhill, 2009).

2.5.1 Contextualization

This research deals with the technical terms ‘SAP’, ‘BPM’, and ‘maturity model’. The study considers the relationships between these three areas in the context of the implementation of ERP in companies.

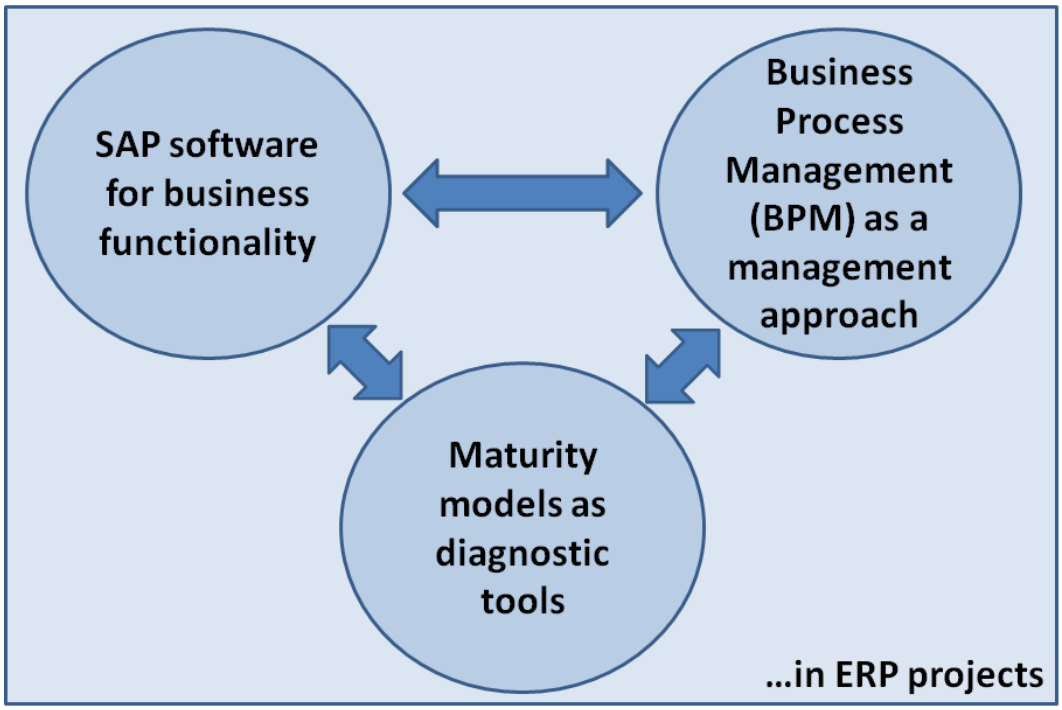

Figure 2.10: Technical terms in the context of ERP projects

The general deployment of IT in BPM projects has been considered by researchers such as Vom Brocke et al. (2014), as a fundamental element towards realising better business values. They identify IT as a tool for better BPM utilisation. Furthermore, research on this topic has demonstrated that IT is most likely to improve the maturity of BPM (Van Looy, 2010).

BPM maturity models offer the opportunity to measure the maturity of BPM in organisations; they deal with process management and aim to improve processes (Harmon, 2009). Not all BPM maturity models investigate the use of IT. However, the utilisation of IT can support the utilisation of BPM maturity models. Some maturity models require special IT hardware or IT software tools to reach the highest maturity level. Van Looy (2014) explains that there is a gap in the literature in terms of the appropriate role of IT in BPM maturity models.

She indicates that no research exists on the general IT acceptance or IT business system alignment for BPM maturity models.

In many BPM maturity models, IT plays only a minor role and is only one explored dimension within a model. However, it is unlikely that a BPM project could make progress in practice without any IT support, and the use of IT should be considered when a BPM project is realised (Vom Brocke et al., 2014). Therefore, BPM maturity models could be considered in the context of the usage of technology. This research analyses this gap in the literature with the unique IT perspective of SAP and indicates dependencies between the use of SAP, ERP and BPM maturity models.

There is a wide variety of different ERP software on the market, but SAP is the world's largest provider of enterprise application software. The SAP AG reported that 87% of the Forbes Global 2000 companies and 98% of the 100 most valued brands use SAP software in their organisations. In addition, over 80% of SAP customers are small and medium-sized enterprises (SAP AG, 2017b). Consequently, SAP is a global player on the market and the SAP ERP software system is the world’s market leader for the ERP environment in organisations (Pang, Dharmasthira, & Montgomery, 2015). This circumstance is one of the main reasons why this paper is considering the special SAP approach.

A good ERP system promises to be the data and information base for management decisions (Antonucci et al., 2004). However, the question arises, if a given ERP system influences the utilisation of BPM maturity models, whether this software system is the base for general process data which could be used for a BPM maturity model analysis.

SAP provides, with the ERP system, a special IT tool with pre-built business processes and recommends these processes as good management practice (Kim Man & Keith, 2005). A BPM maturity model could determine whether these SAP ERP standard processes are really as good as the advertising promises. Many companies already use SAP ERP and the question arises of whether these companies already possess a certain advantage in the use of BPM maturity models through the use of SAP ERP. It can therefore be examined

whether a certain process of maturity is provided to organisations through the use of SAP ERP. BPM maturity models and SAP ERP both focus on process and deal with optimal business processes for organisations and processes improvement. SAP ERP and most BPM maturity models were developed independently, and this research examines how they can depend on each other.

2.5.2 The role of SAP ERP in BPM projects

This research aims to compare concepts which imply similar ideas. On the one hand, there exists the SAP ERP systems, which include pre-built business processes recommended to be the best known business processes for organisations. On the other hand, BPM promises an improvement of business processes for organisations. Both concepts have the same aim of optimizing an organisation's processes.

BPM maturity models have a diagnostic tool to measure the effectiveness of process at organisations. This measuring tool can be used in addition to SAP ERP and BPM. It analyses, with a framework of tools and methods, the growth of BPM at organisations.

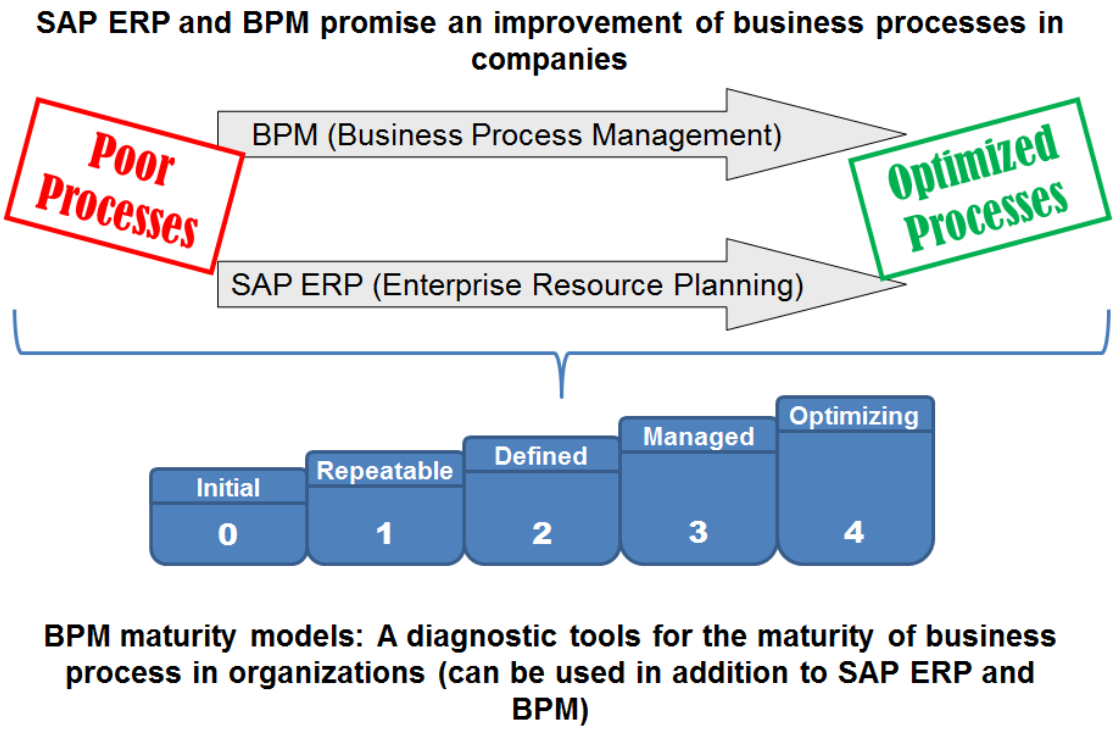

Figure 2.2: Interaction of SAP ERP, BPM and BPM maturity models

This study considers the relationship of all these concepts and how these are used in practice.

2.6 Summary

The literature review demonstrates that a BPM maturity model is basically a diagnostic tool to measure the effectiveness of processes in organisations. This measuring tool can be used in addition to SAP ERP and BPM. It analyses, with a framework of tools and methods, the growth of BPM in organisations. This is the theoretical approach, which has been presented by the literature. But how does the practical use of BPM maturity models take place within a company and to what extent does the use of an SAP ERP system play a role? The following three research questions have been developed to investigate the practical business and IT connections in more detail:

1) How are BPM maturity models used in the planning and implementation of ERP software projects?
2) How does SAP impact upon the use of specific maturity models?
3) To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

The literature suggests that a BPM maturity model can be used anytime and anywhere. But what is the actual practical application like in a company when an ERP system is in use or should be introduced? The first research question is therefore developed to explore the practical application of BPM maturity models in ERP projects and the experience gained in the implementation of maturity models. As described in sub-section 2.3, there is only a small body of literature regarding the relationship between ERP systems and the use of BPM maturity models. Thus, answering this question can show whether and how BPM maturity models are used in ERP projects, and leads to other related sub-questions: Are there certain prerequisites for using BPM maturity models, or is the implementation of an ERP software project independent of the use of a BPM maturity model? Does a BPM model require a special function within an ERP system or does an ERP system already have to be used for a few years to implement a BPM maturity model? For this purpose, the decision-making process within the company is analysed. In addition to dependencies, this

research question is also intended to show how and to what extent BPM maturity models are used within ERP projects in practice and if ERP projects deal with BPM maturity models, and if not, why not.

The second research question assesses the impact of SAP on the use of BPM maturity models. It examines whether a BPM maturity model accepts the process behaviours which an SAP system provides or whether some changes to the standard SAP system are necessary to use a BPM maturity model. Most BPM maturity models recommend the use of IT to improve the BPM maturity in the company, but the literature research has illustrated the fact that this IT recommendation is very generally addressed. This research identifies for the investigated BPM maturity models if there are any limitations which make it impossible to use a BPM maturity model within the SAP environment. However, SAP is only one possible ERP platform that a company can use and there are many other ERP tools on the market, but the SAP ERP platform is the market leader. For this reason, it is of interest for many companies to know the impact and constraints which can have a restrictive effect on the application of an SAP ERP system if a BPM maturity model is used. In addition, it is to be determined what the implementation strategies of the companies are. Should there exist first of all an SAP system and a BPM strategy within the company before a BPM maturity model is introduced, and what is the usual order for the introduction of these three topics and why?

The third question suggests a classification of the BPM models to their SAP suitability, should this be possible within the examined BPM maturity models. Whilst Van Looy (2010) has already introduced a classification of BPM models according to their general IT suitability (cf. 2.2.1), a more comprehensive classification is introduced through addressing this research question and specifically adapted to the use of SAP ERP. It is expected that different BPM maturity models have different requirements and different dependencies when using SAP as a basic ERP system. This question determines what these differences are and how the examined maturity models could be classified according to their SAP suitability. It is also important to investigate whether special SAP modules like SAP FI or SAP CO are better or worse suited for the use of certain BPM maturity models. For this reason, the SAP modules which

are used within a company are also analysed for this question, and whether different modules are used differently in certain BPM maturity models is investigated.

3 Research methodology and design

This chapter establishes which methodology is selected for this research and gives reasons why it is preferred. The following sections outline in more detail the research principles, the philosophical thinking and the approach behind this research. They demonstrate why certain research instruments are used for this work. Then, the adoption of an explanatory research strategy is discussed and the selection of research groups is explained. This is followed by a description of the research choices with independent sources. The subsequent sections describe the time horizon, techniques and procedures for the analysis and evaluation of the research. Finally, the ethical principles are identified and a brief overview is provided, which lists the research questions with the associated methods.

In general, this chapter explains why this research follows a post-positivist approach.

3.1 Research principles

Cryer (2006) evaluates some basic principles for research methodology and includes a body of methods used to gather and process data. Saunders et al. (2009) established a 'research onion' with six layers to gather and process the main data. The researcher has to identify each of the six layers to understand his own research process from a structural viewpoint. The following figure demonstrates the chosen research principles for this research.

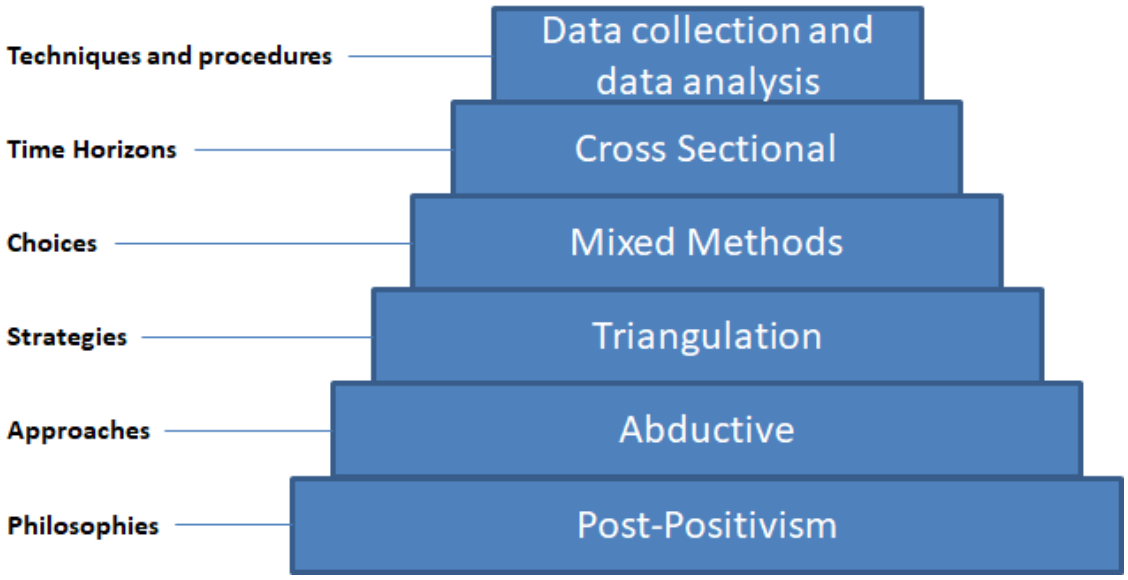

Figure 3.1: Research principles for this research

3.2 Research philosophies

The philosophy contains important assumptions about the world view of a researcher (Saunders et al., 2009). This research adopts a post-positivist position (Guba, 1990; Ryan, 2006) and this section describes the justification for this position.

All paradigms are based on three fundamental questions, defined thus by Guba (1990):

- Ontology: What is reality or what exists?
- Epistemology: What is the relationship between knower and knowable or how we know what we know?
- Methodology: How should the questioner find out knowledge?

The philosophy of this research adheres to the work of Ryan (2006) which describes the differences between positivism and post-positivism. Based on that paper and Guba's' (1990) descriptions, the author identifies himself as a post-positivist researcher and answers the questions in the following manner:

Ontology → What exists?	• Research is wider than expected, because different things can be used as research. • Research is more complex than a positivist usually thinks. • There are limits to research; reality can never be completely understood.
Epistemology → How do we know what we know?	• Post-positivists discover that there is no neutral knowledge. • The research avoids dualistic thinking by the descriptions of opposites as a result. Researchers know that research and science is multiple and complex. The world is not only black and white. • The ethical aspects of the research are emphasized.

Methodology → How do you discover knowledge?	• The post-positivist has a learning role. The researcher learns with the topic. They work with people directly rather than researching them. • Researchers know that there are limits to research. • Investigate problems rather than solving the problems. Researchers know that research can involve open-ended exploration.

Table 3.1: Approaches of a post-positivist philosophy (based on Ryan, 2006)

A post-positivist world is composed of various complexities that are considered within the research. O'Leary (2007) outlines miscellaneous indicators for a research document in a post-positivist manner, for example:

- The impact of the subjective positioning during the research.
- Recognizing that several truths can exist and that the described 'truth' is based on the researcher's own research methods.
- Exploring the reliability of the research by well documented and systematic methods. This includes an explanation regarding the subjectivity of the researcher during the research and how this impacts the result.
- The fact that the research result is not necessarily transferable to a different group, setting or group size.
- Based on the research paper, others should understand, through a deep explanation, how and why the researcher has come to their conclusions. This is necessary, since in a different research context, other results would have been found.

The goal of post-positivism research is the generation of 'new knowledge that other people can learn from and even base decisions on' (Z. O'Leary, 2007). The new knowledge for this research is the development of principles that can be used to make decisions for a particular company (see section 5.2).

The ontology of a post-positivist researcher assumes the existence of research limits. One limit for this research is the identification of all existing BPM maturity models. It is nearly impossible to identify all BPM maturity models because they

are continuously being developed. Moreover, the models are not always clearly demarcated from each other. This was described in section 2.2.4, which shows, for example, that the literature does not always clearly distinguish between BPM and BPO models.

As determined by the literature review, new maturity models in different specialized fields are generated almost daily (Becker et al., 2009b). Therefore, the realities of maturity models deal with different key aspects and cannot be reviewed and understood completely in all their detail by one researcher within a limited timeframe and multiple specifications.

The epistemology for a post-positivist describes that objective research is a complex work with interactions between researcher and persons. Furthermore, Onwuegbuzie (2000) outlines that data from different sources lead to an optimum result. The best research is constructed from different views. Therefore this research uses triangulation from different data sources (see section 3.5).

Based on the philosophy explained here, the following summary explains why this work adopts a post-positivist position:

- The topic is much more complex than one researcher can investigate in a limited time. There are hundreds of different BPM maturity models, and almost daily new models are developed. Therefore, it is never possible to examine all existing BPM models.
- The researcher learns with the topic, because it is not possible to know all the existing BPM models before interviews are performed.
- Through the learning role within interviews, the researcher is influenced by the respondents and no neutral knowledge is transmitted. The researcher gets to know only specific models and learns from what an interviewee reveals.
- The determined principles emerge from the interviews and the interviewed experts. If other experts are interviewed, this can lead to additional or different results.

- With this research, new knowledge is developed in the form of principles. These principles can be used by other organisations to make business decisions.
- This research does not solve any problems but rather highlights the impacts of SAP on the utilisation of BPM maturity models in ERP projects.

3.3 Research approaches

Saunders et al. (2009) outline two major research approaches:

- Deductive: This approach tests a theory
- Inductive: This approach builds a theory.

Bryman and Bell (2007) support this theory and explain that the relationship between theory and research has a different sequence in each of these two approaches. The deductive approach starts with a theory that requires testing by a research, and the inductive approach produces generalizable outcomes from research:

- Deductive: theory tested by observations / findings
- Inductive: observations / findings produce a new theory

However, there still exists a third approach to describe the associations between theory and research: The ‘abductive’ approach, which has the goal of representing the theory which ‘inferences to the best explanation’ (Harman, 1965). Like an inductive research which generates a theory from the research (Greener & Martelli, 2015), an abductive research approach uses observation and selects the theory ‘that is the best from an explanatory point of view‘ (Iranzo, 2007, p. 340).

- Abductive: observations → theory which inferences to the best explanation

The literature often gives an explanation of the abductive approach through the analogy of wet grass. Rain could be the best explanation for wet grass; however, it may depend on where you live and whether you have also considered that in a dry period during the summer with wet grass and dry streets, a sprinkler system could instead be the best explanation (Doyle, 2015).

The full knowledge of the case examples and their generalisability could make the difference between inductive and abductive approaches (G. Thomas, 2011). The researcher recognises the limits of the generalisability and that a misjudgement could be made in the research because the most simple and most likely explanation is discussed (Reichertz, 2004).

This research has an abductive research approach towards examining the impact of SAP when used with BPM maturity models in ERP projects. It is quite possible that the inclusion of other experts would have led to a different result. As described in the methodology section, by using the post-positivist position this research understands that the world is much more complex than the researcher considered during the research.

In more detail, this research starts with a case research on organisations which use BPM maturity models. It builds then a generalised theory regarding the behaviour in practice of different BPM maturity models in SAP ERP projects. Finally the research concludes with a second survey to analyse the practicality of the generalised theory and investigate the found explanations. As described by G. Thomas (2011), this exploration uses the abductive approach in the form of a case research method to collect facts from the examined case examples, followed by a judgment about the best explanation of these facts. For this purpose, four different BPM maturity models are studied, with at least two experts of BPM maturity models being interviewed in each case example, before a general output is generated. Finally a web survey evaluates the general applicability of the findings from the case examples. For this final survey, process managers and process consultants are then interviewed within a web survey.

3.4 Research groups

As described in section 3.2 data from different sources lead to an optimum result (Onwuegbuzie, 2000). These data can for example arise from different groups that are analysed.

First, personal interviews investigate in-depth the expert knowledge from the practical use of BPM, SAP and BPM maturity models. But what makes an expert for the purpose of an interview? For this study, an interview expert is

defined as a person who has many years of experience in the areas of SAP and BPM. In addition, these professionals use BPM maturity models or similar approaches to improve BPM in organisations. As a requirement to be an expert in this context, a practical experience of approximately 10 years in the mentioned areas is expected.

In addition to these requirements, the experts within these interviews come from two different groups:

- Users who utilise BPM maturity models
- Developers that have produced a BPM maturity model

Both groups deal with the models in praxis for their organisations. The study should have a high degree of relevance to practice, therefore, a group of academics is not considered. Here, two practical groups are examined, composed of the developers and users of BPM maturity models, and are able to give expert opinions. These groups can offer practical experience, deeper insights and support the post-positivist approach through a learning role during the research process. Experienced users in the BPM environment would come primarily from process consultants and process managers who handle SAP and BPM on a daily basis.

Van Looy et al. (2013) identify 37 different BPM maturity models, the highest number of possible models. In addition to that, one more BPM maturity model is known through the professional practice of the author. This results in a minimum number of 38 possible experts if at least one developer or one user for all mentioned models is interviewed. But not all model developers and users are willing to participate in an interview. The aim should be to find, for this research and each researched BPM maturity model, at least two experts which used or developed the specific model in practice.

As mentioned in the literature, a sample size of one expert is too small (Bryman & Bell, 2007) and due to time and cost considerations, more experts per maturity model could be difficult to handle for one researcher. Not all maturity models are used in practice and not all companies are willing to provide information about their SAP environment. In later phases of the research, it was

difficult to find at least two experts per reviewed maturity model from different organisations who were willing to provide information.

As described in sub-section 2.2.4, the maturity models which use ‘General IT’ and ‘Specific IT’ are the most interesting models for this research. Therefore, BPM maturity models should be considered which suggest any kind of IT, such as hard- and software tools or databases, and BPM maturity models which refer to specific IT tools, for example any kind of CRM system.

Based on the methodology, a post-positivist has a learning role and learns by different sources. As already highlighted, the literature mentions a different number of BPM maturity models and it is impossible for the individual researcher to know all existing models in detail. For example, the researcher has to evaluate which SAP restrictions are given for different maturity models and if, for example, ‘Gartner's maturity model for Business Intelligence and Performance Management’ (Hostmann & Hagerty, 2010) can be used in the same way as a pure BPM maturity model which does not consider performance management.

This unknown knowledge forces a researcher into a learning role for the data research, just as the methodology assumes is the case for a post-positivist. It should be emphasised that the aim is to investigate the restrictions of BPM maturity models if SAP is used and to develop a comprehensive mapping to indicate their suitability with SAP processes. The aim for this research is *not* to solve any problems with the usage of BPM maturity models within a SAP environment.

3.5 Research strategies

As an explanatory study (Collis & Hussey, 2009), this research investigates the relationship between SAP and BPM maturity models in ERP projects using several methods and a qualitative research approach.

According to Saunders et al. (2009), the use of more than one method or data source in qualitative research is called triangulation. Triangulation is used in qualitative research to test the validity of information from different sources (Carter, Bryant-Lukosius, Dicenso, Blythe, & J Neville, 2014). This research

uses a research design comprised of personal interviews, a documentation review and a web survey.

The following figure illustrates the research strategy and the different sources for this research:

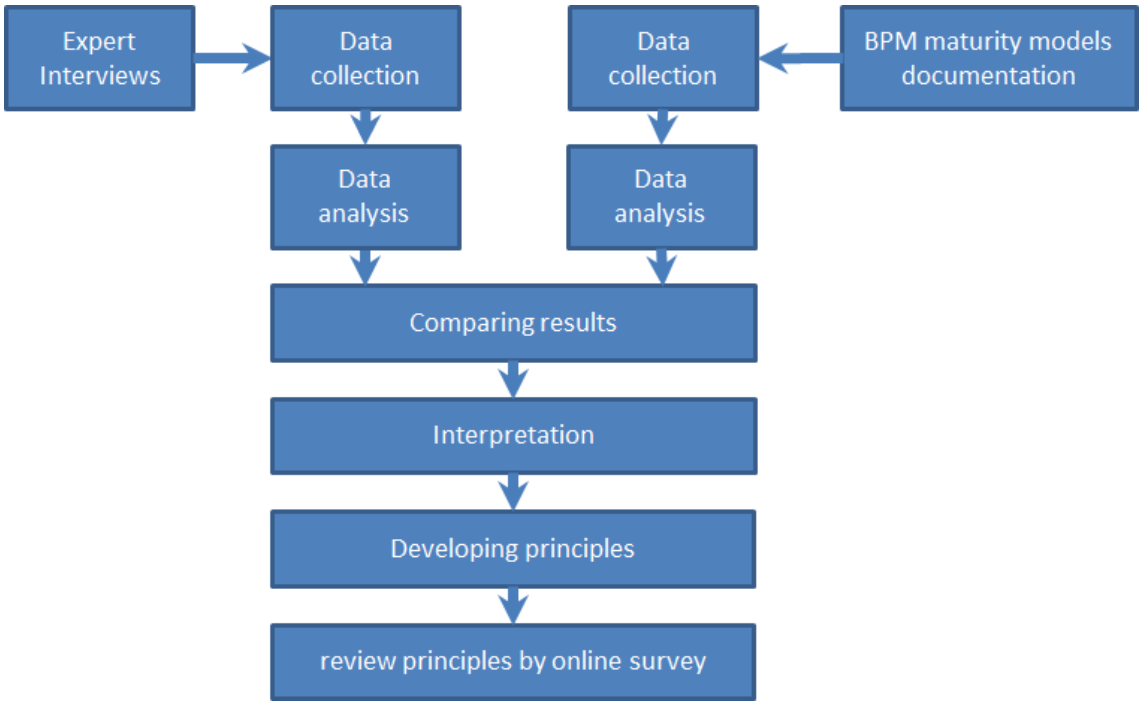

Figure 3.2: Method of data collection and analysis

First, experts were interviewed face to face about the application of BPM maturity models in practice, depending on the use of SAP. Due to the fact that most experts know a specific maturity model in particular, the results for each interview can be classified into a case example that belongs to a specific BPM maturity model. Therefore, the use of a specific BPM maturity model is seen within this research as a case example that is analysed. Based on the semi-structured expert interviews, this research examines in a first step a small number of organisations and their use of a specific BPM maturity model in depth. This data collection by interviews leads the researcher to adopt a learning role within a post-positivist manner.

The second data collection method explores and analyses the existing documentation of the investigated BPM maturity model case examples, as far as any documentation from the producer of the BPM maturity model is publicly available.

Based on the results of the interviews, the documentation of the investigated BPM maturity models and the results of the research questions, principles are developed that should be considered when using BPM maturity models in an SAP environment. These principles can be considered for a successful implementation of BPM maturity models within an SAP system. On the basis of these principles, it is possible to clarify whether the company makes an extensive use of an SAP system in the spirit of the BPM concept and achieves the best from the BPM and SAP world.

As a third source of data investigation, a web survey was undertaken to validate the developed principles, which are based upon the first two data sources and the knowledge gained from them. Also in this step, business experts were asked about their experiences, and for a validation of the principles. A descriptive analysis was then applied to the results of the web survey.

3.5.1 Evaluate BPM maturity models as separate case examples

As explained by Yin (2009), research with more than one case is multiple case research. This is an appropriate approach in business and management research and is used to consider the unique and different findings of different case examples and to produce a more generalisable theory from variable cases (Bryman & Bell, 2007).

This research uses multiple case research with more than one BPM maturity model as a separate case example and, additionally for each case, a minimum of two interviews if possible. The interview partners were chosen from the author's network of business and personal contacts of developers and users of BPM maturity models. A case research approach is used that draws on the expertise and experience in this network of contacts. Up to four different BPM maturity models are studied as separate case examples; the target was to find at least two experts to be interviewed in each case example.

Regardless of careful planning, there was the risk that some of these experts might not be available at the proposed interview time. The 'snowball technique' (Kumar, 2011) delivered further experts linked in some manner to those interviewed. This selection of experts can lead to constraints that limit or restrict the outcome of the research, but has the advantage that these personally

known experts make it possible to get detailed and open answers that experts not personally known may not provide.

BPM maturity model documentation (e.g. user manuals and leaflets) were also examined to complement the interview data and gather appropriate information about the usage of IT systems like SAP. This documentation was used to validate the results of the case examples (Gläser & Laudel, 2010).

3.5.2 General research strategy

In general, the research strategy enables the researcher to answer the research questions and meet their objectives (Saunders et al., 2009). This research thesis explains the relationship between SAP and BPM maturity models through explanatory research. Explanatory research takes place if the research clarifies why and how a relationship between two aspects is given (Kumar, 2011). Thus, this research clarifies why and how SAP and BPM maturity models are dependent on each other, or whether SAP impacts the usage of BPM maturity models in ERP projects.

Within explanatory research, case research is most commonly used (Saunders et al., 2009). This research is based, first, on a case approach with semi-structured interviews for an in-depth study of various BPM maturity model approaches, and the examination of BPM maturity model documentation. The aim of this thesis is to collect data, analyse the results and generalise the outcomes, with the primary goal of answering the research questions regarding the dependency between SAP and BPM maturity models in ERP projects, for the selected BPM maturity models.

This work evaluates the two way relationship between SAP and BPM maturity models. It assesses whether SAP can affect BPM maturity models and whether the actual system - such as SAP - is of any significance in the selection and deployment of a BPM maturity model. This approach leads the researcher into a learning role and supports the developer’s way of thinking. This will also answer the question of why the usage of SAP can affect the usage of BPM maturity models.

3.5.3 Principles

As a result of the case analysis, this research suggests as a next step some principles that should be considered in an SAP environment when choosing a BPM approach. The identification and elaboration of these principles takes place after comparing the different case examples and their interpretation. The generation of the principles is done in a similar manner to that done by Vom Brocke et al. (2014).

It is not the goal of the research to develop a new BPM maturity model. The literature research has demonstrated that an IT application such as SAP ERP can support the use of a BPM approach, but not whether the use of SAP ERP rather supports or rather blocks the application of BPM maturity models (cf. 2.3).

The developed principles suggest a set of skills and features that should be scrutinised when a BPM approach is adopted within an organisation and an SAP system is used for the support of business processes. The research explores whether or not BPM maturity models already meet or exceed specific SAP requirements. Thus, the developed principles can be understood as simple suggestions for organisational and IT improvements.

3.5.4 Web survey

Finally, a web survey was used to assess the general applicability of the developed principles and the general feasibility of the findings of the interviews. A questionnaire was presented as a web survey on the internet, allowing the collection of a larger amount of data from more participants in a shorter time and more flexible manner than the personal face to face interviews (Saunders et al., 2009). Furthermore, the web survey can be used to answer the question as to whether the developed principles are considered both feasible and appropriate.

Participants in this web survey were various people such as users, process managers, researchers and consultants for SAP process management or BPM in general. Respondents had to have several years of practical experience in at least two of the three investigated subject areas of SAP, BPM and BPM maturity models. The application of the principles should allow the practitioner to provide general guidance for the successful use of SAP, BPM and the

application of BPM maturity models. The amount of time to participate in the survey was significantly lower than in the personal interview, so that more participants were willing to participate.

The participants for the web survey were chosen from the author's network of business contacts and the German-speaking business network Xing. A search in October 2016 showed more than 1,400 members for the German keyword search 'SAP Prozessmanager' or in English 'SAP Process Manager'. With the topics SAP and process management, only two of the examined areas are covered, but this keyword search forms the basis for finding further participants. The network provided the ability to contact members and send them a platform message as long as they had not disabled this function. One limitation of this platform is that a message can only be sent to a maximum of 20 unknown contacts per day.

Saunders et al. (2009) report that a response rate of 11% or less can be expected from an online questionnaire via an internet request which is open for 2-6 weeks. This leads to the conclusion that a web survey could expect a participation rate for up to 150 participants if all 1400 members are able to be contacted. The aim of this web survey was therefore to reach at least 150 participants, and this goal was achieved.

3.6 Research choices

Through the described use of semi-structured interviews, the analysis of secondary literature research by user manuals of BPM maturity models and a web survey, this research uses mixed-methods to address the research questions and objectives. The use of more than one independent source has - amongst others - the advantage of corroborating the findings from different sources and elaborating on additional aspects which are not mentioned by the other collection and analysis procedure (Saunders et al., 2009). Furthermore, the use of mixed-methods can improve the research in a complex environment on a broader level than one research method allows (Yin, 2009).

Furthermore, the combination of qualitative data with case research, and quantitative data with user manuals, strengthens the investigation regarding the complex relationship of SAP and BPM maturity models in ERP projects, before

finally enabling a theory to be constructed (Greener & Martelli, 2015) which was assessed via the web survey.

3.7 Semi-structured interview questions

Based on the literature review, the following initial research questions were developed and form the basis for the first semi-structured expert interviews. It is likely that the order of the questions will vary in the course of the conversation. It may be that other follow-up questions arise in conversation, or other questions arise through the conversation. Certainly, this guide will develop further during the interviews with new knowledge from previous interviews. Consequently, the list of questions presented at this stage is only a starting point for the first interview.

With reference to the literature analysis, it should be noted that there are different types of questions. Not all interview questions are designed for all three research questions. Many questions will have an open-ended style, to encourage conversation with the participants. These open-ended questions have the advantage that the participants can freely report on their experiences in handling models and are not forced to select answers from a given list (Kumar, 2011). This approach supports the post-positivism manner of this research, which creates a learning role for the researcher who learns directly from the participants of the interviews (Ryan, 2006).

Therefore, the following table illustrates which question refers to which of the three research questions of this research. Furthermore, the questions were divided into sub-categories to obtain a certain structure during the interview. For instance, there are some general questions which will help to classify the experts and the BPM maturity models they use. In addition, there are issues which identify the relationships of general ERP systems and BPM maturity models, or a more specific SAP ERP system and a used BPM maturity model. Moreover, there are also sections which challenge the general context of IT and ERP systems regarding the limitations and restrictions of the BPM maturity models. Moreover, a final section reminds the researcher to summarise the conversation into the key points of the interview (Saunders et al., 2009) and to thank the interviewees. The table also illustrates related questions with the symbol ⌞. These questions represent follow-up questions, which can be used to

elaborate on the previous answer, and examine whether a closer look at this detail could help the research (Bryman & Bell, 2007).

Question	*General Question*	*Research Question 1*	*Research Question 2*	*Research Question 3*
General questions				
Did you read and sign the informed consent form?	✔			
What is the name of your BPM maturity model?	✔			
What makes your BPM maturity model unique or distinguishes it from other BPM maturity models?	✔			
Do you know which BPM maturity models are used by companies if they use a SAP environment?	✔			
Within which companies (industries) is your model used?			✔	
└ Why do these companies use these BPM maturity models especially?			✔	
ERP & BPM maturity models				
Do you need an IT or ERP system to use your maturity model?		✔	✔	
Are there connections between the ERP system and the BPM maturity model?		✔	✔	

Question	*General Question*	*Research Question 1*	*Research Question 2*	*Research Question 3*
What existed first in your organisation? ERP or BPM?		✔		
Introduction of BPM maturity models				
How did you plan your BPM maturity model implementation?		✔		
What should be considered when establishing a BPM maturity model?		✔	✔	
Would you change something if you could introduce your BPM maturity model again?		✔		
SAP & BPM maturity models				
Would someone think that your BPM maturity model cannot be used because you use SAP at your company? (Why / why not?)		✔	✔	
Does SAP influence any area (such as design, deployment, optimisation, administration, culture or structure) of your BPM maturity model?			✔	✔
└ Do any of the BPM maturity model areas need SAP?			✔	✔
Does your BPM maturity model influence/affect SAP? (Why or why not?)		✔	✔	✔

Question	*General Question*	*Research Question 1*	*Research Question 2*	*Research Question 3*
Does SAP influence/affect this BPM maturity model? (Why or why not?)		✔	✔	✔
└ Does the use of SAP help achieve a better maturity level?			✔	✔
└ Does SAP provide any restrictions which do not allow the highest maturity levels to be reached?			✔	
Does SAP influence/affect the use of BPM maturity models in general? (Why or why not?)		✔	✔	✔
Is SAP affecting the development of BPM maturity models? (Why or why not)?			✔	✔
Which behaviour of the BPM maturity model is not suitable for use with SAP?			✔	✔
How does SAP support the use of the BPM maturity model?		✔	✔	
└ What is the advantage of using SAP with this BPM maturity model?		✔		
└ Is SAP an acceptable IT System for your BPM maturity model? (Why or why not?)		✔	✔	

Question	*General Question*	*Research Question 1*	*Research Question 2*	*Research Question 3*
SAPs process behaviour with BPM				
Does your maturity model recommend a BPMS?		✔	✔	
└ Does SAP influence/affect the maturity model as BPMS?		✔	✔	
Does the BPM maturity model accept the process behaviour which is provided by SAP?			✔	✔
Do parts of the BPM maturity model have to be changed if SAP is used?			✔	✔
Does SAP need some changes if the BPM maturity models is used?			✔	✔
Are SAP changes required due to the business process in the BPM maturity model?				✔
General IT				
What are the general IT requirements for the BPM maturity model?		✔	✔	
└ What are the requirements for your BPM maturity model if it is used with SAP?		✔	✔	

Question	*General Question*	*Research Question 1*	*Research Question 2*	*Research Question 3*
Did you think about IT systems such as SAP during the developing of your BPM maturity model? (Why/why not?)			✔	
Does your BPM maturity model need in general an IT system or software tools to reach the highest maturity levels?		✔	✔	
Does your BPM maturity model influence/affect the use of IT? (Why or why not?)		✔	✔	✔
└ Which IT-restrictions for the BPM maturity model exist if SAP is used?		✔	✔	✔
└ Are there general IT restrictions to keep in mind which affect not only SAP but other areas?		✔	✔	✔
Do IT systems influence/affect BPM maturity models in general? (Why or why not?)				✔
Is the use of IT a prerequisite to reach higher maturity levels for any step of your BPM maturity model? Could you give examples?		✔	✔	
└ Could the SAP software handle these IT requirements?		✔	✔	

Question	*General Question*	*Research Question 1*	*Research Question 2*	*Research Question 3*
Special maturity model questions				
Do you remember the requirements and restrictions for your BPM maturity model?		✔		
Does a developer think about SAP environments while designing a BPM maturity model?			✔	✔
Limitations & Restrictions				
Is your BPM maturity model based on the Capability Maturity Model (CMM) or other maturity models?			✔	✔
Does your BPM maturity model combine other techniques like SOA, workflows, Six Sigma or BPO?			✔	✔
└ Does the use of such techniques have any limitations?			✔	✔
└ Does the use of other techniques affect the usage of the BPM maturity model in a SAP environment?			✔	✔
Do you know of any restriction between BPM and BPO?		✔	✔	
└ Is your model a BPM or BPO model?		✔	✔	

Question	*General Question*	*Research Question 1*	*Research Question 2*	*Research Question 3*
Further information				
Could you recommend the maturity model to other SAP users? (Why or why not?)			✔	✔
Do you have any documentation for your BPM maturity models?	✔			
└ Could I please receive the documentation for further analysis from you?	✔			
Could you recommend other developers or users of BPM maturity models which also use SAP?	✔			
Conclusion				
Summary & reflection: The interviewer briefly summarises the interview and considers the key points of the conversation in their own words.	✔			
Thank you for your time and support	✔			

Table 3.2: Inital semi structured questionaire

3.8 Time horizons

The time horizon for this research is, due to time constraints a cross-sectional snapshot study (Saunders et al., 2009). The research analyses the current SAP impact on BPM maturity models in practice and evaluates the picture at the time of the study (Kumar, 2011). Overall, it describes the incidence of a phenomenon and the related factors in a short period of time, regarding the present day relationship of SAP and BPM maturity models in ERP projects.

3.9 Techniques and procedures

Personal interviews were selected to glean the greatest amount of expert knowledge from practice, and support the researcher's learning role for the data research. For this research, the semi-structured interview provides the flexibility to explain and understand the expert's opinions regarding important issues, events and patterns in the complex interaction of SAP and BPM maturity models in ERP projects (Bryman & Bell, 2007).

The software tool MAXQDA for the qualitative data analysis and comparison of the interviews supports the researcher in arranging, organising and analysing all transcribed interviews. In addition, the software tool supports a systematic interpretation of the SAP impact on possible BPM maturity models. The different interviews can be coded to identify relationships and generalisations from the interview transcription data to assist the research questions and objectives. For example, the research could group the topics in the different interviews concerning the implications for maturity model utilisation and required SAP changes.

A common approach to identifying themes within a qualitative data analysis is the use of thematic analysis. This approach allows the analysis of 'the frequency of the occurrence of certain incidents, words, phrases, and so on' (Bryman & Bell, 2007). In other words, this approach states that the amount and intensity with which a subject is mentioned and treated reflects the importance of the subject (Guest, MacQueen, & Namey, 2011). For this purpose, the coding functionality within the MAXQDA tool can be used to analyse important topics. The tool can be used to search for frequently referred to topics, or to analyse how intensively some topics are addressed within the interviews.

Additionally, the analytic function of the MAXQDA tool can be used to analyse the BPM maturity models documentation regarding any described SAP dependencies.

These research methods with multiple measurements result in the use of triangulation. This thesis uses this special type of methodological triangulation through the use of more than one method to collect and analyse the data.

It is not expected that an overall truth is obtained as a result of this research, but rather to test whether SAP affects the use of BPM maturity models and to receive at the end a generalizable result about practice behaviour.

After the analysis of the interviews and documentation, some principles were defined, before an additional descriptive analysis investigated the applicability of the developed principles. This descriptive analysis was based on a set of pre-formulated questions that can only be created after the analysis step. The information was collected with pre-formulated questions via a web survey. The main purpose of this last step is that the collected information will systematically be described in the form of descriptive statistics with figures and tables (Saunders et al., 2009). The analysis describes how many participants in the survey agree with the principles that have been defined or how often statements were made about why they did not agree with certain principles (Kumar, 2011).

3.10 Research ethics

From the analysis of Bell and Bryman (2007) and the summary of Easterby-Smith, Thorpe, Jackson, & Lowe (2008), the following ethical principles are identified as important for this research:

1.	Ensuring that no harm comes to participants
2.	Respecting the dignity of research participants
3.	Ensuring the fully informed consent of research participants
4.	Protecting the privacy of research subjects
5.	Ensuring the confidentiality of research data
6.	Protecting the anonymity of individuals or organisations
7.	Avoiding deception regarding the nature or aims of the research
8.	Declaration of affiliations, funding sources and conflicts of interest
9.	Honesty and transparency in communication about the research
10.	Avoiding any misleading, or false reporting of research finding

Table 3.3: Ten key principles of research ethics

The above ten principles are a summary of the above mentioned literature in social science, and represent the ethical aspects of research. They consider the interests of the participants, their research subject and the accuracy of the data. Easterby-Smith et al (2008) recommend that one important aspect for management and business research is the protection of the informants' interests. In addition to the ethical issues of the university, the above ethical principles are key guidelines for this research.

Each interview partner was informed about the ethical standard for this research at the beginning of the interview and will have to read and sign an informed consent form. The web survey also refers to ethical standards in the introduction section of the survey. Within the interviews the first step declares how the data are anonymized to protect their privacy and how the interview material is treated as confidential material which is only stored and accessible by the researcher. This form is a paper which explains that the participant was 'fully informed about the nature, purpose and use of research to be undertaken and their role within it' (Saunders et al., 2009, p. 593). This form is explained and handed out at the beginning of an interview. It explains to the participants the five main aspects of the research which are illustrated by Saunders et al. (2009, p. 191), as follows:

- the nature of the research
- the requirements of taking part
- the implications of taking part and participants' rights
- the use of the data collected and the way in which it is reported
- who to contact if there are any questions about the research.

Based on the 'information letter and consent form for research participants' on the website of the University of Gloucestershire (MacLean, 2014) and the example consent form by Saunders et al. (2009, p. 192), an Informed Consent Form has been developed for the interviews which collect a lot of personal information and is included as an appendix to section 9.1. The web survey, on the other hand, can be answered completely anonymously and refers to the ethical standards that are used.

3.11 General research overview

To conclude this section and provide a brief overview, the following table describes which research question was explored by which method, and which design and what sample was investigated to address the question.

	Research Question	Method	Design	Sample
RQ 1	How are BPM maturity models used in the planning and implementation of ERP software projects?	Interviews	Semi-structured interviews with open-ended questions	Users of BPM maturity models + BPM expert from SAP
RQ 2	How does SAP impact upon the use of specific maturity models?	Interviews & Analysis BPM documentation	Semi-structured interviews with open-ended questions + Analysis of BPM documentation	Users & Developers of BPM maturity models + BPM documentation (4 case examples)
RQ 3	To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?	Interviews	Semi-structured interviews with open-ended questions	Users & Developers of BPM maturity models (4 case examples) + BPM expert from SAP

Table 3.4: General Research Overview

4 Findings

The previous chapters have described the theoretical approach and how the research was carried out. This chapter describes the execution of the research and how the answers to the research questions emerged from the interviews and the documentation of the maturity models. The purpose of this chapter is to provide a basis for the following chapters from the practical experience of the interviewees and the available documentation.

This chapter contains first, the key findings of the expert interviews. The first section provides a general overview regarding the selection of interviewees and the general conduct of the interviews. Due to the thesis word limit, this chapter contains a list of the main statements for each of the eleven one-to-one interviewees. The eleven interviews are the main elements for this research and form the basis for answering the research questions and discovering new knowledge. The third sub-section examines the results of the interviews and their contributions to answering the three research questions for each case example of the analysed BPM maturity models. That third section also describes why the interviews are divided into different case examples depending on the maturity model used. Finally, the research questions are re-assessed in light of available documentation.

4.1 Introduction

The search for potential interview partners was a difficult process and resulted in many rejections. This section outlines how the interview partners were found and the interviews prepared. The interview partners are also described in the following sections as experts. Every interview partner has gained practical experience in the reviewed topics and therefore has gathered knowledge that distinguishes him/her as an expert for the purposes of this research. As mentioned before, an expert for this research is a person who has a practical experience of about 10 years in the mentioned areas. This means that for example senior managers or senior consultants are suitable interview partners for this research.

4.1.1 Determination of interview partners

The search for interview partners was conducted in the context of the author's network of business and personal contacts. It began with a search of the

personal contacts at the business networking services LinkedIn and XING. The request was for contacts who had specified the keywords SAP and maturity models on their profile. Based on the researcher's own contacts, interview requests were made to business contacts in Germany, Austria and Switzerland. In addition to this search procedure, some international conferences were also attended to get in touch with experts who have practical experience in the utilisation of SAP as an ERP system and BPM maturity models.

As a result, this searching process resulted in 64 people in Germany, Austria and Switzerland being identified as potential experts and being personally requested for an interview. Finally, eleven people confirmed they were willing to be interviewed for this research.

Those individuals were treated as experts, who had already engaged with the usage of SAP as an ERP system and who employ a BPM maturity model, or wanted to use a BPM maturity model in the future. The eleven participants included two developers of BPM maturity models.

4.1.2 Considerations in finding interview partners

Most refusals were based on the fact that the requested experts did not have practical experience with the use of a BPM maturity model. Many companies have been identified who use SAP as ERP software and also make BPM, but only a very few also use a BPM maturity model.

A short discussion with potential experts led to the impression that some companies do a qualitative process evaluation, but these companies do not use the wording 'BPM maturity model'. To examine this behaviour in more detail, three experts were interviewed, who currently apply no BPM maturity models, but perform some form of quality process assessment already at their company, or would like to apply a BPM maturity model in the future.

Most of the eleven experts willing to give an interview desired that the results of the research would be anonymous. Only three interviewees had no objection to their name being mentioned in the study, and only two people had no problem in stating the name of their company and industry in the research. Therefore, to make this research more comparable, no expert names or trade names are stated.

4.1.3 Qualitative sample size

As discussed above, only eleven experts were willing to give an interview. In the literature, the number of interviews conducted for successful research varies between different university business schools and whether the research is done by undergraduate or graduate students (Bryman & Bell, 2007). More generally, a sufficient number is reached if no new information or themes are observed in the additional data collection, and saturation occurs.

Guest, Bunce, and Johnson (2006) are more concrete and mention that about twelve participants in homogeneous groups can be enough to achieve a sufficient result. In this case, homogeneous means participants who have the same 'position' or level in an organisation, or participants who have the same background knowledge. The authors additionally point out that a sample of six interviews can be sufficient to enable the development of meaningful themes and useful interpretations.

One example is given by the CEO study by J. Latham, R., (2013) which carried out 14 interviews. The author reports that the saturation for this study was already achieved by conducting 11 interviews (J. R. Latham, 2014). For the BPM study of Vom Brocke et al. (2014), only ten practitioners are interviewed. All persons interviewed were part of the management level of a company or are external consultants, which develop the topic of BPM within different companies. These ten interviews formed the basis for the development of 'Ten good Business Process Management principles'.

For this research paper, saturation had already appeared after the 10th interview. In the 11th interview, only very little new knowledge could be analysed and determined.

Baker and Edwards (2012) explain that within qualitative research, the attainment of a sufficient quantity of interviews cannot be set at a certain number. It is crucial to achieve saturation and try to gain new knowledge through additional interviews. In addition, the use of triangulation with other research methods can show whether the number of interviews is sufficient. For this reason, this research uses triangulation by different data sources. The last step was to review the established principles through a web survey after analysing the interviews.

4.1.4 Basic conditions

The duration of the interviews ranged from 41 minutes up to 2 hours and 23 minutes. The total duration of all interviews is 14.5 hours. All experts use German as their mother tongue, therefore all interviews were performed in German and recorded by Dictaphone between December 2014 and September 2015.

Three interviews were conducted in Switzerland and eight with German respondents. Seven interviews were carried out face to face, three were by telephone, and one via skype. Subsequently, all recordings were transcribed by the researcher. Finally, all transcribed interviews were encoded and the analysis was supported and computer-assisted by the use of the software program MAXQDA as described at section 3.9.

At the beginning of the research, it was not clear which experts were available for a survey. For this reason, it was not possible to predict which BPM maturity models could be analysed by closer examination due to the practical experience of the experts. The experts are familiar with the following four different BPM maturity models: eden, BPMM, CMMI and the SAP maturity model. This means that these four models were already being used by the experts, and were described in the interviews. Three interviewees explained during the interviews that they actually use no BPM model in practice at their company, but the introduction of a BPM maturity model is being considered currently. These interviews were also particularly helpful, because the experts were able to explain what they would consider if they chose a BPM maturity model and what they think about the relationship between an SAP ERP system and the usage of a BPM maturity model.

All experts are senior managers or senior consultants in the area of BPM, SAP and BPM maturity models at different stages of BPM implementation and have at least 10 years of professional experience. Five of the experts work as consultants in various companies and five experts work at the management level within global companies. One expert initially worked in a global company and is now a consultant within the BPM topic.

The selection process ultimately led to two developers of a BPM maturity model being interviewed. The remaining nine interviewees were users of BPM maturity models or else considering the use of a BPM maturity model in the future.

The following table illustrates in more detail the interviews conducted for this research and displays the main BPM maturity model focus of each interviewee. Not all experts have already used all of the named maturity models which they discuss. Therefore the following overview distinguishes between the term ‘user’ and the term ‘known’ for a maturity model. ‘Known’ describes experts who have already heard or read something about the model but have not actively used it in their organisation.

"Name"	Date	Duration	Type	eden	CMMI	BPMM	SAP Maturity Model	Use BPM & SAP ERP and are considering using a BPM maturity model
Expert No. 1	11.12.2014	1:27 h	Face-to-Face	Developer & User	Known			
Expert No. 2	21.04.2015	0:48 h	Face-to-Face	Known				User
Expert No. 3	24.04.2015	2:01 h	Face-to-Face	User				
Expert No. 4	01.05.2015	0:45 h	Phone	Known	Known	User		
Expert No. 5	08.05.2015	1:03 h	Skype	Known	Known	User		
Expert No. 6	15.05.2015	2:23 h	Face-to-Face	Developer & User	Known	Known	Known	
Expert No. 7	29.06.2015	1:23 h	Phone	User	User		Known	
Expert No. 8	09.07.2015	1:00 h	Phone		User			
Expert No. 9	23.07.2015	1:28 h	Face-to-Face					User
Expert No. 10	24.07.2015	1:30 h	Face-to-Face					User
Expert No. 11	02.09.2015	0:41 h	Face-to-Face	Known	Known		User	

Table 4.1: Overview of Expert involvement with BPM maturity models

4.2 Overview of the interviews

This section lists the main points that have been identified as interdependencies between SAP, BPM, and BPM maturity models within the interviews. For that purpose, the researcher decides what he considers to be important and what is not. (Remenyi et al., 1998) A much more detailed overview of all interviewees can be found in the appendix. The appendix also demonstrates in more detail how the statements of the experts were arranged into different categories which form the structural basis for the research. In order to ensure a cross-case comparability of the semi-structured interviews, the interviews were arranged in a certain structure and arranged in six thematic categories for this research (Bryman & Bell, 2007).

In section 3.7 ‘Semi-Structured Interview Questions’, the questionnaire of the semi-structured expert interviews was divided into several subsections. On the basis of these subsections, the statements of the experts were also arranged into six different categories. They are:

- Maturity model
- BPM maturity model
- BPM
- IT
- SAP/ERP-System & BPM
- SAP & BPM maturity model

This structure can be seen also in the overview of the interviews in the appendix, and is important for the subsequent analysis of the interviews. This section mentions only several central points within the interviews which should be considered for an introduction and implementation of BPM maturity models if an SAP ERP system is used as a central IT system. These main statements also provide an overview, and form the general basis for the following analysis chapter for comparing the interviews (Gläser & Laudel, 2010).

Due to the semi-structured nature of the interviews, not all questions were asked to the experts in the same manner, but the experts made statements for each category. In the appendix you will find detailed answers to each topic, while this section only demonstrates a summary of outstanding statements. A

closer examination of each interview in this section would be too long and go beyond the requirements for this research.

The references to the individual research questions are presented in the following section regarding the individual case examples.

4.2.1 Expert No. 1

Summary of the main points from expert No. 1

Maturity model

- A maturity model considers the whole organisation
- A maturity model gives an orientation of what process management can be

BPM maturity model

- Eden analyses more general conditions
- Eden can be used across different industries, is neutral and independent
- Eden has no restrictions that would not allow the maximum level of maturity to be reached without the use of IT
- Eden is strongly focused on the user and less on the IT system used
- Eden does not care about the ERP system used
- A BPM maturity model should be used as a communication tool, to provide clarity about terminology and involve people

BPM

- Process management is more than documentation and drawing of the actual processes, and affects the whole organisation
- Process management for the organisation needs, strategic process goals, operational process objectives and process indicators
- BPM is a management discipline and not just a technology, the IT infrastructure has only secondary importance

IT

- Today, technologies have such potential that many users cannot imagine what IT can do for the BPM
- The question is more whether the organisation deals in general with IT and less on how the organisation deals with an IT system
- An organisation needs a flexible IT infrastructure for the corresponding processes

SAP/ERP & BPM

- SAP is a strategic decision. Many organisations need a stable partner and suspect that SAP could be a long term business partner
- SAP implementations and harmonisation projects could be used to introduce the process management into an organisation

- Most ERP vendors need a functional description and 80 percent of all ERP vendors cannot deal with process oriented descriptions
- SAP can be used in a very process-oriented manner but it is also possible to use SAP without process-oriented behaviour
- There are organisations on the market which use essential standard SAP

SAP & BPM maturity model

- A higher maturity level can be reached at the first introduction of a BPM maturity model if SAP is used in a process oriented way, but an ERP system does not fundamentally and always lead to a better process orientation
- There is no evidence of a restriction between the SAP system and the BPM model
- There are processes, such as strategy processes, in which it makes no sense to use SAP
- There must be a combination of the process model-design and the SAP customizing, but problems often arise when both sides are no longer matched with each other
- SAP could provide good support to measure processes and determine process indicators.
- SAP can provide basic controlling functionality

4.2.2 Expert No. 2

Summary of the main points from expert No. 2

Maturity model

- A maturity model is a very up-to-date topic
- The analysis and evaluation should lead to further development

BPM maturity model

- A BPM maturity model should measure how well the process management is established at the organisation
- BPM maturity models are used to measure the BPM progress and the further development

BPM

- BPM includes the planning, controlling, directing, organizing and optimizing of enterprise process models and processes in organisations
- BPM objectives should be aligned with the corporate goals
- BPM should be seen as a holistic approach
- BPM should be a management issue
- The general idea behind BPM is that the organisation wants to make further development for their processes
- BPM should be a management issue with the general idea that the organisation wants to further develop their processes

IT

- The use of IT is not a prerequisite to making a successful BPM
- If the organisations grows, it makes sense to switch to digital BPM tools and use IT support

SAP/ERP & BPM

- SAP could be a very helpful tool in business processes because it contains structured predetermined processes
- SAP or ERP systems could be helpful and support the BPM approach by predefined processes.
- SAP can be a limited resource, when employees want to work differently in the way that SAP provides the functionality
- SAP is a tool which could support the BPM approach
- SAP is very present in the minds of employees if new process models are developed

- E2 expects some saving potential if more SAP standards are used and closely linked with SAP standard processes
- Processes should not generally be based on the development of the given SAP processes

SAP & BPM maturity model

- A central SAP ERP system and a BPM maturity model can work together well but it depends on what the evaluation criteria are
- Very often there is only very rare, or non-existent, process documentation from an SAP introduction

4.2.3 Expert No. 3

Summary of the main points from expert No. 3

Maturity model

- A maturity model has two core functions: it measures the development of BPM and it benchmarks the BPM to compare its current state
- A maturity model should generate alertness and call attention to blind spots
- Maturity models always receive negative attention, because they show everything that is not working

BPM maturity model

- BPM maturity models could be used to gain an overview of the whole organisation and their BPM understanding
- It is important to use BPM maturity models in a wide and varied manner to consider several points
- A positive aspect of the eden maturity model was that questions were completed very quickly
- Whether a BPM maturity model is successful also depends on the corporate culture and the support of the top management

BPM

- The central idea is the continuous improvement of the whole organisation and their processes
- BPM could start with the optimisation of individual processes
- The human resources department should be very deeply involved with the change process of BPM
- BPM should be conducted by the human resource department together with the IT department
- Process management changes often miss a form of communication

IT

- IT must be part of the maturity model and a model must include some IT questions
- IT has a great influence on the working environment for most processes
- The expert strongly recommends the use of standard processes

SAP/ERP & BPM

- The expert recommends not including the IT department if the organisation is thinking about new processes, because they often feel compelled to use the SAP standard process
- However, an IT department added late to the process leads to a highly customized SAP system with higher maintenance costs
- There are mostly only contextual links between SAP and BPM
- SAP offers hardcoded best practices, but a company gives itself a massive workload if it changes the standard SAP processes because they are stored in a rigid system
- If a company is much closer to the standard, then life becomes easier and requirements can be better fulfilled
- Most employers see SAP as a transactional system to support the business behaviour and there are only a few interfaces between SAP and BPM
- BPM maturity models must be flexible, because there is no longer just one way, and that way is then the standard process
- A general disadvantage of SAP is the complexity of the software

SAP & BPM maturity model

- SAP had already been established first in the company, before the BPM or BPM maturity model implementation took place
- A maturity model linked closely to the SAP system would be considered as a disadvantage by some people
- SAP is, for many companies, a really powerful factor and always in the minds of the employees if they create new processes
- During the application of the eden maturity model - or even with the use of the classic SAP system - the expert missed the output of more instructions, tips or best practices
- Maturity models, but also the SAP ERP system, must adapt their role to the new digital behaviours
- There must be life-threatening or extremely painful financial advantages or disadvantages if a company wants to change from SAP to another ERP system

- SAP is also a kind of insurance, because SAP is a well-known name on the ERP market

4.2.4 Expert No. 4

Summary of the main points from expert No. 4

Maturity model

- A maturity model can be used to measure the maturity of something
- A maturity model is an indicator about the direction in which the further development of an organisation should proceed
- A maturity model must match the business objectives and corporate strategy

BPM maturity model

- The BPMM is a complex maturity model and is based on CMMI
- In Switzerland many organisations prefer to use a self-developed maturity measurement
- Swiss organisations prefer checklists rather than a maturity model
- BPMM can be used independently, everywhere and across all kind of industries
- BPMM can be used across all areas with no restrictions
- The goal is never to boost all processes to the highest degree of maturity
- Maturity models have the disadvantage that almost all processes have the same weight and are considered with the same importance
- Often the management does not understand why measurements should be made
- Problems in the field of BPM maturity models are often on a human level

BPM

- From practical usage, BPM mostly concerns the main processes and is then really focused on two or three main criteria of these processes
- The issue of cost reduction and also compliance in the insurance and banking area is an important topic about process management

IT

- The use of IT is not a requirement for the BPM approach, but the results are usually better, faster and more automated if IT tools are used
- IT should be involved if organisations use maturity models, but maturity models are not an IT subject

- Even without the support of IT, process improvements can be achieved if, for example, organisational processes or interfaces between teams are analysed and improved
- Maturity models are not generally suitable for controlling the IT behaviours of a company and new tools are needed which can support this complexity

SAP/ERP & BPM

- An ERP system is an important backbone to orchestrate or manage the whole company
- ERP systems like SAP have some preconfigured processes with given procedures and it is easier for the company to adapt to the system than to develop their own processes and implement these into the system
- The SAP ERP system could be seen negatively because the system digitizes and measures to a large degree
- A SAP ERP system is also often seen negatively by some users, because they expect predefined processes which are difficult to change and these changes costs considerable time and money
- The aim of an SAP system is to cover a wide range of business processes, but the scope of BPM is to cover a whole company and their processes
- The expert expects that SAP covers nearly 30% of the company. But there is still 70% optimisation potential in other processes which are not covered by SAP
- ERP processes often have a better maturity because they are digitized, compressed and under the control of the system

SAP & BPM maturity model

- An SAP or ERP system does not normally have a view on end-to-end processes and the ERP is only a part of the whole company
- The key should always be the end-to-end point of view and not the organisational point of view on the company
- Interfaces that communicate with other systems must be considered, and not just those within the ERP environment

- Before or after the central SAP system, there is a lot of optimisation potential and this should be analysed and optimized, before more complex SAP system changes are made

4.2.5 Expert No. 5

Summary of the main points from expert No. 5

Maturity model

- A maturity model is a quality assessment tool and improves the work of an organisation
- There is never a bad or wrong time to introduce a maturity model
- The introduction must happen in a top-down manner with commitment from the top management

BPM maturity model

- There are differences between the models. A model can evaluate each process or it can examine the complete organisation
- The main approach of BPM involves the possibility of linking multiple disciplines that traditionally run side by side, and the BPMM best addresses this holistic approach
- The BPMM Model derives from the CMMI
- The use of BPMM can be quite extensive, and can require more resources than the company is willing to give
- A BPM maturity model should indicate new or unfamiliar areas
- Some BPM maturity models have a non-transparent software behind which they perform the review; the BPMM does not have this limitation
- A BPM maturity model should analyse the end-to-end process
- A maturity assessment must be conducted differently at different industries
- Which target audience is to be achieved with the model is of importance
- IT technologies such as SOA or Lean will usually have a positive effect on the results of a maturity model, and the improvement culture of an organisation

BPM

- BPM is not a pure efficiency issue
- BPM deals with processes and how an organisation could run in a more process-oriented manner
- A company could certainly conduct BPM without drawing a process

IT

- It could be difficult to adapt old IT systems to BPM behaviours

- IT should play a secondary role within the maturity assessment
- The practical implementation of processes usually makes the direct involvement of IT necessary
- The outcome of the BPM assessments may result in IT requirements, but the processes are not made for IT
- Organisations almost always use IT to support the processes
- BPM is often driven from an IT area

SAP/ERP & BPM

- SAP provides a basic set-up that works, but may not be optimal when an organisation looks in more detail at certain processes
- SAP is probably not a flexible system
- SAP is probably not a cost-effective when it comes to customizing
- An ERP system is customizable, but in practice this would not be always possible due to time constraints, cost or resources
- That an ERP / SAP system has no impact on the used processes is more of a theoretical construct, because practically it can happen quite a lot
- Users often think around the standard software and create additional Excel or Access solutions
- Users often think about the old sequence in the IT system if new processes are created

SAP & BPM maturity model

- Theoretically, the IT system should not affect the process, but in practice the IT budget can block the used processes
- There is always a need to analyse the standard ERP processes for the practical behaviour
- It should not be the case that a company adopts a strategy that is specified by an ERP system without analysing this, and always follows the business processes of an ERP system

4.2.6 Expert No. 6

Summary of the main points from expert No. 6

Maturity model

- A model should indicate the current status of a company and identify areas that require more investment
- A model identifies what should be implemented in the company in order to be more successful
- The use of a maturity model should push the further development of the company
- In practice it is not always the goal to achieve the highest maturity level
- A maturity model could be used for controlling reasons
- A maturity model should be a driver and understand new technologies or market requirements

BPM maturity model

- The use of a model can be linked to one person and the question thus arises: who is the driver of the model?
- BPM maturity must also consider new areas of interest such as digitalisation
- The questions of a model must not be too extensive - the users must have the time to apply the model
- A model must be manageable and the eden model is, with 157 criteria, very small in contrast to other models with over 300 criteria
- The eden model has only practical and no academic criteria
- The IT behaviours in the eden model are not comprehensive enough, for example the model does not deal with media breaks or IT interfaces
- Adjustments to the ERP system only makes sense in the higher maturity levels
- A maturity model is the implementation vehicle for the strategic topic of BPM
- A maturity model makes the complexity of BPM more easily manageable
- A maturity model should stimulate the user's own thoughts about the processes within the company
- A user should first learn basic BPM concepts and use a BPM maturity model afterwards

- A BPM maturity model like eden does not provide BPM basic training
- For the highest possible degree of maturity, all processes of a company should be measured

BPM

- BPM can be used when classical hierarchically controlled entities no longer improve the company
- BPM is not an IT issue; it is a pure business issue
- BPM should have a top-down approach and must be supported by the management, and the management must practice BPM every day

IT

- Many people do not know what is possible with IT, and what IT tools can be provided to operate BPM
- Whether standard ERP processes could be used in the company should be investigated
- The use of a BPM maturity model stimulates the use of IT
- A BPM team should have a basic knowledge of how IT tools and processes could be combined

SAP/ERP & BPM

- The use of an ERP system is a good start to get first IT functionalities
- An SAP team and a BPM team should work in one single process map and not design two parallel worlds
- There is a need to reduce the separation of SAP experts and business people
- SAP offers many business processes which can be used, but these standard processes always need to be reviewed to assess their suitability for the company
- The use of an ERP system forces people to ignore what the company actually needs
- All media breaks within a process should be analysed

SAP & BPM maturity model

- SAP is, in most cases, the largest and most central IT business system tool

- System processes are often viewed as non-changeable, especially when prescribed by SAP
- A BPM maturity model forces a company not to accept things as given
- There is always a need to think about all processes and how these can be best handled with an ERP system
- It makes sense to use proven standard processes
- A company should be focused more on processes that are truly unique to their business
- The use of SAP could be the first step to reflect on processes and establish them later in a more individual manner
- The use of standard processes do not obtain the highest possible maturity level
- If a company uses only standard SAP, it is certainly not in an optimal position
- It might be a good criterion that ERP software uses as many standard processes as possible
- Only an adapted and customized SAP system creates the best conditions and highest maturity level
- Often no one knows exactly what happens inside the SAP system
- It is impossible to create a real process map from the actual SAP system
- Processes should already be measured and a SAP system can support the measurement

4.2.7 Expert No. 7

Summary of the main points from expert No. 7

Maturity model

- A maturity model is more than just a controlling and measuring instrument

BPM maturity model

- The eden maturity model is a good tool for beginners, and if a company is deeply involved within the BPM topic, then it should not use the eden model.
- The eden model is not a controlling tool for daily process management because it misses some additional control layers
- The eden model is a positing instrument for medium or longer-term goals within a BPM environment
- Eden is very striking, catchy and easy to use
- The eden model has a broad community behind it
- There are no general requirements for CMMI and eden to use these tools
- The CMMI model provides more insights for everyday usage but is very complex
- The CMMI model has a high administrative workload to define all initial and measurable values
- The scope of a CMMI application can be adjusted independently

BPM

- BPM deals with the company's management as a whole
- BPM is a structured approach and considers the whole process of a company

IT

- Process management is very often located within the IT department and limited to the aspect of automation
- It is important to establish the process management within the top management and not as a part of the IT department
- BPM needs a technical approach and the involvement of the corporate culture within the analysis

- The use of IT is not a requirement to achieve the highest maturity level, but larger companies cannot reach the highest maturity level without the use of IT
- From a certain size, a company needs an appropriate IT infrastructure

SAP/ERP & BPM

- The use of an ERP system is not necessary to reach the highest maturity level
- Theoretically, no software is necessary but in practice standard ERP software systems are used within a company
- SAP can be considered as a fully functional system without having any process ideas in the system and organisation
- A company does not automatically achieve a higher process maturity if SAP is used in a functional manner
- A process change often has more to do with the mentality of the staff and not with the technical changes
- SAP often uses the keyword process in the context of automation

SAP & BPM maturity model

- A standard SAP system already offers software to support processes
- Key Performance Indicators (KPIs) can be calculated directly from an ERP system
- SAP can be arranged as a controlling tool which measures the actual business steps and provides key figures automatically
- Indicators provide an important basis for CMMI
- An ERP system is not a prerequisite for a successful CMMI
- It is not possible to say that different areas like finance or marketing offer more or less improvement results than other areas
- The use of SAP does not generally lead to a better maturity level, it depends how intensively and professionally SAP is employed as an IT system
- All processes need to be analysed, even if they are defined as best practice by an IT system

4.2.8 Expert No. 8

Summary of the main points from expert No. 8

Maturity model

- Maturity models are very abstract and difficult to apply in practice
- The overall aim must *not* be to always obtain the highest possible process maturity for all business areas
- If a company has the choice to achieve a higher process maturity or make higher turnovers for the same money, then it will always make the decision in favour of turnover
- Maturity models can be used if large change actions are carried out at the company
- Maturity models can define a common language that all employees can understand

BPM maturity model

- A maturity model should be introduced with an expert
- Different maturity levels are determined at different sectors in the same organisation
- Methods like Lean or Kanban can support the reaching of higher maturity levels
- The CMMI model is a method to compare the user's own organisation with other organisations
- CMMI can be quite complex and a company should not get in lost in the detail about the whole application of methodologies
- How the management reacts to the results of a maturity model is important
- The introduction of a maturity model must always come from above management level
- A BPM maturity model must fit the philosophy of the company

BPM

- At many companies, the topic of BPM is financially driven and strongly associated with the financial sector
- Many operations and business topics are ignored if BPM is based in the finance sector

- The introduction of a modelling tool could support the discussion of BPM by the employees

IT

- Processes have nothing, or are only marginally, concerned with IT
- It is always helpful to include the business departments within IT projects
- IT systems have become very complex, because the systems are strongly driven by the requirements of the departments
- Users demand more and more because users have more IT experience from the use of smartphones
- IT is very financially driven
- Employees of a BPM team should be composed of both the IT and the business departments so company can get better process optimisation
- An IT system must be able to react quickly and flexibly to process changes

SAP/ERP & BPM

- SAP provides standard processes, and these processes could be used as a first business process
- SAP provides a basic level of maturity, but every company should individually analyse its processes to uncover improvement potential
- If a system change or a system update is carried out, a process analysis should be made
- It is nearly impossible to map processes that are already perfect, clean and correct at the first introduction of a SAP system

SAP & BPM maturity model

- SAP delivers only a certain level of maturity ‘out of the box’
- An old SAP veteran will always lead the team to a specific SAP solution which he has used for years
- A BPM maturity model should extend the thought horizon of employees regarding processes and systems
- The process change is often driven by human and organisational adjustments
- SAP can produce, with little effort, the key figures for a process analysis and KPIs

- A company does not necessarily need the highest maturity level for a rare process
- An organisation should focus on process instances, which make up eighty percent of the company

4.2.9 Expert No. 9

Summary of the main points from expert No. 9

Maturity model

- A maturity model is a general tool which examines the stability of solutions
- The use of a maturity model is not an important issue
- The staff do not care about their level of maturity for processes
- An audit can also detect weak points
- An analysis tool should interact with the SAP system

BPM maturity model

- A BPM project must explain to the management what they actually do and a BPM maturity model can demonstrate how successful the implementation is
- It is not important how a process analysis is performed, it is more important that any kind of process analysis is made
- Project supervisors would like to see, using BPM maturity models how different the costs for some standard processes are

BPM

- There are things within a BPM environment that should be better implemented electronically with an ERP system and there are things which are done better manually
- The realisation of the topic and the need for business process management comes from the business
- A company should consider what the customer is paying money for
- The BPM implementation was a management decision. A company needs a considerable amount of money and time to carry out such a project

IT

- A BPM project is not an IT project, it is more a transformation process with some ERP implementations
- The proximity to IT is often very helpful because BPM is often linked with the use of software tools
- Process management is often seen as an IT issue and that is not acceptable

- It is important to integrate IT and business members within the BPM project

SAP/ERP & BPM

- There are two management decisions: SAP is the central IT system and standard processes should be used whenever possible
- The company expects better maintainability and a reduction in complexity through the use of SAP
- The organisation must learn that non-individualized solutions can also be effective
- Some employees make the critique that the BPM project only does what's in the ERP, and the real world looks very different
- Economically oriented areas such as finance and controlling are more appropriate for BPM harmonisation than others
- The project’s aim is to introduce at all locations a standardized SAP process and harmonize the process world
- BPM provides the basic documentation for the defined processes
- 80% of all processes are very similar in an industrial company, only a few processes need an individual solution
- BPM can be conducted even without ERP, but an ERP system speeds up the implementation
- BPM is often driven by IT, but IT is only a supporter
- BPM is more of a transformation project with an attached IT portion and needs IT and business employees

SAP & BPM maturity model

- An SAP system can trigger alarms and workflows and determine key figures
- A standard SAP process may not always show the best process route; there are existing SAP solutions which have to be questioned carefully
- Predefined processes are not always suitable for all companies
- The use of an SAP standard process does not excuse the process team from the obligation to check it
- It requires a lot of time and money to realize individual SAP solutions and define own process flows by individual coding

4.2.10 Expert No. 10

Summary of the main points from expert No. 10

Maturity model

- A maturity model is a step or level model which determines how far the company has made progress with a certain topic
- Relevant stakeholders should recognize themselves within the maturity model
- A company needs to consider whether and how a maturity model fits the company
- It should be introduced by a top-down approach and the impetus for the use of a model should come from the top management
- A maturity model does not necessarily have the objective to always reach the highest maturity level

BPM maturity model

- BPM maturity models use KPIs to measure processes
- A BPM maturity model should measure how the management supports the implementation of BPM
- A BPM maturity model needs to check the following three roles: a process manager which supports the process management; part process owners which are responsible for sub-processes and a role for organisational links in the departments
- The best time for an introduction is when the top management wants to understand the topic of BPM

BPM

- BPM often begins as a re-engineering project and is transferred to a continuous process management project
- BPM should be supported and driven by the management
- Issues such as process management and maturity models are often neglected because that subject does not directly result in higher sales for a company
- The topic of BPM need a rethinking in the minds of employees and they must actively deal with the issue

- Often management processes are the worst process-oriented ones in the company and it is very difficult to convince the management to change their processes
- The value-adding processes and the service processes are simpler and more important for the company

IT

- The use of IT has a significant influence for the strategic and technical support of process management
- An interconnection between the two areas of quality management and IT would be the best solution for process management
- IT is often only a service provider to solve problems and not a process efficiency-enhancing area
- A mix of IT and business experts are the best solution for a process management team
- Some processes of a company can be analysed by figures which are based on an IT system, but there are issues such as the culture which cannot be measured by the IT

SAP/ERP & BPM

- The topics ERP and maturity models relate to each other
- The IT and business departments should make a joint decision on which areas should be adapted with standard IT and which should use additional implementations
- SAP is the leading ERP system in the company and a process would not be possible without the use of SAP
- The ideal process solution lies between the following two strategies: ‘process follows IT’ and ‘IT follows process, follows strategy’
- All financial transactions have something to do with the SAP system, therefore a process management must be connected to an ERP system and SAP contains the required data for the measurement of the processes and KPIs
- A process manager must have business and ERP knowledge and is the link between the system and the employees
- A thoughtful use of SAP can avoid many Excel and Access reports

- In many cases, IT was in the past built around the processes, but a balance between the ERP system and the processes must be established
- The question for the long term use of SAP should be: ‘How can standards help to improve processes?’
- ‘What is not in SAP, does not exist’ is an important guideline for the company

SAP & BPM maturity model

- A good maturity model can only be put in place with the cooperation of the company
- An SAP system which runs only by SAP standard processes does not optimally represent the company
- It must always be actively questioned whether the company wants to use the standard or why it doesn’t
- It is important not to have too many self-developments instead of standard SAP processes
- Maturity models and SAP process management must be implemented together by IT and business experts
- BPM project teams which are composed only of technical staff could be unhelpful because this complicates the dialogue with the business

4.2.11 Expert No. 11

Summary of the main points from expert No. 11

Maturity model

- A maturity model is a uniform standardized measuring framework
- A maturity model should fit into a company and its requirements
- A model should have clearly defined steps for each maturity level

BPM maturity model

- A BPM maturity model has the goal of improving processes
- A process with a high maturity level is better and more efficient than a process with a low maturity level
- The SAP maturity model is an internal model for the SAP AG and has limited importance for SAP customers
- The SAP maturity model analyses specific SAP aspects like the use of SAP standard software for the highest maturity level
- The SAP maturity model analyses the maintenance of modifications at standard SAP processes
- The SAP maturity model is based on CMMI but is more simple and easier to handle and has a maximum of three maturity levels
- The SAP maturity model is carried out on a monthly basis
- In practice it is not important to always reach the highest maturity level but a company must define a maturity level which is expected by all processes
- KPIs can be calculated directly from the SAP system
- A maturity model should be flexible and it makes sense to check whether certain criteria are still useful
- In practice a maturity model is not very common or the existing model is perceived as too complicated

BPM

- The minimum requirement for BPM is a process description and further aspects can be the automation of BPM
- BPM consists of much more than the modelling of processes. It also includes the management and further development of processes

IT

- An ERP system can be very helpful for standardizing IT processes

- Strategic processes or management processes can be executed without the use of any IT
- SAP is often a company's leading IT business system

SAP/ERP & BPM

- A consulting company should work out whether pre-defined SAP processes or SAP best practices can be adopted for a company
- A process which runs in an SAP ERP system does not necessarily mean that the company is running the ideal and best practice process
- Every process should be analysed carefully for the company, because standard processes can also be used incorrectly

SAP & BPM maturity model

- Traditional processes such as finance or HR processes can be represented very well by using standard SAP software
- Each company should decide for itself whether the interplay between an SAP system and a BPM maturity model is important
- SAP is often an important IT system and has many touch points within a company
- ERP systems like SAP support the identification of KPIs and provides standardized reports that determine and present KPIs
- Each company should consider what is important for their maturity, and if a standardisation of IT processes is an important thing for their organisation
- An ERP system is not in general a prerequisite for a BPM maturity model, but for the SAP maturity model it is a specific aspect whether a process is implemented with SAP standard software

4.3 BPM case examples that emerged from the interviews

After the general overview of the interviews, this section provides an overview of how different case examples were identified. Each case example is presented in a sub-section and the three research questions are examined in more detail for each case example. The findings reflect the statements of the experts and form the basis for a later analysis in the following chapter 6.

4.3.1 Case definition

As described in the methodology section 3.5, this thesis considers different case examples in order to take account of the unique and different findings within the various BPM maturity models. The number of BPM maturity models available on the market is too complex to analyse all of them within this research. Therefore some models are considered in more detail for this research within separate cases. This section describes which different case examples are considered and how the division was made. In addition, the research questions are examined for each individual case example.

In general, the thesis provides an overview of whether SAP does or does not matter when an organisation uses a BPM maturity model. From the previous interviews, it can already be deduced that each maturity model has a different relationship to the use of IT. E1 reports that the eden maturity model only has very general questions about the IT used and there are no questions about the ERP system used, or in more detail about the usage of SAP. On the other hand, the SAP maturity model uses SAP much more precisely. At that maturity model, the highest level can only be achieved if SAP is used. Due to this different degree of usage in the individual and most frequently mentioned maturity models, each named BPM maturity model is to be regarded as a separate case example.

Table 4.1 shows that each interview partner knows one or two maturity models or has applied a model in practice. Therefore, each interview partner can be assigned to at least one case. The following figure gives a brief overview about the most common maturity models within the interviews and how many experts have mentioned the corresponding models. In addition to the listed maturity models, some other maturity models have been mentioned, but only in such a rudimentary manner that they are not part of this research.

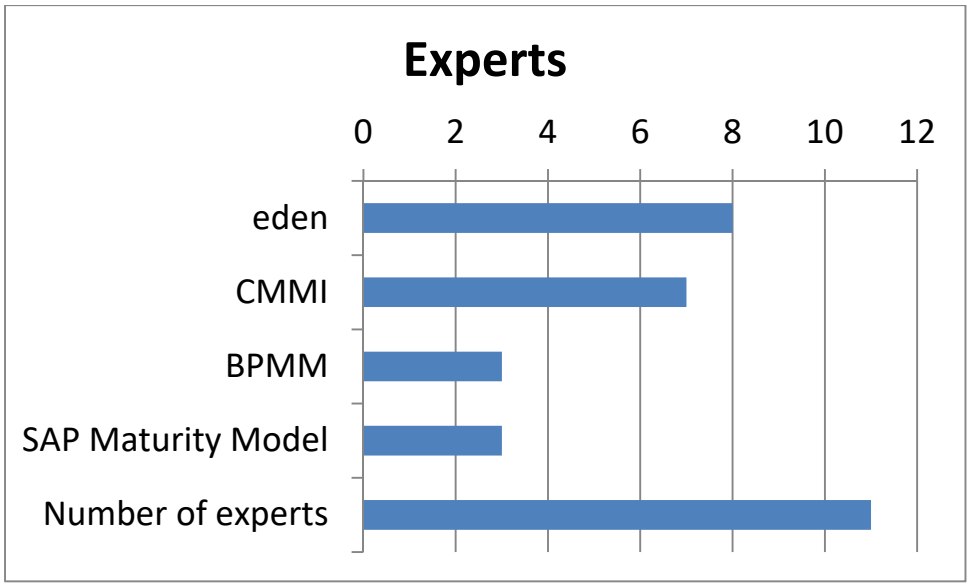

Figure 4.1: Number of experts who mention a specific BPM maturity model

Not all examined models were intentionally selected. Before suitable interview partners were found, the intention was to investigate at least the eden and the SAP maturity model. The eden model should be examined, because the researcher is a certified eden consultant and therefore has appropriate know-how and personal contacts with eden experts. Secondly, the SAP model has already appeared in the run-up to the investigation as a model which is closely linked to the SAP system and therefore this near SAP approach should be investigated. The other models emerged from the interviews and from the search process of finding interview partners.

Several models were mentioned within the interviews but some models were only referred to for the sake of comparison or only briefly addressed. Therefore, the interview looked in more detail at five concrete cases which can be analysed on the basis of the interviews and deserve a more close examination in this research.

The five case examples are associated with the following BPM maturity models:

- eden maturity model

  This model was developed by the working team 'Business Process Excellence' of the BPM-Club. Since 2009, the results have been

presented by the ‘BPM maturity model eden e.V.’ association, founded by eleven members (BPM Maturity Model EDEN e.V., 2016).

- Capability Maturity Model Integration (CMMI)
  CMMI was originally developed by the Carnegie Mellon University more than 20 years ago. Nowadays, the CMMI is administrated by the CMMI Institute. CMMI is described by the institute in a more general way as a ‘performance improvement framework for competitive organisations that want to achieve high-performance operations’ (CMMI Institute, 2016).

- Business Process Maturity Model (BPMM)
  This model was developed by the Object Management Group (OMG) which is an international technology standards consortium founded in 1989 (Object Management Group Inc., 2016). The version 1.0 of the maturity model was released in June 2008 (Object Management Group Inc., 2008).

- SAP maturity model
  The SAP maturity model was developed directly by the SAP AG and is described as a pragmatic and simple maturity model in a process environment. It derived from the Process Enterprise Maturity Model (PEMM) by Michael Hammer and the CMMI. (DSAG-Arbeitskreis BPM, 2013)

- Experts that were considering using a BPM maturity model
  It turned out in some of the interviews that the interview partners used BPM and SAP in the company but did not yet use a BPM maturity model. For these interviews, the focus was more about what the interviewees expect from a maturity model. Partially, these interviewees explain that their organisation have already carried out some analyses of their own BPM approach and also that these approaches were considered in more detail to find practical and necessary requirements for a BPM maturity model.

The aim of the research is to investigate and analyse the interaction between the use of the SAP software package and the deployment of BPM maturity models in an BPM environment. This can lead to fundamental questions. For example, do the different maturity models have different system requirements or is it possible that the models can be used completely independently? Is the use of a maturity model associated with specific requirements if an organisation uses general IT systems or SAP? What are the experiences of the experts and which kind of general limitations have they recognized? Each case example provides an overview about the research questions and is based on a special BPM maturity model. The following sections only interpret the experts' answers on the individual maturity models but do not provide a general overview. In order to implement a mix-method approach, the documentation of the models is considered subsequently. A general analysis is then conducted in the following chapter.

4.3.2 Case 1: eden maturity model

This section presents the first case example and the findings for the eden maturity model.

Eight out of eleven experts are familiar with the eden maturity model. Two experts regularly use it in practice and two other experts were involved in the development of the model. Four of the interviewees knew the model but have not used it so far in their organisation.

The experts report that the development of the maturity model began in 2006 and the goal was to develop a maturity model to deal with process management as a management concept and set up a self-image of the company. In total, the model contains nine dimensions, examined by a total of 157 criteria. The dimensions include, for example, IT, communication and methods. The interviewed developer states that it is not the goal of the model to develop specify strategies and process developments. Rather, the maturity model is used to show the BPM potential and how far this is exhausted.

The model can be used in two areas; first, to analyse individual processes and secondly to analyse the organisation in total. The analysis of individual processes on the process level is used much less frequently. Best known is the model for the evaluation of a company at organisational level.

The analysis of the individual criteria is based on a questionnaire by individual interviews which are either completed directly electronically or answered with the help of an external consultant. The analysis of these interviews is then carried out through the eden association by a software in which the answers of the individual criteria are incorporated and evaluated. In addition, it is possible to request external eden expert advice. This kind of advice based on the eden criteria and is developed by one of the members of the eden organisation. The eden advice does not pursue the strategy of self-expression but handles more details than the questionnaire. All of the experts interviewed have applied the criteria catalogue at the organisational level and therefore only this approach is considered by the interviews.

The experts state that the eden maturity model is used for an awareness of what process management can be. It is not a pure measuring instrument, but it contains hints on how BPM can be implemented in a company and which areas should be considered in the context of BPM.

The experts report that, compared to the CMMI model, the essential difference is that not all criteria must be met one hundred percent in order to reach the next higher level of maturity.

4.3.2.1 Findings for first research question

This chapter describes the findings for the first research question, which were determined by the experts using the eden maturity model:

- How are BPM maturity models used in the planning and implementation of ERP software projects?

The questions within the eden model for the dimensions of IT are mainly directed towards evaluating the cooperation between business and IT. In addition, the model analyses how, and in which way, the organisation work together. It is not important for the maturity model which system or what technologies are implemented to use BPM. It is more important for the model that IT supports the BPM approach through some form of technological support. The experts indicate that the IT department should be integrated into a BPM implementation as soon as possible, because not all employees outside the IT department are aware of all the technical possibilities of IT. However, the main

focus within the maturity model is to determine how deeply in the organisation the topic of BPM is anchored in people's minds.

The experts report that a maturity model such as eden is only to be used as a simple and fast measuring instrument for BPM and therefore has no influence on the ERP system used. The developers of the model claim that the intention is always to use the maturity model independent of the industry, the process types and also the involved systems. Otherwise, the requirements would involve asking detailed questions about application-specific criteria and any ERP system in the world. This depth of detail would have made the list of criteria too extensive for the model, because the goal was to develop a relatively simple maturity model which can be used quickly.

ERP systems are often only intended for financial reasons. Many people forget that other areas can be involved within the ERP, for example material management. A maturity model can help to expand this ERP idea and find areas that have been neglected so far, because the whole company and its processes are considered at the BPM approach.

Many processes have at least small workflows that are controlled within the ERP system and can influence the process flow. This means that an ERP system has touch points for many areas and systems. For this reason, an ERP system can be helpful in order to specify the structure of a company, because many sub-processes go through it. Therefore the application of a maturity model can also impact on the IT used and new or changed requirements, for example, to change some processes or to determine data directly from the ERP system.

The interviews highlighted that a combination of processes and an ERP system can make the topic more complicated and interdependent. If the systems cannot be adapted to the company's wishes, then, in the interviewees’ opinion, the highest maturity level cannot be achieved.

For many managers, the use of an ERP system is a strategic decision. These companies promise to have a stable partner when using large and well-known ERP systems.

The experts report that there is usually an ERP system already within a company, which means that an ERP system such as SAP is already used before any BPM introductions take place. The order of a BPM introduction is, for many companies, as follows: There is already a given ERP system in the company and then a BPM is introduced and the existing ERP system has to be changed according to the new process structure. In the majority of cases, the reason for using a maturity model is to measure how well the BPM approach is established and which points are still open and arise later during a BPM implementation. All surveyed experts describe this as the usual way.

One expert recommends not introducing a maturity model at the beginning of a BPM project. He recommends that in the first year of a BPM introduction, the company and its employees should instead learn how to deal with BPM. Process maps must be modelled and interfaces defined between systems. In addition, the BPM team must first learn what BPM means. After this year, the expert would then use a BPM maturity model to determine whether the company was already implementing BPM in the right areas, or whether the topic had not yet been considered. The expert recommends the eden model because the eden maturity model does not influence an ERP system, but it does help to identify BPM topics that have not been considered so far. A company should first have experience with BPM before implementing a BPM maturity model and developing a framework for their own BPM solution. When a BPM maturity model is used right from the start, it is like using a sledgehammer to crack a nut. All experts recommend that the support of the management should be mandatory when an organisation carries out a maturity model. The management should positively transmit the idea of BPM and should fully support the BPM project.

Only two of the experts who knew the eden maturity model had given different examples and did not implement a BPM maturity model after the introduction of an ERP system. In one example, BPM was introduced at the same time with a new ERP system. Therefore, all target processes were described and defined as process requirements and handed output to the ERP vendors as a requirement catalogue. But about 80 percent of all ERP vendors had a problem with the requirements for their ERP system, and could not make an offer on the

basis of the produced process requirements. These vendors explicitly requested a functional listing of the requirement criteria for their ERP application. Only after a service provider had translated the procedural requirements into functional requirements, were the ERP providers able to do their offers and finally a new ERP system was selected.

The second example of deviant practice was stated by an expert who used a maturity model right from the start. The expert had the requirement to introduce process management in a company, and was aware that this kind of requirement takes several years. In order to be able to show progress over this long period, a maturity model was introduced right from the beginning of the BPM project. According to his statement, it is quite possible to apply a maturity model if no process has been defined at all. In these cases, a model is used as a pure measuring instrument. This leads to a very low valuation at the beginning, but offers the possibility of creating comparative values and shows how BPM has changed the company.

In general, the experts argue that there is no wrong time to introduce the eden maturity model. If it is used several times, it shows the progress of a project, regardless of whether the activities and knowledge in the BPM environment are analysed before a BPM implementation or later. If a maturity model such as eden is applied after an ERP and BPM implementation, then it can show the weaknesses of some areas. But one of the experts explains that it makes more sense to use the eden model only when there exist a basics BPM understanding, and the users can handle a BPM topic and the meaning of the questions.

One expert points out that an ERP system has mostly already modelled its own world and lives in its processes. To recognize this complexity within the ERP system, the use of a maturity model could help. Most people are not interested in the process behind a system. They are only interested in their own tasks. Many employees think that with an ERP system, thinking is diminished; however, that is not the case, and that must be demonstrated by a maturity model. An ERP system does not force people to think about what they really need, and this thought process should trigger a maturity model. If, for example, an ERP system is only a tool to manage the orders of a company and does not

contain any material management, it should be determined by a BPM maturity model that the process is not continuous and contains some media breaks.

To only use an ERP system is not sufficient to obtain good business processes. A company also needs to think about its own requirements. It is also possible to forget areas and process sequences if an ERP system is used. This revisionist approach should trigger a maturity model such as eden and the model should also trigger any changes in the ERP system. Any changes to an ERP system cause the system to increasingly develop into a knowledge management tool. Processes in the company are changed at the request of the divisions and this change is a special knowledge which is integrated into the ERP software. Thus, the ERP system has company-specific knowledge.

One expert reports that eden is the wrong model if the organisation wants a model for daily management. Eden is more a model for looking temporarily and at a fixed time at the BPM maturity and to determine how the process management in the enterprise has developed. For a daily controlling and the consideration of processes, ERP systems play a greater role because numbers and key figures can be determined regularly from the ERP system. Only if eden is applied to individual processes and, for example, the throughput times of processes are measured, then an ERP system can be helpful for eden. But within the more general variant in which the company is measured on its BPM function, an ERP system plays a lesser role.

On the other hand, standard processes in an ERP system can help to avoid reinventing the wheel. If existing ERP functionality can be set up, then a certain degree of basic maturity may already exist in the company. But the higher the degree of maturity, the more the company has to deal with its standard ERP processes and explore what the optimal maturity level could be, and whether the system can map these optimal processes or if there exists the need to make any changes. An ERP system can therefore serve as a step-by-step approach to reach the optimal process. Initially, the standard system can be used at the lower levels of maturity, but there is a need at the higher maturity levels to consider and adapt their own considerations and changes.

If an ERP system such as SAP is used, then this is mostly the central and largest IT tool and some experts recommend that a company should try to use as much data as possible from this tool because this data is already present in the company. The eden model does not observe these considerations, because maturity models which deal with the determination of key figures have rather such considerations. The IT considerations in the eden model are limited and only one developer of the model believes that there is a need to reconsider these IT criteria. In the model, there are more questions about how IT supports the processes, and this question seems to the expert to be too general. What the eden model is missing, in his opinion, is a criterion to use standard processes from an ERP system as long as possible. Process development should only be considered at an advanced level of maturity.

4.3.2.2 Findings for second research question

This chapter describes the findings for the second research question, which were determined by the experts using the eden maturity model:

- How does SAP impact upon the use of specific maturity models?

The experts report that, usually, an ERP system such as SAP is already available in the company and is at least used as the central financial system, supply chain management and / or material management tool. Companies can certainly use SAP and introduce the eden maturity model, because both do not contradict each other. One of the experts expects that most companies which use eden also have SAP as an ERP system in use.

One expert explains that the use of an ERP system such as SAP usually means that the SAP system is the big and central IT tool of an organisation. But the use of SAP does not have any effect on the model. The eden model asks only for general technological information, but not whether an SAP system is used. The model does not go into much technological detail within processes, and therefore the experts are of the opinion that SAP does not lead to any restrictions.

An intensive use of the SAP system can lead to a better maturity level. One expert introduced an example where an organisation consistently used a standard SAP ERP system. All requirements were only defined in the SAP

system and there were almost no other systems within the company. SAP was the leading, and virtually the only, system within the company and the process orientation was very closely linked to SAP. This company ultimately used the eden model for process management evaluation and won an eden award at an event for their use of the maturity model. But on the other hand, one expert claims that the use of SAP does not play a big role for eden, regardless of whether all SAP templates and modules are used, or all processes are implemented without an IT system.

There are many different reasons why companies use SAP, and for many organisations it is simply a strategic decision because they need a stable partner. The experts believe that the SAP ERP system is the market leader. There are still branches of industry where no one would even think of not using SAP. Its use, then, is a kind of insurance. SAP has an attractive name and the IT management often believe that the company cannot make a mistake if it uses the SAP system. However, the statement that the use of SAP leads to all necessary software needed by an organisation is incorrect. That claim is more a marketing statement by the SAP AG. Companies must always define for themselves what they need and then make at least the necessary customizing settings.

The overall assessment of IT is only one dimension of the eden maturity model and makes up only a small part. Even if an employee deliberately evaluates all IT issues with a worse score, this assessment cannot lead to a lower maturity level. One expert explains that he considers the IT sector to be too small. In his opinion, eden is missing topics like SOA or digitisation.

A model like eden can help to recognize and integrate other aspects of process management in an organisation that has not yet appeared. There are still companies which use process management as a management method but do not have processor-oriented and flexible infrastructure, or vice versa. An implemented SAP workflow or first processor-oriented approaches does not necessarily mean that the company is processor-oriented overall.

In many cases, an SAP migration does not pay attention to what the BPM world has already developed, and vice versa. In this case, two parallel worlds are

created that have different interests but similar behaviours. As an example, one expert describes a purchasing process, which was already depicted in SAP, but was modelled again in BPM. The areas SAP or IT and the business area should work together more closely and use the same resources, rather than two different ones. Therefore, the use of a maturity model can support cooperation and create a common foundation.

The model does not specifically ask for systems and their sequences, it asks more for the assessment and perception of the conversation partner. If an employee is satisfied with the system which controls and supports the processes, then he has the right to give this system a high score in the maturity model. But the model cannot recognize how well SAP is used. From the practical experience of the experts, they know that there are companies which use SAP and are extremely processor-oriented, but also companies that use SAP and still work as though they are in the Stone Age. If a company introduced SAP ten years ago, and then made no changes, then a lot of process optimisation potentials are based only on the fact that the SAP system is to be used differently and adapted to new circumstances. At this point, is still a need to open the eyes of the employees to the fact that SAP has developed further. There are definitely things that did not exist ten years ago, but they are now part of the system.

The experts from the eden environment report that the companies are not aware of a link between SAP and BPM. SAP is used transactionally for specific transactions. In the main, no one, or only a few users, has a superior view about the whole process. Even if a workflow is triggered behind a transaction, then few employees see it and the IT department are often the only staff interested in the whole process. Many employees prefer to satisfy the system and its requirements rather than to understand the process behind the system, and SAP is not assigned to BPM.

The experts regret the lack of a possibility to quickly visualize a process in the SAP software and to show exactly how a process actually runs in SAP. Tracking an SAP process is often very difficult. It is difficult to find out whether a business process has been defined by the company, or whether the SAP system has forced this process in the company. In practice, there are often

weak points in the process when media breaks exist and another system is accessed. This would then also be easy to determine if a process flow could be represented directly from the SAP system. Through continuous development of the SAP environment in the company, and the further development in parallel of the BPM approach, there is always the danger that both topics will develop separately. This means that the two themes are no longer coordinated with each other because the participants are no longer aware of the actual process sequences.

Another expert highlights the fact that SAP is a very rigid IT system. If a company defines its personal ideal process, then this company will at some point encounter the SAP system and then have to integrate this ideal process into it. An SAP system can be programmed as a company would like to use it. But such deviations from the standard result in effort when a standard system needs an upgrade, because it requires more resources to test these proprietary self-developments on the new standard. For this reason, one of the experts recommends that an SAP system should become even more dynamic in order to better align its processes to the customer needs.

SAP has firmly programmed best practices solutions that already specify own process flows. With these best practice solutions, SAP provides pre-developed process solutions that have already been proven by other companies. Some of the experts note that the eden maturity model is missing a comparison or consideration between standard and own-developed solutions. Should the process solution run in the best practice process in order to keep the maintenance costs low, or is it necessary to develop an own company solution? Invoice creation, for example, does not necessarily have to be developed by every company themselves. This process should be optimized by SAP best practice. But there are processes that run in the company, which are unique or have special functionality and should be developed by themselves.

The experts describe a standard SAP system as a pure process tool. That means that the system provides a predefined way forward by given standard functionalities. But if a company works with processes for a longer time, then they should be more specific to the company. A maturity model should support,

from maturity level to maturity level, an SAP system and that should be result in processes perfectly adapted to the company's requirements.

If the SAP best practice solutions are still running at the lower maturity levels, an analysis of the process should be carried out at the higher levels of maturity, whether this standard functionality is appropriate for the company or any custom solutions should be programmed, or the customizing of the system should be changed. With each level of maturity, an SAP system evolves and becomes more and more a knowledge management tool about the company. No company has the money and the time to develop everything immediately. A maturity model can help to analyse the company requirements and how it could be developed on top of the best practice solutions. The experts point out that the application of SAP best practices must not lead to a lack of discussion regarding what is important for the company and the need to process own developments or create alternative process steps. Any SAP best practice may be used at the beginning in the company, but in further steps, a company should always analyse if the standard solution is a preferred option - but the eden model does not support this.

Some experts explain that the application of SAP best practice solutions can lead to a higher degree of maturity in the model, because basic functionalities are already specified within the best practice solution. But these best practice solutions can also be responsible for the highest maturity level not being reached, because special company requirements are not adequately covered and the employees are therefore dissatisfied with the IT solution on offer. Overall, the model does not interpret the special SAP functionality and only generally evaluates the IT support within the process management.

More interesting for some experts is the question of how the employees deal with a new or modified system and how the system was implemented in the company. A company should involve its employees in a system change at an early stage in order to gain acceptance for the system. Through many years of experience with an IT system such as SAP, the employees already have a thought-out process sequence in mind and know their SAP transactions. In this case, the employees must be convinced at an early stage to change their process sequences, but this behaviour is also not supported by eden.

The experts claim that an IT department is often involved too late in the redefinition of the process flows. The employees, who are redefining the processes, are afraid that the IT department will try to adapt the processes to the SAP standard. Therefore, process projects do not want to have the support of IT at the redesigning phases of business processes. This can lead to the fact that the IT department is integrated too late in the redesign of processes. But the use of standard applications such as SAP can minimize the costs of a company and reduce the costs for system modifications and enhancements. With this example, the experts demonstrate that IT is then perceived as a restriction.

Such a negative perception can occur when maturity models are too IT-focused and are introduced by an IT department. The key question is, what drives people to accept a change? For example, if IT does not have the best reputation in a company, then the IT department should not promote the introduction of a maturity model. But the experts indicate that the use of SAP software is so complex that an IT employee must be involved in any implementation.

In many cases, it is even necessary to involve external consultants to support the project and determine how SAP can support a BPM project. A maturity model like eden can identify which areas are not optimally supported, but it is also necessary to try to change the mindset of the employees. It is hard to convince an employee who has worked with SAP for many years that a process could be different. A maturity model such as eden has to show that something runs somewhat badly and influences the attitude towards the applied IT system; but the model does not ask for SAP, it asks more generally. In principle, a company will not doubt the use of SAP due to the evaluation of a maturity model, because SAP is usually too important in a company. However, the application can result in many kinds of changes or result in the number of systems used being minimized.

Overall, it can be stated that a SAP ERP system can support the maturity of eden, but only to a small extent. The eden model asks for a general IT acceptance and if the user likes the IT behaviour, then they support the SAP usage. Finally, SAP has less impact upon the use of eden.

4.3.2.3 Findings for third research question

This chapter describes the findings for the third research question, which were determined by the experts using the eden maturity model:

- To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

One developer of the eden model reported that, during its development, a great emphasis was placed on developing it neutrally and independently. The model can be used independent of the industry, the process type and the used IT system. The model claims to be able to be used in an absolute generic manner and for any company. If the maturity model were to ask specific things for SAP, then questions about other ERP systems would also have to be included and the questionnaire would become too large. The goal is to use the model regardless of which standard software or which technology a company uses. Therefore, the model does not deliberately ask whether specific processes are used, or how processes are to be handled. It is also reported that the maturity model is mainly focused on being used primarily at the management level and therefore no concrete processes are named and asked for. As a result, this approach is deliberately different from other models, such as CMMI.

The experts report that the model is used in practice in quite different sectors. Examples given included telecommunication companies, IT service providers, hospitals and industrial companies. What may need to be changed when using eden is the subject-specific vocabulary in the individual industries. For example, in an industrial enterprise, the managing director is described by a different terminology than in a public administration. The content of the questions is always the same in the model. But the technical terms should be better justified to the understanding of the employees at the different companies. Furthermore, the size of the company plays no role in the model. Both a global company and a service provider with less than 100 employees can apply the model in practice.

Overall, the model only has a few questions about the IT used and all these questions are very neutral. The experts also report that a maximum of 10 of the requested 157 criteria refer to the IT dimension. These questions are not

evaluating a software system and ask in a more general way whether IT support is available or IT process changes could be quickly implemented. The questions are not about which systems are used. Instead, they ask more how the system is used and how satisfied the employees are, and how involved they are in the implementation of the system. A developer of the model assumes that it is possible to achieve the highest maturity level without using any IT, because in his opinion the model is so general that a few IT questions cannot make a difference. One expert states more generally that an IT system should exist in the company for a successful use of BPM and maturity models because the use of IT has a greater likelihood of handling the complexity of the BPM topic.

The experts assume that the use of SAP will not lead to any problems with the application of the maturity model. A problem would arise if systems were used in the company which appear to be inflexible and whose processes are already fixed and cannot be configured. One expert reports that the use of SAP can also mean that the processes are already defined. Such predefined processes provide the opportunity for a company to initially concentrate on other really specific company processes. But this has nothing to do with the use of the eden maturity model.

The users of the model explain that the use of the questionnaire could lead to some difficulties. When using the model for the first time, the user may not always be aware about the meaning and purpose of the question. The problem is not the system; it is more the human factor and the fact that some questions could be misinterpreted. Therefore, it is helpful to complete the questionnaires together with people who can explain the meaning of the questions. The experts note that the eden model has a good German-speaking community and it is easy to get appropriate experts for any kind of model support.

One expert has the opinion that eden is more a kind of entry model, in order to attain a current positioning of the enterprise in the field of BPM, because the model is very simple, has nearly no implications and requires only a small amount of time to answer the questions. Several experts report that eden is not a controlling tool which is used for day-to-day process management. Eden should be carried out only after long-term breaks, and then to determine the current level of achievement in the BPM area.

4.3.3 Case 2: CMMI

This section presents the second case example and the findings for CMMI.

Seven of eleven experts have mentioned the CMMI model in the interviews. A total of two of the experts have already used it practically in a company, therefore this section primarily deals with these two experts.

The experts report that CMMI is a model which a company has to deeply consider, because it is quite a complex model. First, the theory behind the model must be understood before a deployment can be made. Only afterwards can a concrete application in the company be carried out.

CMMI uses various criteria for the assessment of BPM and these are assessed by using a valuation framework. However, the model does not explain in detail how an assessment could be made in an organisation. Therefore, it is not possible to work with the model immediately and there is a need for each company to adapt the model for their purposes. For example, the model provides that the processing times of a process are to be measured, but the model does not describe in more detail how to measure these figures.

There are clear guidelines for CMMI, for example, whether specific processes are described and implemented in order to reach the next maturity level. Only when these guidelines have been fully implemented can the next maturity level be reached. Overall, CMMI offers a subdivision into five levels of maturity that can be achieved and which can be used to determine the company's position.

Because the model is broader and larger than other models, the experts expect a greater potential for knowledge that can be gained through the model. Furthermore, CMMI is a model which is recommended for a regular maturity analysis or even daily use. For example, actual figures could be determined automatically from a system and no user has to be consulted. The determined figures or numbers can be, for example, process characteristics which are measured and included in the determination of the maturity level. This key figure measurement is a requirement that has to be implemented only at a certain level of maturity.

The CMMI model is known to many users of maturity models and the experts believe that CMMI is often a basis for other models used at companies. Due to

the great popularity of the model, it is also possible to compare the achieved maturity level with other competitors which apply the same model. The widespread use is also apparent from the fact that the other three models which are investigated in this study were all influenced by CMMI. This means that CMMI was already known to the developers of the other models before they started with the development of their own model.

4.3.3.1 Findings for first research question

This sub-section describes the findings for the first research question, which were determined by the experts using CMMI:

- How are BPM maturity models used in the planning and implementation of ERP software projects?

Both experts who use CMMI describe that in practice an ERP system should be considered if a CMMI based maturity model is established. An ERP system can be an important basis for determining key figures for the maturity model like the throughput times from a sales process in ERP. An ERP system does not necessarily have to be used for the implementation of CMMI, but it can be used as a supporting tool and a good basis for indicator determinations.

When a new ERP system is introduced, the company would like to know whether this ERP system improves the company and its BPM approach. Therefore, the experts recommend the use of the CMMI maturity model to measure the potential improvement of an organisation. However, the model would have to be configured and set up according to the company's requirements, in order to define key figures that allow for any kind of assessment.

In general, the experts explain that the use of ERP systems can be useful for supporting comprehensive maturity models such as CMMI. The use of an ERP system is not an obligation. Theoretically, it is quite possible to run a large company without any IT, but in practice the use of IT makes sense to automate business processes. In the same way, the complete self-development of an ERP system for a company is rather theoretical, since the experts are of the opinion that any standard ERP system is almost always practically used. These ERP systems also support some defined processes in the company and this

support can help to achieve a higher degree of maturity. But from the IT perspective, an ERP system is a pure IT system, so it is quite possible that the processes within this IT system run badly if the business is not involved. If, for example, master data are not checked, then an IT project cannot fix these problems and the project needs support from the business.

If BPM is to be introduced in the company and a new ERP system should also established within the company, then the company should ensure that the requirements of the newly defined processes are implemented in the system and that all necessary process changes are considered. It should not be the case that the specifications from the old system are taken first and then the new process structures defined on this old basis. In the experts' opinion, this kind of change will fail because process changes are not considered as a whole. If the BPM implementation is combined with the introduction of a new ERP system, the project should try to combine the best of the old world and the best of the new world. This would generally represent the greatest added value offered by such an approach. At the introduction, the processes should always be examined and scrutinized very carefully. In these cases, the maturity model offers a very comprehensive view of the processes and a production site analysis of the company.

The application of a maturity model can also be used to find and define a common language regulation and a common understanding with all involved parties in the area of BPM. It is helpful when all involved parties record and present their processes. That allows the employees to identify different process stages in the company and processes can be made transparent to each other. The goal of a maturity model is then to develop a common process sequence and to constantly improve it. To achieve this goal, a company needs a roadmap to identify long-term goals and to illustrate the current progress on the roadmap. It is important for the experts to create a common foundation in the company with a maturity model such as CMMI. On that basis of the CMMI evaluation, the processes and their sequences can be discussed.

The experts describe CMMI as a very complex maturity model, but it is also possible to use the model to show the target achievement in comparison with other companies or business areas within their own organisation. How complex

the model is depends on how extensively it is used in the enterprise. One expert explains that the model can also be used very effectively if only a few comparative factors and figures are defined. As an example, the expert named an instance in which a company limited itself to two core areas when using CMMI. These two areas of analysis were as follows: First, the company should not be running out of stock, and second, the conversion times should be as low as possible in order to save costs, and that was where all the factors were figured for the model.

One expert warned about losing the overview when using CMMI, and not getting lost in too much detail. The use of the maturity model could also result in outcomes that are already known without it, but this should not be the aim of the model: it should demonstrate new facts. Ultimately, the important question in the use of a model should always be how the management reacts to its results. How the figures are obtained and with which methods these were determined are, on the other hand, less important.

The experts recommend that an industry expert should be involved in the selection of a maturity model. This expert should understand the company and the processes which are carried out. For this reason it is advisable to rely on an external consulting service. In practice, it is nearly impossible and costs too much money and time to introduce different models until a company has found the right model for itself and the company philosophy. This knowledge should therefore be available and purchased externally.

The experts mention that it is extremely important to get the support of the management of the company. The introduction of a maturity model must be aimed at a very high management level, because the implementation costs money and employees must be motivated accordingly to sacrifice time for it. If maturity models are introduced only on a lower level, the experts believe that a model will not as much as it would have done if its introduction had been supported by the upper management.

4.3.3.2 Findings for second research question

This sub-section describes the findings for the second research question, which were determined by the experts using CMMI:

- How does SAP impact upon the use of specific maturity models?

SAP is perceived by the experts as a central IT tool in a company. CMMI is a maturity model that focuses more on the degree of maturity of the process and on the identification of key figures. These key figures are, in most instances, available in the SAP system. Therefore, a company should try to determine the required data from the SAP system, because this data is already available and only needs to be analysed.

In principle, SAP is described by the CMMI experts as a system to support processes. This means that, if the processes are to be optimized, the corresponding IT systems must also be adapted accordingly. In addition, the IT system must be used to determine the corresponding figures for controlling and monitoring reasons. For this purpose, SAP invites appropriate tools or functions to directly identify key figures and to analyse them for controlling purposes.

The experts explain that the use of SAP and BPM do not contradict each other. A BPM maturity model is a model for measuring processes and answering the questions regarding how well the processes are running, and whether there exist some potential for improvements. An SAP ERP system is a tool which can be used to implement and support processes. One of the experts defines SAP as a supporting tool for the organisation and to manage the processes within BPM. SAP provides an implementation component which can be used to carry out the processes and it contains, in addition, some controlling function which can be used to measure the actual state. The result of this controlling provides answers to the question ‘how do I manage my processes’ and can lead to management decisions on how the processes can be improved and optimized.

The CMMI model is not only used to implement new BPM behaviour and to evaluate processes which then lead to improvements. In addition, it is also necessary to carry out checks and to verify which changes are made in the BPM environment and how successful they are. In order to carry out these checks, SAP can support the determination of the key figures, because they are already available within the SAP system. This means that SAP can automatically determine key figures for CMMI’s use. These key figure evaluations can be carried out by self-programmed solutions or standard

reports, but it is also possible to determine the key figures by the SAP BW component. The CMMI maturity model offers the possibility of evaluating daily key figures on the basis of the SAP system and to make these key figures available to management in order to analyse deviations.

The goal of a CMMI deployment is not always to achieve the highest possible process maturity level at all times. The experts assume that this is not feasible and that different degrees of maturity for different process domains are always achieved. If a company has the choice to achieve a higher maturity level or to change the process for the same cost in order to generate more sales, then it will always decide to generate more sales. Basically, the use of a maturity model is very helpful for an evaluation of the company and to determine its problems. But the goals for using a maturity model must be clarified. Is the maturity model used to achieve the highest possible maturity level and the highest possible maturity, or is a model used only to make some further development and find possible optimisation potential?

The experts report that the use of an SAP system does not mean that a higher process maturity is automatically achieved through the CMMI model. Even if SAP offers some basic functionality for processes and, for example, a purchase order can automatically generate from a purchase requisition, this does not mean that the functionality is used within a company. When using SAP, it is important to know how intensively and professionally the system is used. For example, SAP can be considered completely functional without any process management behaviours. From the ERP viewpoint, an SAP system is a pure IT system, but an IT project cannot answer the question of whether the content data makes sense. Here, the business must support and validate the data quality. The closer the IT experts work with the business experts, the better the processes can be implemented.

In principle, SAP can be used as a tool to compose process definition and specify standard process. In the next steps, these processes can be configured and adapted to the company's needs. But this configuration does not lead to a truly optimized process in the company. This means that SAP is a tool for setting up processes but also has limitations because SAP does not allow everything, although it is relatively flexible. There are many ways that an SAP

system can be installed and the expert explains that it is nearly impossible to set up a SAP system with all the business processes in a clean and correct manner right from the beginning.

The SAP system provides with best practice several standard SAP processes that can be used in a company. A company should check if these standard solutions and procedures are really the best solution for the own company, or if the standard processes should be adapted to the company needs. But this question is, from the personal experience of the expert, not particularly defined in the CMMI model. If an SAP system presents a possible solution with best practice, then this process behaviour must not be the ideal process solution for the company. However, with these best practices, SAP can deliver a certain basic process maturity. With these standard processes, SAP delivers a lot of industry know-how from different branches of industry.

The experts report that the mentality of the employees is often a problem. In general, SAP allows process changes, but if employees have been performing a process in a certain way for many years, they are reluctant to accept changes and a different process flow. A process management team has the precise task of analysing the process sequences in detail and possibly making changes. They need to clarify whether a best practice solution is really the optimal process flow for a company or whether a maturity model displays improvement potential for the standard process. Does any optimisation potential occur from the determination of the process characteristics such as the determined throughput time of the process? The optimisation may come from the results of the maturity model, but the changes of the processes often result in a human and organisational factor. The key question here is how does the company carry out the changes and introduce the new way of thinking to the employees?

The determination of process execution times is only one possible key figure which can be analysed by the CMMI. The measurement of return rates during the product delivery or the measurement of changeover times at the production can be further indicators that an SAP system can supply.

The experts emphasise that a pure IT view is not always sufficient for process optimisation. A company should not just pay attention to circumstances that can

be automated or supported by IT; rather, an organisation should analyse a process in total and how it can be fundamentally improved. Therefore, it is important for the BPM implementation in the company to have the support of the top management to receive the time and budget for the implementation of strategic changes.

4.3.3.3 Findings for third research question

This sub-section describes the findings for the third research question, which were determined by the experts using CMMI:

- To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

Similar to the eden model, the CMMI can also use various criteria to determine the maturity. The evaluation of the criteria is based on a valuation framework. The model then asks for certain controls, but does not specify how the values are determined. For this reason, a company must first deal with its processes and determine the controlled values. For example, if the model ask for the process cycle time, the company must determine which system characteristics can measure this value, or whether these values have not yet been recorded in a system. At this point, an SAP system can support the determination of the value and provide the key figures. Therefore, an SAP system can be used directly for the key figure determination.

The model can be used in a variety of industries and areas, but is seen by the experts as a very complex model. While the eden model is seen as a starter model that provides a quick snapshot, the experts attribute greater potential to the CMMI model. CMMI is broader and offers a wider range of key figures. Therefore, a more detailed assessment of the overall topic of BPM and individual processes is possible. However, each company must determine whether it wants to build up CMMI as a controlling tool for the company and use SAP as a data base.

For the experts, the eden model is a maturity model, which is carried out once or twice a year to assess how the whole BPM develops step by step. The experts explain that the CMMI model is more suitable for daily use and

operational process management. If desired, each company in the CMMI can define its own complex system of key figures that can be used for daily needs. When eden is executed, the company is defined by a questionnaire at a specific point in time. CMMI, on the other hand, is a more complex assessment with the possibility to define a large number of key figures for daily use. In this case, a company must consider which key figures can be used and how these are measured. These key figures can then also be automatically integrated into the CMMI evaluation from SAP or other IT systems. The use of CMMI means a greater effort for a company because not only a predefined questionnaire has to be answered but the company must assess the criteria for the assessment.

The experts see it as an advantage that companies do not always have to exploit CMMI in the full range of the available possibilities, but can trim it for their own company. Nevertheless, there are companies that use CMMI in a broad manner and carry out an analysis by consultants who actually ask hundreds of questions and then present a highly aggregated result. One of the experts strongly advises that a company does not get lost within the full details during the application of these complex maturity models. If a result is presented that is already known by the management, than it is difficult to explain the added value of the maturity model. There are certainly employees who feel positive that they will achieve a result which has already been expected. But the more important question is how a company reacts to the result. The question is not what methodology was used for the analysis. More important is that a company really reacts to the result and draws consequences from it.

Both experts mention the key figure determination as the main point which is dependent on the SAP system during a maturity determination. The model allows for a much more detailed assessment of the overall BPM theme and the individual processes than the eden model; but this makes a CMMI Model even much more complex.

4.3.4 Case 3: BPMM

This section presents the third case example and the findings for BPMM.

Three of the eleven experts knew BPMM, and two experts use the model regularly in practice. The experts describe BPMM as a model which considers an organisation and its processes as a whole and has been derived from the

CMMI model. From the practical experience of the experts, it is not a model for a single or individual process.

The experts describe BPMM as a very complex model, and therefore only a few companies in the world use it. The high complexity of the model is also a major critique of the experts and leads to avoidance from many companies who would rather work very pragmatically with a checklist. On the other hand, BPMM offers a broad approach for analysing different areas, and to analyse the organisational as well as the strategic view of the processes.

Within BPMM, there are 40 different areas that can be viewed and evaluated. For example, product management, process management and control systems. This extensive evaluation could be, on the one hand, dissuasive for many companies. On the other hand, it also provides the model with the advantage of discovering things that have not yet been analysed. A company should always consider the effort required to implement this model and analyse whether it is necessary. It is absolutely possible to employ an external consulting company with at least 20 people for three months for the purpose only of using this model, and to conduct two to three-hour interviews with the management. In practice, only a few companies make such an extensive investigation and a company should always consciously consider how extensively this model should be used for their own analysis.

For the experts, it is not the aim of this model to apply benchmarking with other companies. The model should more be used to highlight areas that are not yet running optimally. BPMM is more of a flexible model and could be used with different criteria for an industrial company rather than a financial enterprise. One of the experts appreciates the possibility of changing the criteria against the standard description of BPMM. Other models like eden have more fixed criteria and cannot be changed, because at the end a software evaluates the outcomes of the questionnaires and presents the result. BPMM, on the other hand, also offers the possibility to analyse criteria that differ from the standard and offers the possibility of defining some customer-specified criteria.

As an advantage for BPMM, it is also mentioned by one expert that it is more of an international standard which has already been used globally. In contrast, eden is often known only to users in German speaking countries.

For the experts, it is not certain that the maturity levels are measured in whole steps in the model and without decimal places. If there are only three or four levels, it is often difficult to reach the higher level and progress in this may take a long time. This is, in part too granular for the experts. Therefore, one expert evaluates the process maturity not in whole numbers, and use decimal places. This could demonstrate, for example, that a level has just been reached or has almost reached the next maturity level.

4.3.4.1 Findings for first research question

This sub-section describes the findings for the first research question, which were determined by the experts using BPMM:

- How are BPM maturity models used in the planning and implementation of ERP software projects?

Both experts who use BPMM know in practice different approaches to implement maturity models on an ERP system. The first expert is only familiar with the situation in which a given ERP system has already been introduced into the company. The introduction of a BPM approach is always the second step, and the use of a maturity model the third and final step.

The expert associates an ERP system primarily with the central ordering system within a company or as a system which is used only in the area of logistics and financial operations. He assumes that the process flows within an ERP system are well coordinated with each other and the expert expects less optimisation potential. He expects much more optimisation potential within process flows that affect several systems. Therefore, the expert expects that standard processes are already depicted within an ERP system and should already be able to reach a higher maturity level because they are better matched. Processes should always be viewed from an end-to-end view and from the beginning of the process to the successful implementation. This consideration should also include all involved people and systems. A BPM approach is more of a global approach and should always analyse the whole company. An ERP system

considers only a few areas of a company. The key to a successful BPM implementation is the end-to-end view of processes and not to view only parts of the ERP system. With a BPM approach, it is always evident that there are other systems that also communicate with the ERP system. Therefore, a maturity model should ensure that it is not only the IT processes that are modelled and adapted. A maturity model should consider a company in a more global sense, and reflect the overall organisational processes of the company.

An ERP system is a central tool in many processes, especially when it comes to financial data. One of the BPMM experts reports that interfaces between different systems should be considered in more detail when using ERP systems. He justifies this by the fact that, according to his experience, process flows within an ERP system are much more efficient than processes running between different systems. In his experience, processes running within an ERP system always have a higher maturity level from the start than processes with different IT systems or processes that are only partially digitized. He recommends that an organisation should focus, in a BPM analysis, more on the interfaces between different systems. If these interfaces are considered for external systems, this usually offers a great optimisation potential. In this case, processes within an ERP system could be considered later because they have less potential for improvement.

In principle, an ERP system is an important back office tool which handles the central orchestration and where the management of processes in companies takes place. As a central tool, the ERP system may contain some specifications which can then make adaptation more difficult in a later process conversion. But 90% of business processes do not need IT support. The IT dependency plays a much smaller role than in companies where, for example, the whole logistics system is controlled by the IT system.

For this expert, ERP is the important IT system in a company for a BPM approach. Such a system already provides some guidelines and therefore a company is based to a certain extent on the system in the design and use of its processes. The connection of the processes and the ERP system produces, in practice, a certain dependency and complexity.

If a maturity model requires that the processes have to be analysed and updated twice a year, an ERP system does not help. In many cases the systems do not offer the possibility of viewing the process sequences in the system or drawing a process map from the actual system settings. It is possible to adapt the systems and processes to the needs of the company, but people lose the opportunity to quickly review these changed processes and draw the processes out of the system. Even a maturity model is not suitable for surveying and controlling these process changes and the expert is of the opinion that new tools are required which can handle this.

The second expert, who regularly uses BPMM, emphasizes that ERP systems could be a template for the design of processes. Systems that cannot be adapted to the company's wishes cannot reach the highest degree of maturity, but this depends how intensive the use of IT is. If there is an intensive use of the IT system in the enterprise, there must also be adequate reaction to the customer's requirements. Here, the maturity model offers the possibility to check whether the IT can fulfil the requirements which are strategically desired by the company. But if an IT system cannot fulfil many requirements, then the company may realise that the wrong ERP system is in use.

The expert also believes that it can make sense to use a maturity model if there is at present no ERP system in the company, or a major new launch is planned. A regularly used maturity model can show how far the introduction of BPM has been established within the company. In this case, an initial assessment should be carried out on the basis of the maturity model before the planned change. This evaluation can then be repeated on a regular basis to show the continuous development. The expert even describes this approach as his favourite way to show the BPM progress towards the management.

The expert notes, regarding BPMM, that this model contains several areas that are analysed. One area deals with the question of whether the processes in the company are known, defined and documented. If an ERP system is already used, the expert expects that the question in the process area can be answered positively, and that a higher maturity level can be achieved due to the ERP system. The prerequisite is that the manufacturer releases his process description, but this is not always the case.

Furthermore, the expert is of the opinion that ERP systems can influence a process development strategically, because there is not infinite money and time in order to change every process sequence in an ERP system in the way a company wants. If there are self-built ERP systems, then this problem is not so significant, because everything is programmed by itself. But if large standard ERP systems are used and the processes are already specified, this becomes more complicated. The expert explains that standard processes are not always the optimum match for each company, because they have been developed by an ERP vendor and oriented to a variety of different industries. If a company develops new ways, many organisations use proprietary Excel and Access solutions and do not use optimal processes with an ERP-optimized software solution. This approach is usually justified by the fact that an organisation believes that each ERP implementation costs significantly more time and money than an Excel implementation.

The BPMM experts also point out that process flows can already be defined within an ERP system. The use of a standard process could lead to the first BPMM analysis result not being in the lowest maturity level. On the other hand, the use of a standard process can make a process change more difficult if processes are not configurable, or lead to considerable budget constraints.

The experts highlight some risks that result from long-term employees who are already familiar with the handling of an ERP system. These employees will find it harder to develop new processes and think about new processes behaviours. Many employees are not able to abstract and concentrate on the new professionalism. They find it very difficult to make the connection between the ERP system used and the process behind it. But in practice, it is undesirable that the ERP system specifies the processes and allows no change. This would mean that the company has resigned itself to the enterprise strategy being defined by the ERP system. Such behaviour would be able to determine a maturity model such as BPMM and lead to a low maturity level.

One expert states that there are no wrong moments to introduce the BPMM maturity model. Usually, most companies already have an IT system that they use within the company. It is quite possible that a company works very well with the processes that are defined on the ERP system, and gets a higher maturity

level within the BPMM model. But a consideration of the end-to-end process is often neglected. The questions should be which benefits exist for a customer in the end-to-end process and how are these processes implemented within the processes of the ERP system?

The maturity model helps at that point to identify areas that have not yet been considered, or to rethink the company strategy. To achieve this, the management *must* be supportive of the topic. It is not sufficient that only one department introduces a maturity model. The introduction of a maturity model must be desired by the management, otherwise the model will not succeed. Therefore, a maturity model should always be integrated into a company through a top-down approach, in order to maintain the necessary standing in the company and to receive the necessary time and money. Essentially, a maturity model has the following practical use for the management: It demonstrates how far a topic has already grown in the company, and what has to be done in order to progress the topic.

4.3.4.2 Findings for second research question

This sub-section describes the findings for the second research question, which were determined by the experts using BPMM:

- How does SAP impact upon the use of specific maturity models?

For the BPMM experts, an SAP ERP system is an important backbone system that can define and influence process flows. This means that there may not be the freedom to configure the processes in the manner the company would like to do. The system is already preconfigured with certain procedures in some areas and it may even be the case that the company has to adapt their processes to the machine. Theoretically, a process definition is independent from any kind of system, but in practice if a company attains a certain size and level they need an IT system. But the use of an IT system can makes things more difficult, because system dependencies have to be considered. For example, the BPMM would like to have from the process owner twice a year the revision and updates of all processes. But SAP does not offer any functionality to support this requirement and to control process flows. An expert explains that process relationships are often not known in the SAP system, because SAP cannot represent them. The representation of the process view, which is fully

integrated in the SAP system, is often perceived as complicated or almost impossible.

In general, an expert notes that a maturity model must fit the strategy and the goals of the company. A model helps a company only if the model supports the organisation to develop their own goals.

From the basic functionality, the experts believe that an SAP system already contains many functionalities and processes. However, modifying the processes is often seen as a very complex step and involves limitations. SAP is often perceived as a complex system, which can be responsible for the manner in which a process is managed. This often results in a negative perception when an organisation uses SAP. On the other hand, the SAP system is very well supported, so the determination of key figures and thus process measurement values can be obtained directly from the system. Due to the fact that many data already exist in the system, the values can be determined quickly from the existing actual values of the system. This is why SAP is, at least, always relevant to a maturity model such as BPMM, if key figures can be generated and, for example, the throughput times of a job in the SAP system are determined.

The experts explain that a company expects from SAP a certain spectrum of standard functionalities, which are established at the market. The purchase of an SAP system means a high investment sum for the buyers and they expect to get deliberate know-how in standard process sequences. However, many companies ignore the fact that, for the best view, an end-to-end process should be considered, and such a process does not only exist within the SAP system. An end-to-end process often exists across different systems. The expert's experience is that process flows within an SAP system are already very well preconfigured, but when processes are operating on different systems, a company needs a central office that analyses and coordinates the processes in general. In particular, at the interface between the systems it is always possible to find optimisation potential. In this analysis, a maturity model such as BPMM can be used to find the optimisation potential and identify weaknesses.

The experts explain that a distinction must be made between the practical application and the theoretical application of the BPMM maturity model. Theoretically, it is not conceivable that an SAP system can have an influence on a maturity model. An SAP system can be configured as required to achieve the highest maturity level. This means that, first, process objectives are specified and processes are defined. Subsequently, the customizing takes place in the SAP system, and then the ideal process can be executed. But this system change costs money and time, and this is not always sufficient in practice, and usually comes up against the budget question. In that case, SAP cannot be configured and the management or an IT department do not provide the staff and the budget for the changes. As a result, the process must be adapted according to the SAP system and not vice versa. This means that the maturity of the SAP processes is limited and cannot always be designed to the maximum specification. Money plays a decisive role, especially if the system already has standard processes, because a basic functionality exists and the management will then ask why the company should invest money for functionality which still exists. Here, a maturity model can show how, and where, the company can develop further through a changing of the existing processes.

A SAP system has already defined a variety of processes but the business has a continuous development and new products or sales channels are being placed on the market. That means that the system must be adapted, but often the business wants a quick solution and does not adapt the SAP system. For many employees, an adaptation to SAP is too laborious, too costly or too inflexible and an alternative solution is developed through an Excel or Access solution. The expert explains that this kind of adaptation can never be the optimized solution which leads to a high process maturity, since media breaks occur within the process. In practice, this deviation repeatedly occurs, due to the prejudices against SAP. A high degree of maturity can only be achieved if process objectives are defined in a company and these process objectives are implemented into practical processes within a process design. For this implementation, SAP can be used, but only if the monetary and temporal resources are sufficiently available. But this is not always the case, even if a maturity model shows possible improvements. At some point, an organisation

has to compromise, because the SAP adjustments would break the budget, even if the top management fully supports the introduction of a BPM approach in the company and the use of maturity models for verification.

4.3.4.3 Findings for third research question

This sub-section describes the findings for the third research question, which were determined by the experts using BPMM:

- To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

In the opinion of one expert, the maturity model is neither successful nor established in Switzerland and Germany. Many companies in Switzerland use their own very pragmatic maturity models in the form of self-defined checklists to analyse their processes and the organisational and strategic view of these processes. The expert uses BPMM as the basis to define such a checklist for a company, because the model contains all the usual details and the expert describes it as the best maturity model he knows. In terms of disadvantage, the expert feels that the whole model has many different areas for analysis and is therefore very complex. In his opinion, this complexity also leads to the fact that the model is hardly used anywhere in the world. Nevertheless, BPMM is an international standard model which provides a good reference for an international comparison. The model was applied internationally, for example, in hospitals and public administrations in America and England. But the model was not very successful in America and therefore there is currently no further development on the model.

The model is very generically developed, and the modelling and control of key figures as well as the analysis of risks and directives can be used across all industries. The model provides a framework, but the detailed analysis of processes has to be designed by the user himself. Therefore, the model has no limitations and self-defined tools for process analysis could also be used across all industries. The model is so broadly defined that it really fits all and can be used anywhere and in all areas without restrictions, though this makes the model very complex. One expert explains that the model always needs personal settings for the company before it can be deployed, and therefore it is the task

of a consultant to adapt the model to the company and its objectives. These changes have always been carried out without any restrictions by the expert, so the model does not, in his opinion, depend on any system such as SAP.

Problems are more likely to arise at the management level when such a model is introduced. In many companies, an understanding of process management needs to be created, and many managers do not understand why a process needs to be analysed and measured. Furthermore, the managers do not understand why an external service provider should measure processes because the company should know how their processes are running. Therefore, it is necessary to generate a better acceptance for the maturity model or the measurement of processes in general. It does not matter how and from which IT system key figures for processes are measured; it is more important that the management support the process analysis. This means that companies are prepared for the topic and to be a part of it.

The second BPMM expert reports that the BPMM model is derived from the CMMI model. In addition, BPMM has some IT points to be analysed, which are not yet very common in some industries. As an example, the expert mentions the topic of configuration management, which deals with the further development of products, and is not widely used in the banking and insurance sector. In software development this topic could be a much more distinct topic and plays a larger role. Even this expert reports that there are topics which are not suitable for some companies and are therefore not analysed during their BPMM deployment, even if these are provided by the model. It leads to confusion if an organisation asks questions which employees cannot answer, or already know that these questions are rated as ‘not available.’ This is why the expert does not ask such questions, and takes the freedom to exclude certain features of the model or queries and does not ask all the questions of the model. In practice, the expert has noticed that the BPMM is a great model, but not all the questions are relevant to all sectors and certain aspects of the model are disturbing. General IT limitations that come from an SAP system are not noticed by any expert. The most massive points of contact between BPMM and SAP arise only in the determination of process characteristics and key figures. The SAP system has the data that can be used for an analysis.

4.3.5 Case 4: SAP maturity model

This section presents the fourth case example and the findings for the SAP maturity model.

Three of eleven experts have mentioned the SAP maturity model in the interviews, but only one expert has used it in practice. This model was developed by the company SAP AG and is mainly developed for internal use. The special feature of this model is the fact that standard processes of the SAP software should be used. The highest level of maturity can only be achieved if processes run as defined in the standard SAP system. Adaptations and proprietary developments to this given solution mean that the maximum maturity level cannot be reached.

Furthermore, this maturity model includes a measurement of process characteristics and is required to reach a special maturity level. In general, it is necessary to meet on average between seven to ten criteria on each level before the next higher maturity level can be reached. If one of the given criteria is not fulfilled, it is not possible to proceed to the next level. The expert reports from his practical experience that the use of the model has the advantage that a process manager has a better way to discuss his process and process performance when he applies the model and has a higher degree of maturity in the company. People then see what has already been achieved, and what can still be possible.

In practice, the currently valid level of maturity is assessed individually for each process in the company. The maximum level of maturity is three. From the maturity levels of the individual processes, an average value is then determined over the entire company. This average value is used to also identify minor changes in the whole company. It may take a longer time for individual processes to improve in their maturity level. For this reason, it is important that it can be observed from the average value that the company is still gradually developing.

The expert explains that the SAP maturity model is based on CMMI and the PEMM by Michael Hammer. Just like these models, the SAP model also has clearly defined maturity levels, and level three is the absolute maximum level which includes the key criterion to use an unmodified SAP system.

The model which is now used at the SAP AG does not have the same expressions as the model which was described at section 2.3. and presented in 2008 as the ‘SAP’s Process Maturity’ (Scavillo, 2008). Even if the models are similar and both based on CMMI, there are two big differences. First, the current one has only four maturity levels and not five. Secondly, the current model has a much stronger linkage and focuses on the use of SAP's own developed software.

4.3.5.1 Findings for first research question

This sub-section describes the findings for the first research question, which were determined by the experts using the SAP maturity model:

- How are BPM maturity models used in the planning and implementation of ERP software projects?

Only one of the surveyed experts has used the SAP maturity model in practice. In his opinion, a BPM introduction should be carried out with a competent consulting team, who knows whether standard processes for certain requirements still exist in the SAP system. This is especially important for the maturity model, because the top level of the model can be only achieved with a pure standard SAP system. In general, the application of the SAP maturity model leads to the requirement to pay as much attention as possible to the question of how the defined process specifications and the SAP system used can be combined as closely as possible.

In general, the expert recommends not combining the introduction of a maturity model with the start of an ERP implementation. If a new ERP system is introduced, the project should only have the focus on this ERP system. The topic is already so complex that other topics can quickly lose out on the necessary attention.

As a SAP vendor, the expert supports the statement that a special maturity model provides a great support for standardizing processes. But from the view of a process manager, each company should consider exactly what considerations are important for them within a maturity model. If the standardisation of IT processes is part of the process strategy and a company wants to be directed to the ERP system, then an ERP system and his standard

processes are very helpful. An ERP system is not a prerequisite for the standardisation of processes, but an ERP system can support the identification of process characteristics and automatically determine required figures.

Many companies need IT support to run their business and create value. This IT support does not necessarily have to be an ERP system, but such a system usually helps, and in the best case leads to an efficiency increase, claims the expert. A maturity model has, in the widest sense, the goal of improving processes and should first of all highlight the things that are not currently running correctly within the company.

By using a BPM maturity model, a company tries to optimize the use of BPM. For the expert, a maturity model is a measuring framework or a benchmark to assess the maturity of processes. The degree of maturity does not necessarily mean anything about the quality of the process and if the processes are particularly efficient or not. The expert assumes from his practical experience that a process with maturity level three runs better and more efficiently than a process with maturity level one. He asserts that there is a great chance that a process with a high maturity level is well-managed and analysed. In a process with a low maturity level, inefficiencies are much more noticeable. If a non-optimized process is recognized with a maturity model, then this process may need technological changes and therefore the use of a maturity model can lead to changes within the ERP system.

The experts explain that there are a lot of opportunities to use the standard ERP software differently than originally planned during the development. It is possible to use the processes in a manner different from the originally modelled intention. The expert clarifies that the processes which run within a standard ERP system do not automatically run in the way they were planned. Processes can be used very incorrectly. This means that predefined process sequences are used for a completely different process than originally intended.

In general, the expert notes that the introduction of a maturity model should be carried out through a top-down approach in order to receive the necessary management support.

4.3.5.2 Findings for second research question

This sub-section establishes the findings for the second research question, which were determined by the experts using the SAP maturity model:

- How does SAP impact upon the use of specific maturity models?

The SAP maturity model is a maturity model of the SAG AG and was created under the assumption that specific aspects of the SAP company should be considered within the model. The decisive prerequisite for achieving the highest level of maturity is to map an IT-supported process with SAP standard software. It is permitted to use the customizing of the SAP system to the extent that the standard software allows it, but not to use any additional self-developments. The primary goal is to integrate and use processes in an unmodified SAP standard system. This requirement is to be implemented wherever an IT-supported process is used and can be mapped by using the standard SAP software. If a process step cannot be mapped to the standard SAP software, this criterion is not used for the process evaluation. The model has a maximum maturity level of three, and this level can only be achieved if processes are running within the standard SAP system as a best practice. The expert may not be convinced that this criterion is a useful maturity criterion for other companies, but if companies want to use a standardized best practice solution, then the expert assumes that it can be a good criterion. The expert further mentions that a reasonably implemented process should generally have a very high degree of standardisation.

The goal of using the maturity model is to use SAP's own software in the company and to accept and follow the standardized process of the software. The expert points out that this requirement is very much focused on the SAP company and may not be relevant to other companies. The goal of this focus on the SAP system of SAP AG is to be a pioneer for the usage of the self-developed software. The use of the standard software is intended to give a signal to the customers that the software is not only sold to them but can also be fully used for a company. Many employees in a company are familiar of the fact that a system is modified in such a way that it is precisely adapted to their process. This intensive modification of a standard system can lead to economic problems in maintaining the system over the years. Any attempt to update the

system or to import an enhancement package will result in higher budget costs, because each self-development needs extensive tests. For this reason, it is not only desirable for process management aspects but also from IT aspects to represent the processes in a standard system.

The expert explains that every company should consider what the important points are and which maturity model should be used by a company. If the standardisation of IT processes is regarded as an important criterion, then the orientation to an SAP system and its processes promises helpful support, which can be also a cost-effective solution.

A further criterion of the maturity model, which can be closely linked to an SAP system, is the regular determination of KPI. Wherever processes are developed within an SAP system, there are key figures which can be linked directly to the SAP system. The exceptions are manual processes, but if the task is to analyse the performance of throughput times, for example, then these values can be determined directly from the SAP system. The determination of these KPI values is defined at the second level of the model. This means, without the measurement of key figures, a process cannot reach the second stage of maturity.

The expert does not expect that the use of the SAP maturity model requires technological changes to the SAP system and that the software has to be expanded with self-developments. In most cases, processes that receive a poorer rating already show an improvement if these processes are correctly set up within the SAP system. That means that the processes are implemented as they are devised in the standard system and not expanded on through additional steps designed by some employees. Any form of modification to the standard SAP system means that the highest level of maturity cannot be achieved.

The expert states that the goal is not that every process should reach the highest possible maturity level. Within a model, each company should define for itself what is the maturity level that any process should reach. For example, the company could specify that at least maturity level two should be reached at the three-stage model. This means that it is important for the company that each

process can at least be measured by key figures. The expert explains that it may be the case that it does not make sense for a process to reach maturity level three, but that the process, at level two, is a meaningful one for the company.

The expert strongly recommends that any process that runs in a company should be analysed to determine whether it is suitable for that company. It is always recognized in such analyses that processes are used for completely different functionalities than originally conceived. Furthermore, processes that are a best practice solution in the SAP system need an assessment and the process should not be used without further analysis. A SAP standard process can be varied considerably by the customizing, and that means that the process works in a standard SAP system but is far away from being an optimal process. As an example, the expert refers to the use of approval levels. For example, if the process model of the company requires that four levels of approval are required in a process flow, but the standard SAP system only provides two levels, then it is quite possible to establish these two additional levels in the SAP system, but the organisation will not be using a best practice solution any longer.

Finally, the expert notes that, in principle, an SAP system has some big advantages for managing business processes. But each company has to define itself whether a maturity model should work together with the SAP system. Is it important to the company that key figures are automatically determined from the SAP system? Or should the processes be as close as possible to a SAP best practice solution because SAP is the leading IT system in the company? These are two questions which every company must decide for itself, followed by selecting the appropriate maturity model.

4.3.5.3 Findings for third research question

This sub-section outlines the findings for the third research question, which were determined by the experts using the SAP maturity model:

- To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

A dependency on the IT system is achieved with the SAP maturity model wherever a process is also supported by IT. Strategic and management processes do not necessarily have to work with IT support. This could be different when processes are established that can be operated in an SAP system. The expert specifies financial processes or human resources processes in particular. These processes have been mapped and operated in a SAP system for many companies for several decades. If a process can be established in an SAP system, it is only possible to reach the highest level of maturity if this process actually runs in a standard SAP system and without any own development. Therefore, the SAP maturity model has a significantly stronger system dependency than all previously described maturity models.

The expert does not believe that there are any SAP modules that are able to achieve a higher degree of maturity easily or better than others. For this reason, a differentiation to modules, for example in the classic SAP areas FI or CO, is not provided. These areas do not receive a higher degree of maturity in a simpler or faster manner than other SAP modules.

The SAP maturity model is not a subjective evaluation and allows for a very objective assessment. The basic idea in the development of the model was to establish the idea of process management in the company and increase that idea with every maturity level. For this, modelling a process map is not sufficient and there are more activities required which deal with the establishment of process management in the company.

Through the application of the model, the company promises to achieve a certain comparability of the process management activities in the individual areas. For this purpose, a monthly report is carried out, and all the individual areas of the Management Board can determine their actual process maturity level. To determine the maturity level, key figures are also determined, as in the CMMI. The key figure determination takes place only from the second maturity level. These key figures are then determined primarily from the SAP system. In addition, there is a criteria catalogue for the assessment of process maturity. Based on this catalogue, a process manager can assess the degree of process maturity for its own department.

In the expert's company, a total of about 270 processes are measured and assessed individually. From this set of processes, the company then calculates a target value which is determined from the average value of all investigated processes. With the few levels of maturity that the model has, it can take a long time in the case of a single process until this process has been implemented in the standard SAP system and has reached the highest maturity level. Through the average assessment of the processes, the company can still see how the process maturity in the company improves. Even if only some individual processes develop further, the average value shows the ongoing process enhancement by the change of the decimal places.

In summary, two important dependencies to the SAP system exist in the SAP maturity model. On the one hand, key figures from the SAP system are determined in the SAP maturity model. On the other hand, the highest level of maturity can only be achieved if the processes are implemented in the standard SAP system and without any proprietary developments.

4.3.6 Case 5: Use BPM & SAP ERP and consider using a BPM maturity model

This section describes the experiences of the experts who do not use a maturity model, but use an ERP system within their BPM implementation and environment. These experts were asked about their expectations which result from the use of a maturity model and the ERP system.

The experts who applied a maturity model argue that companies would rather use a self-developed checklist to analyse the processes and not a complex-looking maturity model. Essentially, these checklists often derive from well-known maturity models like CMMI.

One of the experts explained the introduction of the process management in his company. The process management projects started in 2006 and are based on the existing SAP system. This project does not use a maturity model but the expert reports that he carries out a self-developed checklist for himself, which is not written down anywhere. He uses this checklist for himself when he applies the topic of BPM to his team. For him, processes have essentially been applied as follows: The processes are modelled, they are trained, they are partly measured and get some process reviews to analyse and optimize the processes. The expert believes that the checklist is only missing the definition of

maturity levels to become a maturity model, but the checklist has all the aspects that would also be present for a maturity model in the BPM environment.

Two other experts reported on their projects for the harmonisation and optimisation of business processes and their integration into a uniform SAP platform. The basis for these projects is the use of SAP as a central IT tool, whereby the use of SAP was defined by the management. Because of this decision, the implementation of BPM must be linked to the use of SAP. These experts also explain, on the basis of the projects, the many steps which would also be carried out as part of a maturity measurement.

In this case, the expectations of the experts for a maturity model are analysed. All three experts already have practical experience within the use of SAP at a BPM project but do not use a standardized maturity model for their process analysis.

4.3.6.1 Findings for first research question

This sub-section sets out the findings relating to the first research question, which were determined by the experts who are not yet using any maturity model and who have been asked about their expectations.

- How are BPM maturity models used in the planning and implementation of ERP software projects?

The experts explain that it is easy to implement BPM without using any ERP system. Both topics are not necessarily related, but can mutually accelerate each other. If a company knows exactly how it wants to develop with the processes, then these process requirements can be based on an ERP system like SAP or Navision. The advantage is that processes can be designed as close as possible to the standard ERP system, which means that less efforts are required for system updates and system extensions.

Theoretically, BPM has nothing to do with ERP, but for the experts it is a mistake to consider BPM only from an established viewpoint. Basically, BPM enables a company to design processes and manage the complexity of the processes, but at the implementation the manual and electronic process steps play a role and therefore the IT used must be analysed. The expert urges that processes should not as far as possible use Microsoft Excel based solutions,

because this always leads to problems and the company does not develop an integrated solution.

It is also encouraged to measure the success of BPM very quickly after a BPM implementation. BPM introductions cost a lot of time and money and the management needs to understand why this deployment is worthwhile. To explain this, maturity models can then be used.

A maturity model must be introduced through a top-down approach. From practical experience, an expert reports that a successful process management can only be implemented and transferred if the top management support and demand the topic. A maturity model should therefore necessarily include the question of how the company management considers the process management as a management task and whether they apply BPM in their everyday life.

A process management system must have interlinks with the ERP system used. Many process steps are used within an ERP system and do not work without it, for example the ERP keeps the required data for measuring figures. If a company wants to engage in process management, it should use a process manager who is familiar with the ERP system and can also handle IT. This person must speak the language of IT and the ERP system in order to formulate requirements in such a way that the IT department understands the requirement and understands the questions for the IT and ERP part. The process management should be interlinked with the IT infrastructure in such a way that the ERP system can be influenced. For a successful process management, the people involved and the organisation must be integrated as soon as possible and not ignored.

The experts are of the opinion that it is helpful for a maturity model when the relevant stakeholders are involved in the maturity model and locate some of their positions. For example, the IT department finds aspects in the maturity model or the management finds some points that are already implemented or could be improved. All involved roles in process management should therefore be reflected in the maturity model, in order to motivate and stimulate the topic further.

The experts expect from a general ERP system that it supports the evaluation and analysis of key figures for a maturity model. In addition, a maturity model should check whether the standard processes of an IT system are used and requirements are already being executed by standard functionality such as workflows or drawn by process maps. Every company has the main task to evaluate the predefined process of a system for themselves and whether they are meaningful.

Two experts were directed by management to integrate the organisation processes into an ERP system and to use the ERP system to harmonize the processes of a company. One expert explains that the implementation and mapping of a process into an ERP system is a task which costs money, is bothersome, complex and expensive and, above all, takes a certain amount of time - but it has to be done. The core task and transformation is the harmonisation of the processes. This is not a pure IT project and has more to do with a transformation process and includes some realisation parts by an ERP system. The experts recommend using standard processes to keep later adjustment costs as low as possible when system updates or enhancements packages have to be installed at the ERP system. A maturity model should ask the question of how much standards really helps the company and where a standard process will not support a company in the long term. Perhaps at this point a maturity model can help to find the necessary balance between the use of standard solutions and the preparation of self-developed process solutions.

Finally, a maturity model should question the strategy of a company and offer the possibility of establishing a master plan for the further development of a company and what kind of IT support is needed for that.

4.3.6.2 Findings for second research question

This sub-section describes the findings for the second research question, which were determined by the experts who are not yet using any maturity model and who have been asked about their expectations.

- How does SAP impact upon the use of specific maturity models?

The project of one of the experts includes the harmonisation and optimisation of all business processes worldwide and their integration into a uniform SAP

platform. At the beginning the user requirements are described by BPM and the next step was the implementation on the SAP system of the company. This results in some follow-up questions for the project. For example, what BPM should additionally provide for the company and what efforts are the company willing to make to reach a better BPM maturity. What is definitely established in this project is SAP as the central IT tool, because this was determined by a management decision. SAP has been involved in the company for about twenty years and the management expects that SAP will be the leading IT tool for at least the next ten years. Therefore, the introduction of BPM is linked to the use of SAP because the data is already available in the SAP system. The positive experiences with the application of SAP promise the long-term use of the system.

From the decision to use SAP, the management expects a reduction in complexity and an increase in efficiency. The company wants to harmonize the processes and integrate everything into an SAP system. A further active management decision is to build the processes as far as possible within the standard SAP system, so this point was linked to a high maturity level. This means that business processes are based on the already defined standard SAP processes as far as possible. The management promises better maintainability and also a complexity reduction. But the company must learn that a self-programmed solution is not always required, and accept that non-individualized and self-developed solutions are good enough for the company. The BPM project compares aspects of the process design: How the business presents the optimal process and what standard process is offered by the SAP system. The goal is then to limit the solution to a point where both sides can live with it and clarify whether a special process design is needed because the business does not know any differently or because the business genuinely needs it to be different? The development of the processes as close as possible to the SAP standard solution is an important requirement for a maturity model. The company promises to get fewer problems during maintenance and handling by standard process solutions. There are still processes where the company decides not to use the standard SAP solution and buy additional add-ons, even if there an SAP functionality exists. But the expert explains that this is only in some individual cases and that it is not the norm.

The expert highlights that the use of a maturity model binds capacity to an extent which not every company is willing to accept. Here, a company has to decide if there is the budget available for the topic. The application of a maturity model would be a future step for the expert after the BPM integration into the SAP world has occurred. The expert definitely expects that the application of a maturity model generates additional benefits for the business, as BPM is only used if there is an end benefit for the company. Maturity models should only be used if the results offer potential value for the company. At the moment, the employees do not care what a maturity model could do. At present, it is only interested in whether BPM is working in the company and making the daily work of the employees easier. If a maturity model confirms these feelings and a department analyses some improvements, then this is, for the moment, uninteresting as regards their practical work. The focus has not yet turned to these matters, because the entire topic of BPM has first to be understood.

The expert explained that a maturity model would also have to deliver key figures. In order to gain such key figures from an SAP system, the company first considered the SAP product ‘Run SAP like a factory’, and this tool has already been presented by SAP. This service has to be purchased additionally and is based on an SAP system. The service then contains a standard kit of process codes, which are determined automatically and are already stored within the SAP system. Based on these figures, certain alarms and workflows can then be triggered. The company expects this product to offer great potential to evaluate the corresponding key figures and get an improved analysis of the processes.

The expert assumes that the use of a standard SAP ERP system achieves a higher degree of efficiency if SAP is used in a professional manner. This assumes that the SAP standard is used in the same way as the SAP development plans the process flow and, for example, workflows are consistently used as SAP offers them. But a company must also analyse these processes because an SAP standard solution is not always the best solution for a company, and the expert knows that there are SAP solutions which do not offer an optimal practical solution. SAP has a dominant position, and therefore some solutions are nearly defined as an industry standard, but this does not relieve a company from evaluating these solutions in terms of the suitability for

the company. This means that a maturity model should analyse all processes of a company irrespective of whether they were developed by themselves or by SAP.

Basically, the BPM project has shown that a BPM introduction has much more to consider than just the ERP system. The introduction of BPM has, above all, a human factor and less of an SAP factor. The employees have to be integrated into the project because a project can only then be successfully implemented. This can also mean that employees are sometimes forced to go in new directions. But the more the employees are involved in a changeover, the better a process changeover will work.

One expert reports that the BPM project is strongly linked to the SAP standard processes, so a maturity model would have to take this approach into consideration. The current process descriptions are essentially the steps that run in SAP. Therefore, the BPM project is exposed to the accusation that the project examines SAP too much and the real world would look different in the company. Perhaps at this point a maturity model could be helpful to answer the question: how much process detail is needed for a generally valid template description? Is it sufficient to define the essential steps or would a much more precise process description be desirable where the system sequences or SAP process steps are described?

Another expert reports on an internal process management project which arose from a re-engineering project and is based on an existing SAP system. The aim of this project was to model, train and measure processes, but also to regularly review and analyse the processes. In the expert's opinion, this project involves all the process steps which are also examined in the context of a maturity model. Therefore the only thing which was missing to make it a maturity model was the division into steps or levels, to recognize the process management quality.

One of the experts has developed his own checklist regarding the most important core criteria that a process should have in his opinion within a company. These criteria are a clear description of the process within the process map and a clear assumption of the responsibility with a management

representative. In addition, such a process requires a process manager who regularly checks this process, promotes change ideas and acts as a contact person in the company. The expert defined the development of these criteria as a subtle and hidden maturity model. In his opinion, a process has also some touch points with the company's SAP system. The process manager should not conduct the regular process analysis of key figures with a manual Excel file. The goal should instead be to determine automatically the required key figures from the SAP system. For the investigation, which SAP fields are used for such a query must then be clarified and applied regularly. The results of the evaluation should be a transparent process support to the users and also a motivation for the corresponding managers to support and push the BPM topic. The aim is to recognize where the process is located within the system, and which target values are required. This can then affect both internal and external procedures, which must be implemented consistently.

SAP is the central IT system within the company and all financial transactions are executed via the system. Therefore, a process must also cooperate with the SAP system. The expert believes that one advantage of the SAP system is the clear structure to force the input of values in a process. This means that the system can guide a user extremely well through a process and provide clear advice on which field must be filled with content and required urgently for a key figure evaluation. SAP therefore offers the possibility of integrating a great automation and analysis capability.

For the interplay between SAP and BPM, neither the statement ‘IT follows process’ nor the inverse explanation ‘process follows IT’ applies. A good process must be viewed from both perspectives. The IT provides a standard implementation and the business analyses how these standard processes can be used for the company in an optimal manner and meet the company requirements. The expert cannot describe exactly how to implement this, but he believes that a maturity model should analyse the balance from these two perspectives to implement an optimized process.

No matter how a maturity model is applied, every company has to think about which maturity model fits the company and whether the company needs are satisfied with the maturity model. The expert does not expect that all processes

always reach the maximum maturity level because that is not always necessary and every company has to decide for itself. In addition, scenarios and deviations which do not fit the company will arise if a process is established with the standard specifications of a system. If the company only uses the standard processes, then the processes will not improve. SAP offers the opportunity for pre-built processes but the company must always ask how much of the standard it wants. Therefore, a maturity model can help to show the correct way and deal with the processes. However, a process development requires people who are familiar with SAP and can implement the system as is needed by the company. The use of SAP can also pose risks, and it may be the case that the system controls the company more than it should, rather than being used as a supporting tool. For the use of BPM within a SAP environment, at least two types of experts are required. Firstly, business experts with an IT background who can articulate what exactly is needed, and secondly, SAP experts who implement the requirements in the system.

One of the experts emphasizes that process management must be closely linked to an SAP system. Many processes will not work without input from SAP. On the other hand, a good process will also affect the SAP system. Furthermore, the SAP system contains many data that are required for the key figure measurements of the processes. A maturity model must show these dependencies and the relevant stakeholders must relocate themselves and their processes in the maturity model. The management must, for example, receive analyses which are based on numbers that are determined directly from the SAP system. But a process manager and the IT department have to find aspects in the various stages of the maturity model that will help to promote the processes.

There are companies who believe in the motto ‘what is not in SAP, does not exist.’ With these companies, a successful data analysis can be carried out on the basis of the SAP system. The problem with the analysis of key figures in the SAP system is finding the right SAP fields that can be used to determine KPI values. It is common practice at many organisations that processes run differently at different locations and therefore different fields are occupied. This means the data quality within the company is different and the question is how

to improve it. A company must then define which fields in the system are required fields and how the data is to be collected before a data analysis can be started.

One of the experts argue that a maturity model can not necessarily be used as a comparison tool between different companies. If both companies use SAP as an ERP system and reach the same level of maturity, this does not determine whether the SAP system has achieved the process maturity with standard processes or by self-programmed solutions. A maturity level does not necessarily allow any conclusions about the exact use of software.

4.3.6.3 Findings for third research question

This sub-section describes the findings for the third research question, which were determined by the experts not yet using any maturity model, who were asked about their expectations.

- To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

One of the experts explains that there are areas that are better suited to harmonizing processes than others. Areas from business management, such as finance and controlling, are similar in many companies and are therefore very suitable because they are easier to standardize than others. In these areas, SAP provides many standard process flows that can be implemented with less effort in a company. It should be the duty of a company to harmonize these areas and to optimize them with a BPM approach. The sales department is also one of these more suitable areas. In addition, the expert believes that a company which has its master data under control, can also realize better and more orderly processes.

On the other hand, the logistics and production areas are much more difficult and areas such as quality management and purchasing are even more complex. But it is precisely from the harmonisation of the more complex and difficult areas, that a company is promised the potential and significant cost savings. But the expert confirms that the standard SAP specifications and process flows cannot be used in all areas. Each company should analyse its

own processes and decide how, and whether, it wants to use the SAP standard. SAP offers some points which do not optimally support the process execution. Furthermore, the SAP system can make certain processes better and certain things less well. Therefore, each company must decide individually whether it buys add-on solutions or is satisfied with the standard SAP process flow.

A second expert identifies the management processes as the areas which would benefit most from process optimisation, because the processes of that area are the most un-process oriented ones that exist in the company. However, it appears to be a significant problem to change management processes. Often, the management do not want any changes and any further development of their processes. Even the management processes are often not included in the process map, because the management refuses. The value-adding processes or the performance processes are the processes for which a customer is directly paid and are therefore often simpler and more important for the company. A financial process must be supported in the company but no customer pays any money for that process. For this reason, companies often try to implement these processes quickly and easily, and are glad to use the standard solution of a system. Generally, all processes need the support of the upper management, if a comprehensive process change is planned. The management should always support that topic and provide some positive examples through their own behaviour. If the management does not boost the topic of BPM, the topic cannot be fully implemented in the company. Sufficient staff, time and money for a project is always a matter of priority and a higher priority is only obtained if the management ask or support it. The topic of BPM has a lot to do with changes in the company and all changes that have to happen in the company have to be supported by the upper management, especially if these are essentially process changes.

One expert explains that it is a mistake to consider BPM in the sense of only consisting of ERP; BPM has less to do with ERP. Rather, it demonstrates a possible method of mastering the complexity in a company and making it manageable. Manual and electronic process steps play an equivalent role and both have their limits. A company should avoid Excel based solutions because these are usually only a workaround that could be solved better within an ERP

system. In these cases, employees sometimes have to be forced to move from Excel to an SAP solution and use an integrated solution, which often then only sees benefits in a long-term view. There are also processes within the company where it makes no sense to solve them electronically. For example, if the steps to book a material flow take longer than to produce and provide the material, then it should be considered whether the booking is necessary; perhaps it is not useful to know exactly the position of the material at any stage. A company needs to deal with the question of when the digitizing of a process is still beneficial and when it is not.

The expert explains that a process that exists in the SAP standard is therefore not immediately efficient. The company must always check whether the standard is helpful or rather hindering. Essentially, the expert has the opinion that there is a lot of evidence that a routine process could be a good support, but that does not absolve the obligation to analyse these processes as well. Each process can be developed and implemented in an SAP system and only assumes that the company has enough time and money to develop it itself. But these processes must also be manageable in the long term and this could be lead to problems for system updates or system enhancements. These updates can be handled easier when standard processes are used. A company should not be driven by the SAP software but should analyse exactly when it can use these standards. It can also be helpful to exchange ideas with other companies and to pick up other ideas and analyse them for their own company behaviours.

Whether an SAP system supports a company in BPM is also dependent on how the SAP system is used. The changes in the SAP system can have effects that were not considered before. As an example, an expert refers to the introduction of new SAP document types for a process optimisation. This change has led some employees to be restricted in their own kind of work. Overall, the introduction has led to a substantial acceleration of the work flow. The expert points out that there is a need to be aware of the SAP system requirements. A company should be willing to accept changes and enter these in the system, otherwise an SAP system can be a fence.

A variety of processes will not work without an ERP system. In many companies, SAP is the leading ERP system and includes data to measure and

analyse processes. A process management has to be linked with the ERP system and processes do not work without it. This also means that processes can influence an ERP system and should be implemented appropriately. Only when processes have been consciously implemented in a system will the processes already have a certain basic maturity and this could be recognized by a maturity model.

One reason why no maturity model has been applied in some companies is the fact that the topic is not interesting enough for many people; they just want to know if the process is working or not. Does the process make it easier for daily work or not? A maturity model is seen only as a tool which offers some added value for the company's headquarters and does not support the individual locations of a company. If the management does not then own the introduction of a maturity model, there is no reason to integrate such a model within a company.

4.4 Additional documentation relating to the maturity models used

In this section, the four previously analysed maturity models are examined for available documentation which contains references about the usage of ERP systems or, more specifically, the use of an SAP system and possible connections to the maturity model. This section helps address the research question and verifies the results of the interviews.

It is not always the case that some documentation is provided by developers of the four analysed maturity models. There are also several instances in which the access is restricted to the general public. In these cases, the research was extended to publications which were available on the Internet, and other literature.

4.4.1 Case 1: eden maturity model

This sub-section assesses the relevant documentation regarding the eden maturity model. Furthermore, the section describes the possible connections between the use of ERP systems and / or SAP systems. The first section provides a general overview of the maturity model and its documentation.

4.4.1.1 General description

The developers and users of the eden maturity model have not been able to recommend any documentation to a further review of the maturity model. They describe that no significant documents exists, that are issued with the maturity model. The questions about the maturity model are answered on a PC system, and are not available to the user in a paper based form. The internet search results in two online documents: the DSAG's ‘Business Process Management Guide’ (DSAG-Arbeitskreis BPM, 2013) and a brief white paper about the eden model on the website of the eden organisation (Allweyer & Knuppertz, 2009). Some additional books depict some brief overviews or general introductions about the eden maturity model.

Some workshop documents were also available from a two-day eden consultancy certification workshop from the year 2011. All the publications identified above identified were only available in the German language. One of the interview partners provided the researcher with a few personal one-to-one English-language translations of the individual criteria of the maturity model.

In general, the following four objectives of the eden model are provided in the workshop documents of the consultancy certification.

The eden maturity model should be:

- Industry neutral - must be applicable in all sectors
- Independent of size - applicable in SMEs as well as in organisations
- Integrity - must consider process management comprehensively
- Usable at different application scenarios - must be suitable for self-assessments as well as for external support.

On the basis of these criteria, the model is to be very extensively applicable and has no criteria that will limit its use.

In two documents, the CMMI and the eden model are compared and two different points are highlighted. On the one hand, it is shown that the eden model has six maturity levels and has one maturity level more than the CMMI model, which only has five stages (Knuppertz, 2012). More generally, the white paper (Allweyer & Knuppertz, 2009) of the eden model indicates that the CMMI model analyse the processes in much more detail than in the eden model.

The workshop document reveals that the results of the measurements are divided into six different maturity levels and are named from stage 1 ‘Chaotic’ to stage 6 ‘Sustainable.’ The model is divided into nine maturity dimensions, which contain between 11 and 33 questions on the evaluation of each individual dimension.

The nine dimensions that are evaluated in the model are:

Strategy	Objectives	Organisation
Methods	Competencies	Measurement
Communication	Documentation	IT

Table 4.2: Nine dimensions of eden (Allweyer & Knuppertz, 2009)

In general, the model contains over 150 questions which are all individually rated by points of the interviewee. These questions are the criteria of the maturity analysis and are divided into nine dimensions. Based on this question, a questionnaire is issued, and an assessment is made about the current status and, if applicable, the future expected development within the company. The

individual criteria can be applied to the whole organisation or to a single process (Knuppertz, 2012). In contrast to other models, the fixed point evaluation provides a strict definition about the maturity levels.

A maximum of 100 points can be achieved in each dimension. This means that a maximum of 900 points can be achieved with the model (Knuppertz & Feddern, 2011). As a calculation scheme for the individual stages of maturity, the following classification is given by the maturity model:

Maturity Level	Lower limit	Upper limit
Chaotic	0 points	149 points
Rudimentary	150	299
Advanced	300	449
Throughout	450	599
Controlled	600	749
Sustainable	750	900

Table 4.3: eden maturity level classification (Knuppertz & Feddern, 2011)

The IT dimension can reach a maximum of 100 points. Therefore, it is quite possible to achieve the maximum maturity level even without points from this dimension, because the highest maturity level can already be achieved with 750 points.

4.4.1.2 IT dependencies

One of the examined dimensions in the maturity model is the IT dimension. Within this dimension, the assessment is based on 11 criteria. The basic understanding of it is that IT supports process management with their strategy and through the systems involved.

Within the eden model, a very general question is whether the IT strategy matches the process management and the IT systems effectively support the processes (Allweyer & Knuppertz, 2009). Another example of a valuation is the question of whether processes are managed with IT systems. Furthermore, the other documents do not demonstrate any closer participation to the used IT system. The documentation demonstrates no references to an ERP system or even to an existing SAP system, and all the criteria are very generally defined.

None of the 11 criteria or questions which examine the IT dimension specify any details about the used IT system. The terms ERP or SAP are not mentioned in any criteria. The criteria are very general, but they cannot be published at this point because the eden community does not agree to this. For example, there are still questions about whether a general IT strategy exists in the company or if an IT system can simulate the processes in the company. Furthermore, one question is about the documentation of the IT prerequisites for the application processes.

The available criteria demonstrate that are questions exists in other dimensions, which are related to IT behaviours. But these questions are also very general and do not refer to any certain IT systems. For example, the dimension 'Measurement' asks whether process reports are generated efficiently. An efficient creation can then mean that a business system creates the process reports electronically. The model asks in another criterion at the dimension whether process indicators are measured. Here, a measurement of the indicators can also be carried out within an IT system but this is not necessary and depends on the judgment of the interviewees. Each respondent answers the question itself by a rating scale between 0 points for a poor rating up to 10 points for an excellent rating. This means that the interviewee appreciates how well or poorly his company fulfils this question or this criterion. For example, it is not explicitly asked whether the measurement is done electronically. Therefore, the IT functionality is not necessarily linked to this question and is within the discretion of the interviewees.

Some criteria at the higher maturity levels could be supported by the use of IT solutions. In the 'organisation' dimension, for example, the question is asked how the process participants, which mean the employees in the company, are supported in the execution of processes. This support could be achieved through the use of effective IT functionality. But all the questions are always very general, and never asked for a particular IT system, IT functionality or for the use of specific processes.

4.4.2 Case 2: CMMI

This sub-section examines the documentation relating to the CMMI maturity model. Therefore, possible relationships between the use of ERP systems and /

or SAP systems and the use of the CMMI maturity model are determined from the CMMI documentation. The first section provides a general overview of the maturity model and its documentation.

4.4.2.1 General description

The other three described models of this work have a close relationship with the CMMI (Allweyer & Knuppertz, 2009; DSAG-Arbeitskreis BPM, 2013) or were developed by people who already had CMMI experience (Object Management Group Inc., 2008).

Originally there was exactly one CMMI model which was released in the version 1.02 in the year 2000. This model was 'designed for use by development organisations in their pursuit of enterprise-wide process improvement' (CMMI Product Team, 2010b). Since the release of version 1.2 in 2006, two additional CMMI models are planned, and the original model received the addition 'for development'. The two additional models are also called CMMI but have the additional names 'for acquisition' (CMMI Product Team, 2010a) or 'for services' (CMMI Product Team, 2010c). The three models have the principle of improving the degree of maturity in an organisation and have a uniform CMMI framework. The CMMI framework contains all the possible goals and practices that can be used equally in all three models and covers the basic concept. In addition, there are specific components that only occur in one of the three specific models.

Name	Acronym	Focus
CMMI for Development	CMMI-DEV	Develop products and services
CMMI for Acquisition	CMMI-ACQ	Initiate and manage the acquisition of products and services
CMMI for Services	CMMI-SVC	Provide services to customers and end users

Table 4.4: CMMI-Models since Version 1.3 (CMMI Product Team, 2010b)

The model 'CMMI for development' covers activities for the development of products as well as services. Examples include software and hardware products, services and processes. Within the model, goals and practices for process improvement are presented which, for example, cover the areas of project management, process management and system development. For this

study, the CMMI-DEV version is the main focus because all the experts used this model or its predecessor version.

Common to all three CMMI models is that they present goals and practices. These must then be interpreted and adapted to the organisation itself and their practical application. This means that the model describes general characteristics and activities that should be implemented and adjusted in a company in order to improve processes. The CMMI-DEV models do not require the execution of certain processes, but generally describe a possible organisation's processes that support the improvement of a company.

The model informatively presents several process areas and their purpose. Targets are then described in a special manner for the different process areas of the model, and must be completely fulfilled in order to reach the next maturity level. The model also demonstrates general practices and examples of how a process area can be successfully implemented.

CMMI has five maturity levels and each level forms the foundation for the following level:

Level	Maturity
1	Initial
2	Managed
3	Defined
4	Quantitatively Managed
5	Optimizing

Table 4.5: CMMI Maturity Levels (CMMI Product Team, 2010b)

The three individual CMMI models contain generic guidelines for the objectives and practices of the models. The process areas are analysed differently in the three models and depends on the focus of the model. The CMMI-DEV and also the CMMI-ACQ models contain 22 different process areas and CMMI-SVC contains 24 process areas, which are explained in more detail in each of the different documentations.

How the data are collected exactly for the CMMI assessments must be determined by each company itself. Within the documentation, different methods are only mentioned. For example, questionnaires as well as interviews

can be developed, but also documents or databases can be searched. The documentation also indicated that key performance figures can be determined from current transactions or processes. IT support can be used to determine key figures, but is not predetermined.

4.4.2.2 IT dependencies

The documentation for the CMMI model explains that the use of modern technologies is needed to keep a company competitive. The technologies used change very quickly and it is necessary to support people and processes with a reasonable infrastructure (CMMI Product Team, 2010b). The three CMMI documentations for the models CMMI-ACQ, CMMI-SVC and CMMI-DEV do not mention the words SAP, ERP and Enterprise Resource Planning. The mention of IT requirements is made in a more general manner. For example, it is stated in CMMI-DEV that the production planning should be supported electronically in order to obtain more effective access to the current and archived data.

The CMMI-DEV documentation (CMMI Product Team, 2010b) illustrates that an organisation should create workflows and support these processes by a daily measurement of key figures. Furthermore, it is explained that the identification of key figures belongs directly to a defined process. Within the documentation, there is a separate process area ‘Measurement and Analysis.’ These areas collect the experience from the planning and execution for each process and develop future uses or improvements within the processes. For example, existing KPIs can be used, or new KPIs can be explicitly defined to enable an analysis. The defined key figures must be defined, collected and stored in order to enable an evaluation.

Each company must work out for itself which key figures are measured. The documentation merely illustrates some possible examples:

- Response times
- Actual costs vis-à-vis to plan costs
- Fluctuations on schedule
- Quality indicators such as the number of errors
- Surveys on customer satisfaction
- Processing time from order to delivery

Within the CMMI documentation, no further details are given about possible electronic systems involved. There is only a general description that appropriate methods and tools are needed, and that data gathering and storage mechanisms should be integrated into workflows. It is also recommended to use real-time data for an effective analysis.

The documentation also mentions the possibility that technical restrictions may have to be considered. At the process area ‘Decision Analysis and Resolution’ the keyword ‘Technology limitations’ is listed as a criterion for the evaluation of alternative solutions. This means that the alternative solutions must be examined to determine whether they are technically possible. Another example is referred to in the process area as ‘Requirements Development.’ That area could also have technological limitations for the analysis or implementation of customer requirements. Further details or examples of possible technical limitations are not given.

In contrast to possible restrictions, the process area ‘Requirements Development’ also refers to some IT dependencies. On the one hand, a technology demonstration can create possible requirements to a customer. This means that the demonstration of new or unknown IT applications may lead to the desirability to establish new functions. On the other hand, it is highlighted in that section that there are requirements which are not recognized by a customer, but which are technologically necessary.

In general, it is emphasised in the model that the main focus of maturity level 5 is a continuous improvement of the processes. This also means that innovative technology improvement should be recognized and implemented. The model suggests that process improvement teams or groups are established, which are made up of experts from different specialist areas. For example, a system administrator could be focused on the promotion of information technology and develop specific suggestions to improve possible new technologies. This could be, for example, at the process area of ‘Organisational Performance Management.’ Improvement could also involve innovative technology improvements that change the processes, the technologies or the performance of an organisation.

The technology topic is generally mentioned as a generic goal of education and training in the field of guided processes and workflows. In order to recognize potential technological changes and technology breakthroughs, or to react to obsolete technologies, employees should receive technology trainings. Alternatively, observing other organisations or pursuing research literature is also suggested.

The process area ‘Risk Management’ warns that the use of technologies can also contain some risks. For example, when technologies are not available for a particular purpose but are expected. Furthermore, the application of new technologies can result in the fact that costs or dates are not being met. It can also be the case that a project team evaluates the lifetime of a new technology as too low and advises against the new technology.

In general, the documentation alludes to the need for technological support or its dependency in the individual process areas. Only very general statements are made and examples are mentioned, but not referred to specific systems and their possible supports. For example, the documents state very generally that appropriate resources should be provided for the execution of workflows. Furthermore, ‘Process modelling tools’ are generally mentioned for a technology support of BPM.

4.4.3 Case 3: BPMM

This sub-section assesses the relevant documentation for the BPMM maturity model. It also discusses possible connections in the documentation between the use of ERP systems and / or SAP systems and the use of the maturity model. The first section provides a general overview of the maturity model and its documentation.

4.4.3.1 General description

In June 2008, OMG issued a released version of the Business Process Maturity Model, which contained almost 500 pages (Object Management Group Inc., 2008). All statements in this chapter are based on this documentation by the OMG.

In general the BPMM model is used to ‘improve an organisation's business process related to its products and services’ (Object Management Group Inc.,

2008). BPMM can be used as a process model or as a framework for the development of improvements.

The BPMM has five maturity levels that build on each other.

Level	Maturity Level
1	Initial
2	Managed
3	Standardized
4	Predictable
5	Innovating

Table 4.6: BPMM Maturity Levels (Object Management Group Inc., 2008)

Each stage of maturity has specific objectives that must be met to achieve the maturity level. In the BPMM, these targets are divided into process areas, which are described for each maturity level. The individual levels of maturity build on each other, which means that the achievement of Level 4: 'Predictable' also includes all targets of the previous levels 1-3.

BPMM should be considered as a framework, which can show for individual process areas what should be achieved in processes in order to achieve a good process maturity. BPMM does not describe all necessary processes that an organisation needs, and this means every company must define what processes are required. The BPMM also describes the fact that each company must define by itself which methods and approaches are needed to achieve its own corporate or process objectives. The BPMM model documentation includes no limitations or descriptions of how a company should structure its processes.

4.4.3.2 IT dependencies

Within the BPMM documentation, the terms SAP, ERP or Enterprise Resource Planning are not mentioned, but the term 'management system' is used within the specific and institutionalisation goals of the model. BPMM mention that a management system should be used to improve and manage the organisation's process improvement goals and strategies, and this can be supported digitally by an IT system.

A fundamental point within the documentation of BPMM is the description about technological processes changing at organisations. The document explains that

for many reasons, it is not the technologies themselves that cause the IT projects to fail. Often, this is bound up with the fact that the organisation is not ready to allow some changes. The BPMM model would demonstrate through a framework a possible solution for companies. For example, different areas such as manufacturing, finance or IT operations can be changed to improve the processes. The BPMM model describes possible elements and useful behaviours to serve for a continuous process improvement.

The following points are given as examples of possible IT support within the documentation:

- Use an IT system for the regular planning of the company's needs and production.
- IT support for the provision of services and the establishment of a product and service offer.
- Collect, store, access, distribute and dispose of data and information by using an IT system database.
- The application of methods to implement IT projects in enterprises and to identify the risks that can arise from that implementation.

The model explains for all IT related changes that an IT solution should be used. It is not defined in detail how exactly this IT solution should be implemented or what system could be used. It is up to each company to conduct these IT related changes.

The document does not specify any detailed specific technical limitations that may occur when implementing BPMM. Overall, the document indicates very generally that, in the case of certain criteria, a specification of requirements should be established and maintained. This could also include technical limitations such as performance requirements and design constraints.

A large segment within the BPMM documentation deals with the measurement of key figures in the section ‘Guidelines for Measurements and Analysis.’ Essentially, it explains that the measurement and analysis is needed to make decisions on how the business and the processes could be used and improved. The BPMM document recommends the performing measurements as a

requirement in all branches and on all levels of the business, for example within projects, organisations or work units.

The section regarding the measurement of key figures explains general definitions in particular. For example, the BPMM model indicates that some key factors should be identified at an organisation which are helpful to support measurable criteria. Finally, concrete measurable numbers must be named themselves by each company. Within the whole model, is it not specified which numbers allow for a concrete measurement. Each company must therefore analyse its own key indicators in order to demonstrate their process improvements. The documentation of the model indicates that the IT-supported continuous performance measurement within a company could be a desirable solution.

4.4.4 Case 4: SAP maturity model

This sub-section examines the relevant documentation for the self-developed maturity model for the ERP system of the SAP AG. It presents the described interrelations of the documentation between the ERP software from SAP and the use of the maturity model. The first section provides a general overview of the maturity model and its documentation.

4.4.4.1 General description

The expert was not able to recommend any further documentation to review the research questions. A handout and detailed description of the model is only issued on special request to SAP customers. For this reason, all documentation is considered for internal use only. An external document about the model is briefly presented within the DSAG guide about business process management (DSAG-Arbeitskreis BPM, 2013). In addition, the model is described in a conference paper at the ‘International Conference on Business Process Management’ (Reisert, 2015).

‘SAP uses its own process maturity model that has been tailored to the company's needs’ (Reisert, 2015). That self-developed model is based on Michael Hammer’s PEMM and the CMMI (DSAG-Arbeitskreis BPM, 2013). Overall, the model has four levels of maturity from level 0 to level 3. The following table provides a rough overview of the four levels as well as some requirements which are dedicated to the corresponding levels:

Level	Requirements
Level 0 (insufficient)	Processes are: - inefficient - not managed - not transparent
Level 1 (minimum)	Processes are: - a little transparent - documented in the basics - a Process Manager has been named
Level 2 (standard)	Processes are: - managed - have detailed documentation - are measured by key figures - performed by a risk assessment
Level 3 (excellence)	Processes are: - Continuously improved - Executed by SAP standard systems - Use over 80% Process standardisation - Defined by Annual improvement targets

Table 4.7: Overview SAP maturity levels (DSAG-Arbeitskreis BPM, 2013; Reisert, 2015)

4.4.4.2 IT dependencies

'Well-designed business processes are a key success factor for SAP' (Reisert, 2015) claims a SAP consultant at a BPM congress. Two process objectives are mentioned in this context. Firstly, the success of each process is measured by key figures, and secondly, processes should be continually improved. In order to achieve these goals, a own SAP maturity model was developed at the SAP AG, which 'measures the degree of maturity of a process in a comparable way' (Reisert, 2015). The aim of the model is to regularly and centrally monitor the process maturity and to develop it continuously.

SAP's own maturity model is very closely linked to the application of the SAP software and has some dependencies which are a prerequisite for achieving certain maturity levels by the model.

Level 0 states that the processes are absolutely insufficient, and the use of SAP applications plays no role at all in this maturity level. It is only from the following level that there are possible links to SAP systems.

If a process is at least represented as a workflow model in the SAP system, Level 1 is reached for the process. In addition, the basic process documentation

should be contained within the ‘SAP Process Map’ tool at that level. For the next Level 2 a documentation must be substantially extended and contain detailed information about the process.

The basic element in Level 2 is that ‘Process Performance Indicators’ are defined in the company. These indicators are intended to measure the processes in the company and provide a basis as a quality assessment. It is important that the analyses of these indicators are carried out as far as possible by standard SAP tools, especially when indicators are automatically measure,. A possible tool to use a business process monitoring within SAP standard software is the SAP Solution Manager which is mentioned by the paper. Examples of the measured ‘Process Performance Indicators’ could include (Reisert, 2015):

- Number of process inputs per year
- Throughput time per process
- Working time per process
- Customer satisfaction

If a process is implemented as a workflow within an SAP system, then workpoints can be set within the workflow and used as process performance indicators for the evaluation and management of the process (DSAG-Arbeitskreis BPM, 2013).

The key feature and prerequisite to achieve the highest maturity level at this model is the use of a standard SAP system without any kind of modifications (DSAG-Arbeitskreis BPM, 2013). A little less stringent is this specification at the document from (Reisert, 2015). The paper states that over 80% of the processes have to be implemented by a SAP standard process sequence in order to obtain the highest maturity level.

As a general rule, it is pointed out in the documents that the best way to improve the process is to show the management the possible impacts of a process improvement. It is recommended that the management support the implementation through a top-down approach. This approach allows the process managers to be more motivated to achieve a higher process maturity (Reisert, 2015).

4.5 Summary overview

Until now, only the findings from the expert interviews and the documentation have been reported; no analysis or conclusion was made within the chapter. For improved clarity, the expert interviews were subdivided into five different cases. Within these cases, some similarities and differences were shown between the different BPM maturity models but also within the same maturity model by different experts. The analysis of these findings now follows in the next chapter.

5 Analysis

The previous chapter discussed the general findings of the interviews and the relevant documentation from the maturity models; this chapter now identifies the key statements from the interviews which are compared, analysed and interpreted.

The first section contains a qualitative analysis of frequent and important statements from the interviews. Statements from the interviews are checked against the documentation of the four different BPM maturity models. It follows an interpretation and consideration of the interaction of SAP, BPM and maturity models, and why these points in a BPM project require a closer examination if an SAP ERP system is used as a central IT component.

As a result of this research, ten principal guidelines are developed which are not always elaborated by each analysed maturity model. Considering these guidelines could support a company in using a maturity model in the best way possible if they use a BPM approach within an SAP environment.

5.1 Comparing Results and Interpretation

This section contains a qualitative analysis of frequent and important statements from the different interviews. As a basis, the qualitative research method *thematic analysis* is used for this section (Bryman & Bell, 2007; Guest et al., 2011). These statements are then checked and it is determined whether supporting or differing statements can be found within other expert interviews or within the documentation of the maturity models. Finally, the individual statements are interpreted and how these statements can be seen in the context of the use of BPM maturity models and SAP as a central ERP system is analysed.

Some keywords are immediately visible to the reader when viewing the interviews, because they were mentioned in several interviews and independently of the considered case. On the one hand, very general points were mentioned which are not necessarily connected with the use of an SAP system. But, on the other hand, there were also topics that occur immediately when an SAP system is in use. For this reason, noticeable topics from the interviews are determined and analysed step by step in this section. The MAXQDA tool is used for this purpose and supports the determination. Finally

an interpretation and a consideration between the interaction of SAP, BPM and maturity models follows, as well as an examination of why these points in a BPM project require a closer look if a SAP ERP system is used as a central IT component.

First, the analysis begins with an overview of common words within the interviews. There are many words which are not useful for the analysis and therefore words like ‘and’, ‘any’, ‘other’, ‘the’ or ‘one’ are excluded. All interviews were performed in German, therefore the following figure demonstrates common German words within the eleven interviews:

Figure 5.1: Tag cloud - German

For a better understanding, the words are translated from German to English and the following tag cloud demonstrates the English equivalents from the German origin. For a better one-to-one translation, the word ‘Prozessmanagement’ is translated within the figure to ‘process-management’ and ‘Reifegradmodell’ to ‘maturity-model’.

Figure 5.2: Tag cloud - Englisch

In many cases, word contexts on a topic are much more important than the frequency of individual words, so the tag cloud is only conditionally meaningful, but it can provide an initial indication. Starting from this frequency distribution within the interviews and what the researcher noticed of topics during the

interviews, important terms are analysed in this section by using the interviews and documentation of the cases.

5.1.1 Management

It can be seen from the summary of the interviews that almost every interviewee recommends that senior management should be involved in driving forward the introduction of BPM and BPM maturity models. The topics of BPM and the introduction of BPM maturity models can be only successful if the management supports the topic sufficiently.

A closer interview analysis by the MAXQDA tool reveals that all experts make a statement about the topic management.

While E1 only mentions that the top management is involved within the issue, most experts point out that the management must necessarily support the BPM topic. E2 explains that BPM and BPM maturity models will change a company. But as soon as a change in the company is pending, the management must support this because only then can a successful implementation happen.

E3 explains that if a managing director wants to have an overview about the subject, then this can be a good time to introduce a BPM maturity model. But E4 argues that it is always difficult to convince the management of the relevance of the topic of process management. Even more difficult is the topic of BPM maturity models, because the manager does not always immediately understand how a measurement can benefit a company. But, overall, the management must be convinced for a successful implementation to happen.

E5 explains that there is no wrong time to introduce a maturity model, but a compelling condition is that the management supports the project. The expert has not experienced so far the situation in which a bottom-up approach has led to a successful solution in the field of BPM. E6 also explains that only a top-down approach could be successful. In other words, the topic BPM will only work if the management presents the issue. As with other new subjects, for example Lean, the topic can only be successful if the management are focused on the topic.

The higher the issue is placed at the management level, the more successfully it can be implemented. However, E7 asserts that this is unfortunately not always

the case in practice. Sometimes it could be that the IT department is the driver and would like to convince the management of the BPM topic by applying a maturity model. A BPM maturity model analysis, which is required from an IT perspective, would mostly only examine the aspect of automation and how IT can support processes. What is missing is the awareness from the top management levels and a rethinking throughout the whole company.

The decision to deal with BPM has to be made at a very high management level. Only then, illustrates E8, can the BPM team rely on extensive support within the company.

Even within the organisations of experts E9 and E10, the general changeover from a functional to a BPM company culture was a management decision. E9 explains that the reason for a change may come from the business, but the general decision must be taken by the top management. If the management no longer provides the necessary support, E10 would ask the management directly whether the consequences of handling BPM are still desired.

The opinion of E11 is that the selection of a certain maturity model could be taken by a BPM team, but the general commissioning from which a BPM maturity model is executed should come from the top management of an organisation.

The management also feature in the documentation of the maturity models. Within the different models it can be seen that the management should support the BPM change process in a quite different manner. The following sections illustrate the mentions of the management within the maturity model documentation:

eden

The eden whitepaper defines the link between top management and process management as a strategic goal. The top management should be an essential driver for the BPM and must precisely specify that goal. The document even describes the need for support from top management which creates the framework for process management. From a certain degree of maturity, BPM cannot be successful without the support of the top management. In practice there are quite a few projects that introduce the model by a bottom-up

approach. The documentation mentions that these projects receive an analysis result through the use of eden, which can convince the management to analyse BPM on a company-wide basis (Allweyer & Knuppertz, 2009).

CMMI

The CMMI documentation states that the senior management is required to help with their understanding and interaction ‘to plan, implement, and deploy organisational process improvements’ (CMMI Product Team, 2010b). Furthermore the senior management is needed and responsible for the establishing and communication of the change process. Ultimately, the support which is provided by the senior management is the important step towards a successful process improvement.

BPMM

There exists a clear definition within the BPMM documentation about the role of the management. One of the specific and institutionalisation goals is: ‘The organisation’s process improvement activities are sponsored by executive management’ (Object Management Group Inc., 2008). In addition, the executive management is asked to provide process improvement targets and strategies for the model and to review and approve the process improvement strategy. Nevertheless, it is generally mentioned in the document that management should use the BPMM model to understand the necessary process improvements in the company.

SAP maturity model

Reisert (2015) explains that the origin for the BPM was a business driven decision. In addition it is generally held, that a key element for a successful BPM implementation is ‘a vibrant Process Management Community’ (Reisert, 2015) which consists of various employees, management levels and initiatives.

Summary

As a summary of these statements, it can be concluded that in general, the top management should be absolutely involved in order to enable a successful BPM project and the application of a BPM maturity model. The motivation to increase the degree of maturity has more influence if the top management is involved. It is important that employees support the execution but they must also know that the management supports the execution and provides the

budget and time for the maturity model. It is quite possible that the appropriate BPM maturity model can be selected by another department, but the management should be fully behind the decision to apply a BPM maturity model. Additional initiatives and communities within the company can support the efforts, but the management must actively support the BPM idea to ensure a successful implementation.

5.1.2 Maturity levels

All models have different prerequisites to reach the highest maturity level. In general, however, several experts have pointed out that in practice it is not desirable to always achieve the highest degree of maturity at all times. This statement came from experts from all case examples.

The goal of expert E4 was never that all processes always have to work at the highest possible maturity level. That is not realistic. But the goal should be at least to focus on the core processes and to enable an end-to-end consideration of the processes. The desired goal should be to make these end-to-end processes as optimal as possible.

Also, the experts E6 and E10 explain that in practice the goal cannot be to establish all processes at the highest level of maturity. A maturity model does not necessarily have the objective to always reach the highest maturity level. But a company would like to improve themselves and therefore a maturity model would be started to make further developments and step by step improvements.

Expert E8 also explains that in practice a company will not be able to always achieve the highest maturity level. Rather, a company will always have different degrees of maturity for different process domains. If a company has the choice to generate more sales or to achieve a better maturity level for the same money, then it will always try to increase the sales. For this reason, maturity models are, for the expert, more of a theoretical construct. Maturity models could be helpful to determine the position of some processes within the organisation or to determine why at difficulties occurs in a particular place. But then this model can only help to get a bit further and to optimize the processes. Furthermore, E8 applies an eighty/twenty rule which means that an organisation should focus on the process that makes up eighty percent of the company

business. This may lead to the conclusion that these main processes should be developed as far as possible to the highest possible maturity model and it is not that important how far the maturity levels are developed in the remaining twenty percent of business processes.

Finally, E11 also explains that it is not important to always reach the highest maturity level. A company must always look at the possibilities which are offered by a process and define its own objectives. It may be the case that the company does not want to reach the highest possible maturity level because it could be a limit for other things. For example, there are a few dependencies that do not allow the process to reach the highest level, but can still be a good process. However, a company must at least define which maturity level should have a process. For example, E11's company defines that all processes should have at least maturity level two, which means that all processes are drawn down, described and regularly measure certain KPIs.

Within the documentation it is also partly mentioned whether it is the goal to reach always reach the highest level of maturity. Overall, it is described differently in each of the four case examples.

eden

It is very generally described that, after a maturity assessment, individual processes with a high potential should be developed further to get a higher maturity level. This should be done in order to use the available resources efficiently (Allweyer & Knuppertz, 2009). There is no statement within the documentation that every process should reach or should not reach the maximum maturity level.

CMMI

In general, the CMMI documentation (CMMI Product Team, 2010b) states that a high maturity level exists when level 4 or 5 is reached. Furthermore, the document recommends that a company should ask itself which processes should receive more or less attention but the minimum should be that each process reaches maturity level 3. Afterwards, a company can decide for itself which processes the company should focus on and develop further steps.

BPMM

The BPMM documentation also gives a brief indication that the maximum maturity level does not have to be reached at every process. But it should be noted that each organisation can achieve a maturity level 2 or higher with the present specification. (Object Management Group Inc., 2008)

SAP maturity model

'The main target of Process Management at SAP is to continuously improve the business processes' (Reisert, 2015). Furthermore, the document reports that an overall process improvement is carried out for all processes of the company. All processes are monitored centrally. In this case, the company has the overall goal of bringing all processes to the highest possible level.

Summary

It is not realistic to always achieve the highest level of maturity for all processes of an organisation. At the very least there should be a minimum requirement for a maturity level which any process should reach. This minimum level may then be determined for example that all processes of the company are at least described and drawn down within the process map. It can also be defined within the company that only important processes should receive further development and should reach the highest possible maturity level. The described eighty twenty rule could be such a consideration, and means that an organisation should focus on that process which makes up eighty percent of the company's business.

5.1.3 BPM team members

With the exception of the expert for the SAP maturity model, experts from all the other case examples report on how a BPM team should be created within a company, and why it can be helpful to attract members from different areas for a BPM team.

E3 declares the human resource department to be an essential part of a BPM team. A BPM project has a lot to do with changes, and the result of a BPM maturity analysis will also lead to changes in the company. These changes require good communication and in some case the development of employees. The handling of human beings should mainly be handled by the HR department,

and therefore it could be a reasonable solution to combine the HR and IT department for a better BPM approach.

E4 explains that the IT department should also support the use of BPM as well as BPM maturity models, because IT support is important to intensify the topics and make them faster. E6 supports this statement, because the solutions that are designed for and implemented in a BPM environment also depend on how the IT is structured in the BPM team, and which IT employees belong to it. But depending on how many and which IT specialists belong to the team, the topic of BPM is considered more or less intensively from the IT world. E6 further explains that there should always be a certain basic IT knowledge in the team to produce better BPM results.

A BPM team should always be aware of what else is going on in the company and what other teams are working on, so it is good to have a broad team that brings together a lot of knowledge about the company. E6 provides the example that a BPM and a SAP project team designed two separate business process maps within the company. In this example, the purchasing process had been designed in the BPM project and also in the SAP team, but in much greater detail and for a different requirement. This means that two teams have independently developed this process with their own experts, and therefore these two teams have almost doubled the costs. Therefore, a BPM team should know what knowledge is already present in the company in order to build on it.

In addition to the double development of process models, E8 explains that it can also be very helpful if a company agrees on a common language. This does not necessarily mean a language such as English or German. Rather, technical terms should be formulated intelligibly and universally valid and that means at least between the team members. As far as possible, it should be possible to ensure that the team members always know the same about the topic of specific processes or interfaces. When a team is combined from several areas, they can, for example, explain an interface to each other, and the optimisation potential can be better identified when the topic is viewed from different perspectives. It is also not only important how IT can support the business but also important why the business would like to have something in a certain way. For this reason, E8 works with teams that consist of 50% IT specialists and 50%

business professionals. A team should be careful when old veterans are in the team. An old SAP professional will always try to force his team towards a specific SAP solution, because he has up to now had the best experience with this old solution. In this case, a BPM team must decide if it really is the best solution, or if different opinions could provide a better solution even if it is based on less experience.

E9 also has a BPM team of different specialists. In this case, two-thirds comes from the business team. Not only are people from certain specialist areas sent to the team, but also those from superior areas and management. The relevant input must come from the business, but a consulting company can support a BPM team as well. E9 also explained that the team is very international. This can lead to linguistic barriers and make the project more expensive, but that offers the advantage that a broader base supports the project with special ideas and different input. However, it is important to remember that the main task of a BPM team should be to ask critical questions and to analyse the processes of the organisation.

E10 also explains that a mix of IT and business people is a good combination for the BPM team within a company. The integration of IT specialists could be very helpful to correctly formulate IT demands and the integration of business people enables a BPM team to know exactly the business requirements. This combination promotes the communication and a more interactive operation in order to implement a suitable process solution within the company.

Within the documentation for each of the four BPM maturity models, there is no detailed information included on how a BPM team should be exactly composed.

eden

The eden paper does not name any facts about a composition. Only one expert has explained in an internal work paper of the eden association that a BPM team must be established in order to successfully ensure an analysis and further development of processes. But this definition was not part of an official documentation.

CMMI

As a specific practice, the point ‘Establish and maintain teams’ is listed in the CMMI documentation. These teams are then responsible for a successful implementation. It points out that the size of the organisation depends on how many people are established in the team. In the case of a smaller organisation, for example, all employees and relevant external stakeholders can be part of the team. In the case of a larger organisation, the relevant stakeholders should be identified and established in the team. The documentation also mentions that it is very important to establish a team which is broadly structured to enable the best possible coordination and implementation throughout the company. How exactly a team should be composed is not described. In general, a team is defined as follows: ‘A group of people with complementary skills and expertise who work together to accomplish specified objectives’ (CMMI Product Team, 2010b). Furthermore, the document describes as one example that a process group could include people from different disciplines like a system administrator for the IT background or a marketing representative with a focus on customer needs.

BPMM

Only two sections mention that a team is needed for the application of BPMM. But neither section describes which persons belong to this team, the documentation describing only what the team is responsible for: The section ‘BPMM compliance’ states that ‘the team collects and evaluates evidence regarding the implementation of practices described in the BPMM and makes judgments about their strengths and weaknesses and the extent to which they collectively satisfy the goals of the process areas at the maturity levels within the scope of the appraisal’ (Object Management Group Inc., 2008). A second statement notes that a cross-functional design team could identify requirements to improve the efficiency and effectiveness of products and services.

SAP maturity model

The SAP document explains that the BPM team is called a process governance team and is ‘a highly-respected in-house consulting team with a reputation of creating impact’ (Reisert, 2015). This team is established by different professionals, but a business owner and a process manager which are

responsible for an individual process, are not part of the process governance team and are based at the business unit.

Additionally, it is important to create an agile BPM community with key stakeholders of different processes and a variety of communication platforms like newsletters, info sessions, trainings and excellent process conferences.

Summary
A BPM team should be formed from different specialists areas such as the IT and business units, because BPM maturity models are not a general IT topic and also other departments should be involved and support it. More aspects can be considered when the team is broader but at a minimum, the integration of IT specialists and business people can be very helpful to formulate business requirements correctly in response to IT procedural necessities.

If an ERP system is the central IT component, then specialists who are familiar with the ERP system should also be involved. Only in this way is it possible to provide IT functions which may already be present in the standard system. When the IT and the business unit work together they can define their own language for technical terms and enable the best possible coordination and implementation. Finally, this team can understand both the IT and the business people.

It is quite possible that such a team is also enlarged by other departments in order to gain the greatest possible acceptance in the organisation. For example, the HR department can be involved to ensure good communication with the employees.

5.1.4 BPM maturity model fits the company

Almost all experts report that a model has to fit a company, or why their model is suitable for all kind of companies and industries.

Expert 1 is convinced that the eden model can be operated for all types of business and can be used across different industries and company sizes. He has already used the model in various sectors, and only the wording should be adapted in order to be able to talk in the special company language to the employees. In contrast to the CMMI model, eden has much more flexible restrictions to achieving the next maturity level. This means that with the eden

model, not all questions of the maturity model have to be answered positively in order to reach the next stage of maturity. E11 explains that the SAP maturity model is quite different. The next stage of maturity can be reached only if all prerequisites have been fulfilled. This mean that a company can already meet the requirements of the next maturity level, but still remain at a lower level because one prerequisite of that lower level cannot be met. This can then have a frustrating effect on the company because no higher level of maturity is achieved over a longer period of time.

E3 explains that a fast and easy use of a BPM maturity model could be an excellent argument for the use of a particular maturity model. It could be also important to analyse the BPM maturity model in a wide and varied manner in order to consider the BPM maturity in a variety of ways.

E4 asserts that the complexity of a model can mean that the model can be adapted to many possible prerequisites, but the complexity can also be a disadvantage. If a company has to work through very complex documentation, and create all the questions and measured values of the model itself, this can frighten many companies. This can also lead a company to develop only a shorter checklist and avoid using a more considerable BPM maturity model. E4 reports that he used BPMM across all kind of industries because it is very generic and independent.

E5 reports that a major difference is that BPMM, in contrast to eden, does not use any hidden analysis software to determine the maturity level. If a company is not always clear about how a criterion is evaluated, then the maturity model may not be fully accepted within the company. Therefore, a company must know whether it is acceptable that the evaluation is carried out directly by the eden association and that the responses are passed by external consultants to the eden association.

Whether a model is used in a company is also dependent on how much time a company wants to invest in the analysis, explains E6. Within the eden model, the number of questions are fixed and can be answered in a relatively short time. But within the CMMI model, on the other hand, the model must be developed in more detail before the first assessments can be placed. The CMMI

documentation is the basis for the development, but the individual questions or measurement procedures must then be prepared and adapted to the company.

Expert E7 does not recommend the eden model as a controlling tool for daily process management. A company must therefore know whether it needs a maturity model for daily use and control, for example, the throughput time for every process, or whether it simply wants to make inventory of the current situation of the organisation. E7 also emphasizes the simplicity of the eden model and notes that it is a tool for beginners who have only just begun with BPM and want a quick and easy to use model. Eden is seen by all experts as a tool with simple and predefined questions which are quite general, and a company must be aware of whether this is sufficient for them. CMMI and BPMM, on the other hand, are much more complex tools and could be too complex for companies who are not so familiar with the topic of BPM. But CMMI has a greater potential for insights and metrics. With such complex models as CMMI and BPMM, it can be helpful to hire an expert, as E8 suggests.

A company must also consider whether the structures of a model are sufficient, as E10 suggests. Could a maturity model with three maturity models levels be too crude and is it better to apply a finer model with more levels? Should a model also examine specific roles in the company? What do companies expect from the results of a model? For example, E11 expects clearly defined steps for each maturity level and not a matrix outcome which relates to one or more possible maturity levels. The question is also whether the model should offer an overview of the entire BPM activities within the company or about each individual process, as the SAP maturity model does.

The documentation also mentions some limitations or application areas for the different BPM maturity models.

eden

The members of the eden work group are from various sectors like financial services, automotive, mechanical engineering, process industry or aeronautics and therefore care was taken that everyone can use the model. Within the eden description it is explicitly pointed out that the model is sector independent. This means that the criteria can be applied in any organisation. Even as a process analysis it does not matter which special processes are considered. In the

standard, eden offers a sector-neutral application of all maturity criteria. Generally, eden does not distinguish between whether larger or smaller companies want to use the tool to measure and improve the degree of maturity (Allweyer & Knuppertz, 2009).

CMMI

In general, the CMMI documentation describes that the selection of an ‘appropriate model is also essential to a successful process improvement program’ (CMMI Product Team, 2010b). A model should be chosen according to the main type of the lifecycle processes (e.g. conception, manufacture, operations, maintenance, etc.) which should be focused on. For example, CMMI has three different kinds of frameworks and the ‘CMMI for Services’ is different to the ‘CMMI of development’ and the ‘CMMI for Acquisition’. But not all of the factors mentioned within the CMMI framework have to be used, and a user always has to decide for his company which points are important, especially when the document clarifies that the point is only to be applied if necessary.

Especially in the ‘CMMI for Development’ and ‘CMMI for Acquisition', numerous sectors are listed that can use this CMMI framework. Specifically mentioned are ‘aerospace, banking, computer hardware, software, defence, automotive manufacturing and telecommunications’ (CMMI Product Team, 2010a). The document ‘CMMI for Services’ describes it much more generally. This CMMI framework can ‘be used by all companies that are interested in evaluating and improving their processes to develop systems for delivering services’ (CMMI Product Team, 2010c).

BPMM

The BPMM documentation describes four ways in which BPMM can be used:

- As a guideline for a business process improvement program
- For the identification of risks within a successful implemented system
- As an evaluation tool to identify the capability of suppliers
- As a benchmarking tool for the evaluation of the business processes

In none of these four possible ways is it pointed out that it can only apply to certain industries. It is always stated that the tool can be used in general for the analysis of business processes. In general, as in the CMMI framework, the

documentation explains that individual process areas must be tailored to the needs, requirements, characteristics and goals of the company (Object Management Group Inc., 2008).

SAP maturity model

The best prerequisite for the SAP maturity model is given when SAP is used as a central IT business system in the company. The SAP software has the general requirement that it 'helps organisations of all sizes and industries' (Reisert, 2015) to manage the complex business processes. The SAP AG use their own process maturity model which has been tailored to the company's needs and towards a continuous improvement of the business processes. This makes the model best suited to SAP AG, which uses the SAP software as a central IT component. Fundamentally, the SAP model is based on the CMMI framework and has been developed from it.

Summary

Each company must decide which type of model it would like to use. If the company has limited experience with handling BPM maturity models, perhaps a simple model like eden can help to provide a quick initial result with predefined questions. If a company would prefer to use a model for daily process management, then a CMMI or BPMM model can enable better support. But every company must be aware that the use of CMMI and BPMM is much more complex and requires much more preliminary work than with an eden model. If SAP is used as a central IT component, the SAP model could also be a possible solution. But this model has been developed primarily for SAP AG, and is not available for everyone. This means that the model may be passed on only if an SAP customer asks especially for it at the SAP AG.

Overall, this means that every company needs to clarify which model is best suited to its own needs and if the strategies of the company change, there could be a need to also change the BPM maturity model that is used.

In general, it is important to generate new experiences and new knowledge through the use of a model. A maturity model which delivers in the end only the knowledge which is already known by the users does not help a company to make any process improvements. A company must consider whether there is a

need to change the used BPM maturity model to another one, if an established maturity model no longer offers important process improvements. It must be also considered whether it makes sense to use a different model because, for example, the company's strategy has changed.

5.1.5 IT

Besides the word ‘SAP’ the term ‘IT’ was frequently mentioned in the interviews and the experts had many explanations for the general relationship of IT and BPM maturity models.

E1 explains that IT is one of nine dimensions of the eden model but that the IT questions are very general. This also fits the statement that IT has only a secondary importance for the model. But E1 indicates that new technology can have such an enormous potential that many users cannot imagine how IT can support BPM. Furthermore, an organisation needs a flexible IT infrastructure for flexible processes improvements and changes. But the eden model does not pay any attention to this flexibility, and the model does not refer to new technologies.

E2 argues contrary to this. He argues that the use of IT is not a prerequisite to making a successful BPM, but for large organisations it makes much more sense to use IT applications.

However, E3 is much stricter in dealing with IT. He states that IT must be part of the maturity model and a model must include some IT questions because IT has a great influence over most processes. He even recommends using standard processes, which are defined by IT systems. But here he is caught up in contradictions. He recommends not inviting IT to take part in the development of new processes but he also argues that an IT department involved late in the process leads to a highly customized system and produces much greater costs than the use of normal standard processes would.

E4 explains very generally that the use of IT is a prerequisite to reach the highest possible maturity level. Therefore IT is absolutely necessary to measure key figures, optimize processes and align processes with each other. But in contrast, he also states that IT is not a general requirement for BPM, but the use of IT can be very helpful to ensure a better and faster result.

E5 indicates that IT should play a secondary role in maturity assessments, but on the other hand the practical implementation of processes usually makes the direct involvement of IT necessary. In a very meaningful statement, he explains that theoretically, the IT system should not affect the process, but in practice it can have a lot of influence. For example, budget restrictions can block the processes used within IT. Additionally, users often think in the form of old IT transactions if they want to create new processes or there may be technical restrictions to changing a process to fit the new BPM requirements.

E6 also states that the eden model deals not with media breaks or IT interfaces but these areas have a lot of optimisation potential, and E4 makes a similar statement too. For this purpose, E6 recommends the use of a BPM maturity model to stimulate the use of IT. For this purpose, the BPM maturity models must consider new IT areas such as digitalisation, the use of mobile devices or the use of other new technology areas which were previously unknown to the user. Additionally, the use of an ERP system can be a good first step to getting initial IT functionalities because often the SAP ERP system is the largest IT system within the company.

E7 explains that it is not very beneficial if BPM maturity models are managed by the IT department alone, because then the BPM idea is limited only to the processes of automation, but BPM is not a pure IT topic; it is more about the corporate culture of an organisation and the support of the management.

E8 also reports that the individual process initially has nothing to do with IT, but IT supports the execution of the processes later. This IT behaviour has become very complex in the last few years because the users have more IT experience and therefore more extensive IT requirements. Also for this reason, IT experts and business departments must work together to develop new processes, as described in section 5.1.3.

Furthermore, E9 supports the statements that the use of IT is often very helpful, but that it should be used only as a support for the BPM. In practice, care must be taken if some management decisions affect the IT used. For example, a management decision could be that SAP is the central IT system of the organisation and standard SAP processes should be used where ever possible.

E10 states that IT use has a significant influence for the strategic and technical support of process management. But IT is often seen only as a service provider to solve some problems and not a process efficiency-enhancing area. For E10, the ideal process solution lies between the two strategies ‘process follows IT’ and ‘IT follows process, follows strategy’ and an organisation must find the right path and the right strategy individually.

E11 additionally illustrates that SAP is often the most important IT system and has many touch points within a company. Therefore, the SAP system can be used as a strategic tool to implement processes, but each company should consider what is important for their maturity, and whether a standardisation of IT processes is an important thing for their organisation and something to be considered within an applied BPM maturity model.

eden

A successful BPM project also involves the implementation of IT systems for the process execution, whereby the IT systems effectively support the processes of an organisation. The eden model defines the dimension of IT as an important starting point for a successful process optimisation (Allweyer & Knuppertz, 2009). The result of the eden analysis forms the basis and should then help to discuss the results and enable further development of the applied IT. The model therefore does not suggest how IT should be used; rather, it would like to encourage a general discussion about the IT used.

CMMI

The CMMI documentation mention at two points the use of IT (CMMI Product Team, 2010b). First, the document describes the fact that it is not always clear how and what IT can do to meet and identify requirements of the customers. For this reason, it is proposed to involve relevant stakeholders. The second point also has to do with the use of IT resources, because a project team should be broadly structured and, for example, a system administrator should be included in the project team to take account of IT issues.

BPMM

The use of BPMM promises that the used enterprise systems are also investigated more closely. For example, BPMM will use methods that examine the risks and weaknesses of the implemented IT projects within the company.

That could be a documentation whose mechanisms, operations and procedures are used to collect, store and access data within the existing IT database or how and which IT systems have been established to carry out the capacity planning of a company. BPMM does not represent specific practices to a particular system, but rather asks questions in general terms and suggests an evaluation of the systems used and their processes. In general, the improving of organisational readiness for technology deployment was one of the main motivations for the development of BPMM. The BPMM approach should demonstrate that the use of technology can lead to a process improvement. Additionally the model explains that care should be taken with technology changes or new technology trends which can be ‘reasons for revising the performance and quality goals for the organisation’ (Object Management Group Inc., 2008).

SAP maturity model

The SAP maturity model generally describes the fact that process improvements generally involve close integrations with IT projects and the use of innovations. Therefore an actual improvement can be the impact of an IT project. The presentation of the annual financial reports, which often have very long entire times through the use of complex processes and inadequate IT, are mentioned as a negative example. Here the close interlinking of the process analysis and the IT used can contribute to a positive process improvement. In general, the SAP maturity model points more to the use of the standard SAP system and recommends less the use of general IT systems (Reisert, 2015).

Summary

In general, the use of new technology or the improving of given technology to new standards can have an enormous change and improvement potential for the use of BPM. Many users cannot imagine the possibilities with the use of new IT features and therefore projects needs IT specialists for a successful application. A BPM maturity model could be very helpful in identifying new technologies and using them for the processes of a company. But BPM is not a pure IT topic and processes should not generally be developed by them. IT should only offer support for process improvements and it should also be considered that IT is not absolutely necessary for a successful BPM development, but enables faster results.

Every company has to consider for itself how it wants to use IT for processes and which core functionalities of IT are important. IT strategies must be found which lie between ‘process follows IT’ and ‘IT follows process, follows strategy’ because it is not desirable for IT to set the targets for the processes, but it can be useful to use prescriptions and not only develop own process behaviours (cf. 5.1.6.).

The use of a central IT system is a strategic decision and many processes flow from that IT system. Therefore, the use of suitable IT must be considered carefully.

5.1.6 Use of standard SAP processes

The use of standard processes has already been mentioned at section 5.1.5. Therefore, the purpose of this section is to analyse how and why the application of standard processes and especially SAP standard processes could be helpful, and what should be observed when these are used.

Expert 1 estimates that a higher maturity level can be reached at the first introduction of a BPM maturity model if SAP is used in a process oriented way, but an ERP system does not fundamentally and always lead to a better process orientation. Essentially, most ERP Systems are designed in a functional manner and many ERP Software vendors could not handle a procedural requirements catalogue. E1 states that nearly 80 percent of all ERP vendors need a functional requirement catalogue in order to create an offer for the introduction of their ERP system. There are still many ERP vendors who are not as familiar with the process descriptions and cannot implement these descriptions directly into their ERP systems.

Additionally, E7 explains that the use of SAP does not generally lead to a better maturity level, it depends on how intensively and professionally SAP is employed as an IT system. In principle, there are many companies where SAP is the leading IT system in the company, and several of the experts like E1 confirm this through their practical experience. E2 explains that companies which use a standard SAP system promise that the use of SAP and the use of SAP standard processes results in a wide range of potential savings. But E7 points out that this is only possible when the SAP standard processes are used in the way it was conceptualized. It is quite possible to use SAP only in a

function-oriented manner without the use of any established processes. If SAP is used in this way, such a system cannot contribute to a process improvement. The same applies if SAP systems are not adapted over the years to new circumstances within the company. In these cases, it is helpful to compare the current processes in the company with the predefined standard processes in the system and to develop an optimisation potential.

There are different opinions among the experts as to how and when an IT department should be involved within the development of new processes. To a certain extent, the experts are themselves contradictory. E3, for example, would not like to introduce an IT department early in the development of new processes because the IT department always aims to establish SAP standard processes. On the other hand, the use of non-standardized SAP processes will lead to massive costs because they have to be developed by themselves. Each SAP enhancement package or each SAP release change makes it necessary to test the customer-specific programming to the new SAP system, explains E6. During the interviews, some experts have thought about their world and asked themselves what and how they use the SAP system. E2, for example, indicated that he had not thought about the possibility that SAP could have a limited impact on the development of processes. The company tries to orient itself on the given software and implement processes in such a way that they can interact with the system as best as possible. E2 comes to the conclusion that SAP can restrict the creativity within the company if processes are specified and have already been used in a specific way for the last few years, or if the process development is based on the existing system.

An everyday problem for E5 is also that a user does not want to use the standard, because they assume that this is cumbersome, and workaround solutions are much more flexible and cost-effective. This is why Excel solutions are often created, but in the long term they are much more expensive than a standard solution. Even these solutions have to be checked again at any system update and any system adjusted. Therefore, it should always be investigated whether a standard solution is a better choice in the long term.

In general, the standard SAP solutions should always be analysed when a process is introduced in the company. E9 explains that a minimum of 80% of all

processes are very similar and can use the standard behaviours. Only up to 20% of the company processes need an individual solution, because their process is very special or there is no corresponding standard solution on the system. Overall, the company has learned that the development of individual software solutions costs a lot of money and a company must also learn that there is nothing negative about the use of standard software. However, the examined BPM maturity models do not necessarily require a company to use standard software, although a possible exception is the SAP maturity model. In principle, it is always the case that the offered standard processes should also be analysed in detail to see whether they are suitable for the company. However, E6 explains that the use of standard processes does not automatically lead to the highest possible maturity level within a maturity model.

Just because a standard SAP system is used, a company does not necessarily have an optimal position. These SAP standard processes could be used as a first business process solution but, indicates E8, a deeper analysis is always then needed in order to achieve an optimal process implementation for the company. E9 confirms that the use of a standard process does not excuse the process team from the obligation to check these processes for the optimal ability. But which area should be adapted with standard processes and which should use additional implementations is always the decision of the process team in addition to the business unit, indicates E10. A process team should always answer the question of how a standard could help to improve processes for long term use or why a standard process does not optimally represent the company.

For E9, another advantage of a standard SAP system is that the system can trigger alarms and workflows if certain circumstances are met, but overall it needs a lot of time and budget to realize a SAP system in the required manner of a company. Overall, the practical experience of the experts is that, as often as possible, a standard solution should be preferred because it pays off in the long term.

The only model of this research which actively raises the question of whether SAP standard solutions are used, is the SAP maturity model. Only when standard solutions are used it is possible to reach the highest maturity level at

all. But each company should consider whether the use of all possible and offered SAP standard processes is important for their SAP usage, and whether the SAP maturity model is a possible alternative.

Also, E11 indicates that every process should be analysed carefully because standard SAP processes can be used in an incorrect manner. In addition, some experts have the opinion that traditional business processes, such as finance or human resource processes, can be represented very well by using standard SAP software, because they have been developed for a long time, and with experience from many different industries.

Within the documentation of the maturity models the standardisation is mentioned above all in the SAP maturity model. The other models are not so much concerned with the use of standard processes which originate from an IT system.

eden

The term ‘standard’ is used in the eden model mainly for the application of the eden maturity model. It explained that eden supports a standardized method for the determination and evaluation of process maturity and uses a uniform evaluation standard for this purpose. The use of standard processes in IT systems is not addressed. It is only generally described that IT systems are implemented to support the process management (Allweyer & Knuppertz, 2009).

CMMI

Even if the CMMI documentation deals with the term ‘standard’, this does not mean the use of predefined standard IT processes. Standard processes are processes that a company would like to develop and carry out company-wide and in the same manner for different applications. These standard processes are described as organisation guidelines. The term ‘standard processes’ describes the fundamental process elements that are expected. Establishing standard processes is defined as a specific practice in the CMMI, but no IT system is mentioned in this context (CMMI Product Team, 2010b). Only the documentation for ‘CMMI for Services’ recognizes such a connection. Within the specific practice: 'used the defined process for the work' it is stated that standard service systems already contain predefined standard processes and

these are then 'good candidates to consider when selecting standard processes for delivering services' (CMMI Product Team, 2010c).

BPMM

The BPMM documentation also discusses the organisation's standard processes. In this model, maturity level 3 is referred as a 'Standardized Level'. ‘At maturity level 3, the organisation's standard processes for developing, preparing, deploying, operating, and supporting the products and services are documented for use across the organisation’ (Object Management Group Inc., 2008). In this context, the standard process does not mean the standard process of any IT software used. What is meant by standard process here is an organisation-wide program which is established, in addition to the work processes, and also intended to improve the company's support and management processes. Although the keyword computing is mentioned at this level, the term computing has, within this context, nothing to do with standard processes that arrive from IT systems.

SAP maturity model

Only the SAP maturity model requires the use of SAP standard processes for the highest maturity level. In this case, the aim is that more than 80% of the processes use the SAP standard processes (Reisert, 2015). Through the standardisation, the company promises a simple measurement of process characteristics, which can be evaluated with a standard SAP system. Furthermore, the standard solution is intended to simplify collaboration, because problems can be analysed more easily and there is no need to search through self-developed source code. Overall, the company promises to increase the total productivity by simplifying internal business processes. This behaviour is also intended to support the company strategy: 'if we simplify everything, we can do anything' (Reisert, 2015).

Summary

The practical experience of the experts shows that the use of standard processes can be very beneficial. On the other hand, the documentation of the maturity models contains almost no pre-requisites for the use of standard processes which are defined by IT systems. The experts hope that with the use of standard processes, the maintenance costs can be massively reduced. All

processes that are not developed by the system vendor must be checked and, if necessary, adapted in case of system updates, system extensions or system enhancements. This effort is not required if processes are established with provided standard processes.

In any case, however, it must not be the case that the company is massive influenced by a standard SAP system in such a way that no different processes are possible and only standard processes are provided. Every process has to be compulsorily assessed to see whether it complies with the standard behaviour the company requires or not. The use of standard processes never releases a company from the obligation to precisely analyse these processes and test them for their own requirements. In doing so, the company must agree on a procedure and determine how far a company should adapt to a standard process or whether the process must adapt to the company's demands. No generally valid regulation can be given for this investigation and commitment.

It is also arguable whether an IT team should be involved in the development of a process right from the start of the process definition or not. On the one hand, users who are familiar and have years of experience with the SAP standard processes are often unwilling to accept new processes that differ from their old SAP experience, but on the other hand it can be much more cost-effective if individual processes do not have to be programmed.

With sufficient time and money, each SAP system can be customized to meet the process requirements of a company. In practice, however, the budget is quite limited and a company must determine whether standard processes should be adapted or not. When a standard process needs some adjustments, it is important to analyse the impact of these adjustments.

As a result of the interviews, it can be noted that many companies are trying to use the SAP standard processes. They are hoping to reduce time, costs, resources and other expenses. Many processes are similar across different industries and therefore many experts recommend the use of the standard processes which are provided by an SAP ERP system, even if the examined BPM maturity models do not consider this point of view. Finally, the overall questions are: how much of a standard is possible and necessary and should

the process follow the IT, or should the IT follow the process specifications of a company.

5.1.7 Interfaces from and to SAP

Some of the experts explain that it is useful to consider the interfaces to and from an SAP system in more detail. This can be done for several reasons.

E1 suggests that an interface between the SAP system and the developed process model would be a good addition and ideal tool. Settings are often executed within the SAP customizing, but these settings are often not changed immediately within the process model. It would be practical if these changes were immediately visible in the process model. Thus, parallel developments could be avoided and any divergence between both models would also be avoided. But so far, he does not know of any SAP tools that can meet this requirement.

The interfaces to and from the SAP systems were also referred to more frequently by the experts. It is almost always the case that an SAP system not the only IT system in the company and there are often exist interfaces to and from the SAP system. Therefore, many experts also recommend that these interfaces must be examined more closely.

E4 explains that an ERP system describes only parts of a whole enterprise. Such an ERP system like SAP often does not include an end-to-end process view. But the key to a process consideration should always be the end-to-end view of a process from the start to the end. The result of such an end-to-end process view is often the perception that a process runs at different systems. The interfaces between the different systems often produce a lot of optimisation potential. Processes that run within one single system are often much more optimized than those with interface breaks between different systems. It is then very helpful to analyse the end-to-end process in its entirety and to work out which data are processed between the systems. Also, exactly how each system passed and processed the data should be analysed. Frequently, erroneous or incomplete data transmissions can be detected, if the process has not been considered as an end-to-end process in its entire scope. However, the process must not be viewed solely from the IT point of view. A process always needs an

analysis in form and content and needs coordination with the requirements of the business.

E4 assumes that processes which only run in one system have a better maturity, because they are digitized, compressed and are under the control of one system. If processes are specified by the system, the companies expect that the individual process steps are perfectly matched with each other. The situation is different if several systems are affected. It is helpful to consider the end-to-end process in a process analysis in order to get to know the whole variety of the process. Therefore, E4's recommendation is always to analyse first all the process steps which are transferred between different systems like SAP.

E5 also supports this end-to-end view. There is often a system that adopts a leadership role, and it must then be analysed whether the other systems can manage this or whether a change in the process is required so that the different systems can communicate with each other better. The execution of a maturity model should find these weaknesses because a model should consider the end-to-end view of a process.

In general, E6 reports that the IT consideration of the eden model is not sufficiently detailed. One point of criticism is, for example, the lack of consideration of media breaks and interface dependencies. In principle, a process should be considered as an end-to-end process in order to exploit the greatest potential for optimisation and to better understand the reality. A maturity model should therefore force a company to think about process behaviours and comply with certain standards.

If employees from different areas speak the same language and use the same technical terms, it is much easier to understand the processes in their entirety. A maturity model could be helpful to define this same language. E8 reports that with this common basis, the required interfaces can be analysed much better. In reality, more and more systems should be looked after with less and less resources. But if the employees do not understand the common goal of a system, then support becomes increasingly difficult.

E10 also indicates that, depending on the process, an interface consideration must be more or less intensive. In the case of frequently used or extensive interfaces, an analysis must be more intensive than with less used and small interfaces.

In the four analysed models, the interfaces are also more or less intensively examined in the documentation.

eden

The eden model generally asks whether interfaces have been defined between processes. Additionally, the eden model wants to know if interfaces are described within the process model to customers and also to suppliers, external partners and service providers. It is not specified how exactly the interfaces should be described and what an interface is. The interviewer should only indicate if he feels that this definition and description has been satisfactorily executed.

CMMI

In CMMI, the description of interfaces is an important topic. For example, in the context of interface coordination, the maturity analysis can be helpful for the interface requirements development with the persons who represents external and internal interfaces. In general, CMMI also describes an end-to-end perspective as an essential part of the requirements development process, in order to fully recognize and implement the requirements. The formulation of interface requirements is mentioned in several places within the documentation, for example, the interface compatibility should be ensured and interface requirements should be recognized and documented.

The documentation also indicates that an incomplete interface description can lead to risks, where it is not always clear what an interface should at least ensure. The document often refers to interfaces between processes, projects, stakeholders or teams. Thus, an interface does not necessarily have to mean a data exchange or application program interface, but can also mean a human interface.

Within the context of product integration, a main point deals with the compatibility of interfaces (CMMI Product Team, 2010b). It is also highlighted

here that many problems arise when interfaces are not described adequately, or the documentation of the description is no longer updated.

BPMM

In the case of BPMM, the description and analysis of interfaces is also closely linked to process integration. From maturity level 3, it is required that process interfaces should be well-defined, documented and verified (Object Management Group Inc., 2008). In contrast to CMMI, it is not indicated that interfaces could be data interfaces between systems as well as human interfaces between departments. But the description suggests, that interfaces usually mean the connection to other systems.

SAP maturity model

The documentation does not refer to any external systems. The focal point is the SAP system, which forms the basis for everything. In principle, well-designed business processes should form the key for a successful SAP system. The process documentation forms the basis for improvement projects. ‘The focus of process documentation is to deliver valuable information for the people executing the process’ (Reisert, 2015). How detailed the processes should be described is not defined, and also whether interfaces within processes could play a role within these documentation.

Summary

The examined maturity models do not always analyse whether a process runs in several, or only in one, IT system. In principle, the experts assume that a process that runs in one system has a higher maturity than processes that run over several process boundaries. Frequently, in this case, not only different systems but also different employees are affected by the process and have to understand and handle several systems.

Processes should always be considered as end-to-end processes. If more IT systems are affected, more employees are often involved. These employees and IT systems must then find a common language and analyse which data are necessary for an optimal process. Therefore, it is important that every IT interface is investigated no matter how big or small it is, but unfortunately this investigation does not always receive the necessary attention in BPM maturity models. In general, a well-documented interface description can provide a solid

basis for the development of process optimisations. But overall, frequently used processes should be analysed more thoroughly, because an improvement can be more successful due to time and budget reasons.

Even for interfaces that affect an SAP system, detailed descriptions should always exist to clarify which data is needed for a transfer and for which demands these data are required. The application of standard interfaces or web services which are provided by SAP does not release a BPM project from the obligation to analyse and document these interfaces.

5.1.8 Measurement of KPIs

Experts from all cases see the use of SAP as a good basis and supporting tool to measure process indicators. The experts report that SAP can produce, with little effort, the KPIs for the BPM maturity models. The four maturity models have different requirements for the measurement of key figures.

The eden experts explain that the model asks for a measurement of figures in a very general sense. Therefore, a SAP system can provide these figures.

The CMMI and BPMM are much more complex, but the experts explain that KPIs can also be recovered directly from the SAP system in these models. But, explains E8, for the complex models like CMMI or BPM, there is a high administrative workload to define the measurable values for the BPM maturity models. But he also point out that processes which run only a few times a year need less effort regarding measurement than processes that run several times a day.

The expert for the SAP maturity model, E11, also mentions that ERP systems like SAP support the identification of KPIs. He describes furthermore that SAP provides standardized reports that determine and present KPIs.

In general, most experts describe that SAP can be arranged as a controlling tool which measures the actual business steps and provides key figures automatically.

E4 notes that an SAP system can recognize and identify many key figures. Therefore, the system must be checked by the BPM team to see whether the figures are used correctly. Due to practical experience, E10 explains that there

are fields in the SAP system which have similar mentation and the organisation must clearly define which field contain the figures which are used and evaluated for the measurement. This total monitoring by key figures can also be viewed in a negative sense. A company must take care that the SAP system and the permanent measurement of the key figures do not lead employees to have negative opinions about the permanent monitoring, and for this reason, numbers are intentionally misrecognized, explains E4.

E9 declares that SAP is often an important data source because the system is has already used frequently and over the long term within an organisation and it therefore already contains a large amount of historical data. There are even companies which have the guiding principle: ‘What is not in SAP, does not exist’. Most of the financial transactions have something to do with SAP and therefore many process data can be determined directly from the SAP system. In addition to financial transactions, there are also data that cannot be determined from an IT system. E10 mentions as an example the lived culture within the company. How the BPM is perceived by the employees and whether this kind of organisation is already anchored in the minds of the employees cannot be measured by an IT system.

However, E7 highlights that a maturity model is more than just a controlling and measuring instrument and measuring should be only a sub-area within a maturity model. But all models mention the measurement of key figures as a basic measuring instrument.

eden

In the eden model, measuring is a separate dimension. This dimension is especially focused on the tracking, rating and controlling of the process performance and the co-ordination of this with the process manager (Allweyer & Knuppertz, 2009).

The questions are more general and aim to find out whether process characteristics were defined and also evaluated. For example, it is asked if process indicators for performance measurement are quantified on all process levels. How these key figures are determined concretely is not described. It is also not asked whether an IT system supports these measurements.

CMMI

In the CMMI, one chapter refers to ‘Measurement and Analysis’. The measurement is defined as a support process in maturity level 2. CMMI defines this as follows: ‘The purpose of measurement and analysis (MA) is to develop and sustain a measurement capability’ (CMMI Product Team, 2010b).

The chapter does not specify which systems can be used to obtain measured values, but in general it is defined that measurement data can be generated from existing resources. It is pointed out explicitly that whether the value of the result really corresponds to the indicator which should be measured must be examined. CMMI also states that the obtained information must be prioritized because not all results are equally important. The actual measured characteristic numbers must be defined separately by each organisation. Several examples are mentioned within the documentation, for example the number of persons per hour, the number of defects by severity or a milestone performance that measures the estimated delivery time. The data collection is to be determined from existing data sources and the organisation must define how the data is collected and stored. It is not specified that SAP or another ERP system can be used for this collection.

CMMI points out that historical data can also be used for analysis. These historical data could originate from a SAP system but it is not confirmed in the document. However, it could be possible to measure these throughput times from an old SAP system which existed before the BPM introduction took place.

BPMM

In general, the documentation contains the note that IT system databases can be used to process and store data. Furthermore, there is the reference that 'data on the performance and quality of products and services may be captured in product support or customer relations databases' (Object Management Group Inc., 2008). The document does not contain a reference to a specific system and only explains that there are systems which can contain data. It states very generally that measurement-related objectives and issues could be identified and documented.

In general, it is described that process information should be used to analyse these and to improve the standard processes in the organisation as a result of

the findings. Some small hints on how this can be done are then covered in the chapter ’Guidelines for Measurement and Analysis’ (Object Management Group Inc., 2008). This chapter describes very generally what planning and preparation for measurement could look like. The document does not contain indications on how the data can be measured. For example, it is explained only generally that work efforts can be analysed against the plan figures.

SAP maturity model

A central part of the BPM team is an SAP-wide measurement of the processes and their effectiveness. ‘The effect of the process changes are measured along Process Performance Indicators’ (Reisert, 2015) and could be compared with previously defined criteria. The measurement is a central element of maturity level 2. To reach this level there is a need to measure basic performance indicators, like the throughput time of a process or the costs per output.

In order to simplify the measurement of key figures, the SAP maturity model already provides six key figures (Reisert, 2015):

Input:

- Number of inputs per year
- Involved Full Time Equivalents

Operations:

- Throughput time (sum of throughput time per process)
- Working time (sum of working time per process)

Output:

- Cost per output
- Customer satisfaction (customer of process)

These six key figures are often the starting point for a further development of additional measured values.

Within maturity level 2, it is stated that the monitoring is to be carried out as far as possible with SAP standard tools and the stored data within the SAP system.

Summary

It is important for most models that measurements are carried out. According to the definition, it is therefore quite possible to make a data analysis through

Excel, even if already predefined reports exist in the SAP which could provide accurate key figures. Only the SAP maturity model provides an exception here; after all, the process characteristics should be analysed with SAP standard functionality if possible.

However, a company should ask itself whether it is not much more effective in the long term if measurement results are generated directly by some SAP reporting tools that are provided. These reports may also help to carry out initial analyses. In the case of the CMMI and BPMM models, the measurement variables must still be determined by the organisation, and the execution of a standard SAP report could form a basis which can be extended in the future. This is already done within the SAP maturity model. The six key figures given are often the starting point for a further development of additional measurements. An analysis of key figures should necessarily depend on how often a process is executed and how important it is. In addition, a company must pay attention to the system to see whether the required key figures are maintained and if all involved parties maintain the same key figures in their processes.

The experts report that most financial transactions are associated within a company with SAP. This means that for many companies, SAP is an important IT component. Many of the experts point out that SAP could be the starting point for a solid foundation of processes evaluation. Even if most BPM maturity models do not link the measurement of key figures to an SAP system, the experts explain that in practice such a connection often exists.

5.1.9 Introduction of a BPM maturity model

All experts have their own experience with the planning and implementation of BPM maturity models. Both similarities, as well as differences, can be represented. In almost all cases, the SAP system was already present in the company before a BPM culture had been established. This is why many IT stakeholders are characterized by the SAP guidelines, which they have already practiced for many years. If users have years of experience with the SAP standard processes, they are often unwilling to accept new processes. This acceptance problem has already been explained at section 6.2.6. A BPM maturity model is seen by many experts only as an additional tool. From

practical experience, E9 and E10 explain that they would not introduce a maturity model at first. They support an introduction only if the BPM approach is established in the company and the management asks for the tool and supports the application.

All experts agree on one fact: The introduction of a BPM maturity model can only be successful if the top management supports the application (cf. 5.1.1). That is why E10 explains that the best time for an introduction is when the top management wants to understand the topic of BPM and support the application of a BPM maturity model.

In many cases the application of an SAP system is also a management requirement, report E9 and E10. Based on this requirement, the aim is to reach a superior goal, which could be a standardisation of the used SAP processes (cf. 5.1.6). The purpose of a BPM maturity model should be to support these standardisation processes. A BPM maturity model should be the best way to check the standardisation for these companies and determine how advanced the BPM approach is already. But with the four tested BPM maturity models, only the SAP maturity model meets this requirement.

E5 explains that there is, in general, no wrong time to introduce a BPM maturity model. He personally thinks it would be better to implement a BPM maturity model at an early stage. It is, in principle, possible to introduce a BPM maturity model, even if no BPM knowledge is available in the company. In this case, a company is made aware of many areas that need to be considered in the BPM environment. This approach will, however, be more successful with the eden model, because this maturity model contain predetermined questions. With CMMI or BPMM this could be much more difficult because the company needs to define many variables by itself and the employees have to understand what BPM means. E6 specifies rather the opposite; he explains that in his opinion it is not necessary to introduce a maturity model right from the beginning. He recommends that the users of a maturity model should first collect some experience with BPM and understand its concepts before they apply to use a BPM maturity model. E8 goes a step further and recommends that a BPM maturity model should be installed together with an external expert. Only

through such external support can many errors can be avoided, and a better result can be achieved.

E1 explains that the introduction of a process culture within a company can be combined with other projects. BPM can be established, for example, by a re-engineering project, which is carried out initially. The re-engineering project can be expanded with a permanent concept as a BPM initiative, as was established in E10's company. Additionally, an SAP implementation and harmonisation project could be used to introduce a process management within an organisation. But E11 believes that it would be a great mistake if BPM is introduced together with a new SAP system. The introduction of a new SAP system is a very comprehensive project and should not be disturbed by other projects. Therefore, the situation should be avoided in which an SAP introduction does not receive the full attention which is needed for an effective introduction. Where an SAP system is usually already present within a company, a company must decide if it will introduce a BPM maturity model at the beginning of all BPM activities, or only after a BPM approach is established at a company. Overall, explains E8, the use of BPM maturity models should not lead to results which are already known without the use of a maturity model, The application should lead to new findings which allow a process improvement for the organisation.

E1 explains that the IT department starting with the introduction of a BPM maturity model could be a good idea. This approach allows other departments to be convinced of the possibilities of a BPM maturity model. It should be noted that BPM is not a pure IT theme, as described in section 5.1.5. Also, the experts explain that the human factor is much more important in an introduction than the technical background (cf. 5.1.3).

The documentation often describes what should be investigated and how this can be examined. Often there is only a very general description of how the BPM maturity model could be generally introduced at a company.

eden
Without a commitment from the top management level, it is not possible to implement a company-wide process management. The goal should be always to implement the BPM maturity model by a top-down approach. In many cases

the bottom-up approach corresponds more to the reality of the company. Here the documentation promises that the eden maturity model could support new BPM approaches if eden is introduced through a bottom-up approach. The documentation explains that the result of a bottom-up introduction could convince the management to use the BPM maturity model across the whole enterprise. Further statements about the introduction of the model are not describe. (Allweyer & Knuppertz, 2009)

CMMI

The introduction notes to the CMMI model are also very general. It is explained that it is not necessary for the application of CMMI that certain processes are used or processes are measured in a certain way. Each organisation has to decide whether, which and how they want to measure processes.

An important step is that the senior management supports the introduction of CMMI. In addition, all relevant stakeholders should be integrated during the implementation. In addition, a team that operates CMMI should consist of members of different business areas and must know as many requirements as possible about the processes (CMMI Product Team, 2010b).

BPMM

The BPMM provides a framework and summary practices as a guideline for continuous process improvement. It does not describe when and how the model could be introduced. The described stepwise improvement suggests that the model can be introduced at any time. As a result of the BPMM deployment, a personal roadmap for a continuous process improvement should be created, recommends the documentation.

The model can be used very individually and is not linked to any general conditions. It is not specified when the model must be executed. A company must define for itself how the model could be applied and which stakeholders should use that model (Object Management Group Inc., 2008).

Since no ERP systems are mentioned in the documentation, no connection can be made regarding the usage at ERP projects.

SAP maturity model

The systematic development of processes began at SAP AG in 2008. The first developed process map was the basis for the introduction of the self-developed SAP maturity model. In order to establish this BPM knowledge within the whole company, a process governance team was founded and developed, built, measured and constantly improved the process management standards.

Additionally, this team manage a process management community and have established broad support within the company through this community. Through various and recurring information, actions and trainings, the topic of BPM and the company's own SAP maturity model is constantly being promoted and expanded. The documentation describes such a community as a key element for a successful introduction (Reisert, 2015).

Summary

The introduction of general BPM concepts are often also based on other activities such as a re-engineering project or larger system implementations. The introduction and application of a BPM maturity model is often described by the experts as a following activity. It is important for the companies that SAP runs successfully and constantly, and that certain BPM activities and processes are established on this system.

All experts and the documentation describe that a BPM maturity model is only successful if the top management fully supports the use of the model. Therefore, it is important to always pay attention to the management requirements. For example, if the management require that the company should use as many SAP standard processes as possible, then a SAP maturity model can analyse this circumstance better than an eden model.

In order to successfully implement a BPM maturity model, as many communication channels as possible should be activated in the company. For example, training, communities, newsletters and awards could be established to successfully launch the topic and to reach and inform as many people as possible about it.

The experts report that there is apparently no wrong time to introduce a BPM maturity model. Due to the different stages of a BPM maturity model and the

different depth of analysis in each stage, there is always some improvement potential for the investigated processes.

A characteristic of the interviews responses is that the introduction of a BPM maturity model is usually a downstream step. It seems that many companies already use SAP and then want to use a BPM approach secondly. Only afterwards is a possible thought the use of a BPM maturity model. Then the question arises how much work, time and effort should be invested. A company has to decide whether it wants to operate a complex model such as BPMM or CMMI, or whether a smaller variant is sufficient like, for example, the eden model with predefined questions.

5.1.10 SAP Components

None of the documentation contains a closer look at the use of BPM maturity models in a SAP environment. But the experts have some practical experience regarding the combination of a BPM maturity model within different SAP application components. Some of these characteristics are discussed in this section. Some more general points like the application of preconfigured SAP processes have already been listed in the previous section. For this reason, this section is limited to the usage of SAP application components like ‘SAP Finance’.

There are areas which are obviously more suitable for any form of harmonisation than others. These areas are finance or controlling because these are strongly linked to the business management, explains E9. Additionally, E6 points out that some companies are restricted in their thinking, and use SAP for historic reasons especially as a supply chain tool, for material management or as a pure financial tool. SAP provides many instruments for the generation and monitoring of key figures and also additional controlling possibilities are easy to integrate. However, SAP is not just a financial and controlling tool, and can be used much more flexibly. Some companies must learn first to understand this fact. Therefore, it may be important to integrate SAP specialists who can generate this understanding. All models refer to the use of key figures and control capabilities, and these are often closely related to the finance area, but this should not be the only aspect for the use of SAP within a BPM maturity model, even if these points are very closely linked with

each other. E9 explains that areas such as finance or sales are much easier to standardize than other areas. For example, an area such as ‘Master Data Management’ is much more complex, but only those organisations who have correct master data can also handle proper processes. Due to this reason, the area of Master Data Management could also be extremely important. The experts cannot imagine that the use of a special SAP application component could be unsuitable for the application of one of the examined BPM maturity models. The SAP components can always be used to support the application of processes in companies and provide a first impression of how a process can be run. The task is then to analyse this standard process more closely, as described in section 5.1.6.

That certain areas are easier to analyse than others does not mean that the BPM maturity models cannot be used for all kind of SAP components. On the contrary, all experts explain that their BPM maturity model can be used across all SAP components and industrial sectors. This also applies to the SAP maturity model, explains E11, even if this is much more closely linked to the SAP system than others BPM maturity models.

In many cases, the SAP components themselves are not restricted, but the people behind the individual areas are. For example, E10 explains that management processes are often the most unprocessed processes that exist in a company. The management does not usually want to deal with its own processes and does not want to adapt them. For this reason, these management processes are mostly not included in a company's process map. The value-adding processes and processes for which a company deserves money are simpler and more important because a customer pays for these processes directly and the management immediately sees an increase in profit or a loss.

Summary
The interviews demonstrate that there are no SAP application components that are better or worse suited to the application of BPM maturity models. There are component which may be easier to manage, but all experts agree that they could not imagine a situation in which a special SAP application component cannot be analysed by a BPM maturity model. Therefore, maturity models

cannot be classified according to different SAP components and their usability. It is much more important that the companies themselves define and classify which processes should be analysed more closely and which should not. The SAP components used are not important. Much more important is each individual process and how exactly this should be designed and harmonized in combination with an SAP system.

5.2 Principles for the successful use of BPM within an SAP environment

All the interviews, which involved many practitioners, have confirmed that the SAP and BPM concepts are closely related. Theoretically, there is often no such link found in the documentation, but in practice the SAP system is the leading ERP system in many companies and therefore there is a practical connection. Many BPM maturity models currently consider only a small range of IT applications, and do not analyse any kind of ERP system. But in many companies SAP is the dominant system, and for this reason a BPM maturity model should also consider this. Maturity models, such as BPMM or CMMI, are already very complex, but companies are often interested in guidelines that are less complex and require a smaller budget. Therefore, the following principles have been developed to analyse the SAP usage within a BPM application. The goal was not to develop an own BPM maturity model which could be much more complex and comprehensive. The success of eden is due to the fact that the model has, in contrast to other models, less criteria and is easy to handle, explain E6 and E7. E6 also notes that many companies prefer a checklist instead of a complex maturity model. Furthermore, the article Vom Brocke et al. (2014) explains that it is much easier for practitioners to follow a general BPM guidance and therefore they developed in their article more general ‘Ten principles of good business process management’.

For these reasons, it is not necessary to develop a separate and totally new BPM maturity model to understand and show possible dependencies. The following ten principles could be considered for the successful use of BPM maturity models within a SAP system. These principles can be used to clarify whether the company uses an SAP system extensively in the sense of the BPM idea and gets the best output of both worlds.

Not all of the listed principles are very closely related to a used SAP system. But these principles should always be clarified and elaborated upon if an SAP system is used. For this reason, the principles are divided into two categories:

General principles

There are general principles that are not directly related to an SAP system. But these topics were extremely important to the experts even if they were not

directly influenced by an SAP system. If some of these principles are analysed in much more detail, there is a primary connection to the SAP system used. Nevertheless, these principles could even applied in a company without an SAP system.

SAP principles

With these principles, it is more obvious that these can be analysed more reasonably when an SAP system is used in a company. These principles are directly related to the SAP system.

All principles can be used as a basis for a company to think about a successful connection between the use of an SAP system and the application of BPM. These principles are not meant to be comprehensive. They are intended to make a start on thinking about the connections and to develop them later on for specific environments as appropriate. Overall, the following principles allow practitioners to rethink the usage of their SAP ERP system within a BPM environment. The corresponding background information on the individual principle is taken from the previous sections. Each individual principle is listed below, as well as an explanation as to why this principle could be important for a company, and what should be observed in particular to ensure the affinity between the two.

Ten principles *which are not investigated by many maturity models but should be analysed by a company if it wants to successfully use a BPM approach within an SAP environment:*

General principles

- *Ensure that the concept and operation of process management is understood and owned by the senior management.*

  There should be support from, and the requirement of, senior management to be directly involved in the introduction of a BPM maturity model. The motivation for increasing the degree of maturity has more influence if the top management is involved and demands a higher process maturity level. The successful implementation of a BPM maturity model is only possible if the top management demands this and a top-down approach is carried out in the company for the introduction and application of process management.

- *Establish a minimum level of maturity for each process in the company.*
  The company should decide for itself the minimum maturity level that should be attained. In practice it is not conceivable that all processes are developed up to the highest possible maturity level. Each company should determine which process level should be reached at least from all processes as a minimum requirement, and which processes should be developed to the maximum maturity level. Therefore, a company should define important processes within the company. These processes at least should be developed to a very high process maturity level. For example, quotas can be defined in the company. That means that, for example, at least 80 percent of all processes should reach a certain level of maturity or all finance processes should reach the highest maturity level.

- *Ensure that the most appropriate BPM maturity model is selected according to the specific requirements and nature of the company.*
  There are many different maturity models on the market. A company should therefore be concerned with which model should be used and why. If the strategies or a central IT component of a company change then there could be the need to also change the BPM maturity model that is used. A company should therefore regularly ask, what are the prerequisites and how often and extensively is the maturity model used? If company requirements have changed, this could be a good reason to change to another BPM maturity model. This principle can also be supported by external service providers or consultants who have experience with different maturity models.

- *Establish a BPM team within the company which consists of different specialists who know the IT as well as the business requirements.*
  BPM maturity models are not a general IT topic and other departments should be involved and also support the topic. For example, a process manager could be established for each main process, who has ERP knowledge and knows the demands of the business. These employees must speak the IT language to formulate requirements, be able to influence the ERP system and must have the expertise from the

departments. That means that the BPM team must be the link between the IT and the people and must understand the IT and the business people. Many BPM teams therefore comprise stakeholders from various disciplines. A specialist who understands the SAP system should also belong to a BPM team as well as people who know the detailed company process flows. It can also be useful to integrate the HR department because process changes affect the people involved much more than the IT systems. IT should only support the BPM process improvement and should not play the main role in a BPM project. For this purpose it is important to integrate stakeholders from different areas and IT specialists together in one BPM team.

SAP principles

- *Ensure that management fully supports the use of SAP in the enterprise to the full extent.*

  The use of a SAP ERP system within a company as the central IT software system can be a strategic decision. In this case, a company should decide how to integrate this requirement into the BPM approach of the company. What does the SAP specification mean? Does that mean that only key figures have to be generated from the SAP system, could there be other systems besides the SAP system or should a company use as many standard processes as possible? Furthermore, the company must determine who decides possible solutions or any adaptations of a SAP system. Like the principle of whether the process management is supported by the senior management, it also applies here that the successful implementation of a SAP system is only possible if the senior management demands this.

- *Establish as many SAP ERP standard processes as possible at the company in order to minimize the complexity of system upgrades or enhancements.*

  If the company desires the use of SAP and the management supports this, then companies should also decide whether and to what extent standard SAP processes should be used. The use of standard SAP processes reduce the time, cost, resources and other operational

constraints and supports the introduction of new SAP enhancement packages or release changes. Each change makes it necessary to test one's own solutions and adjust the customer-specific programming to the changed SAP system. But it is important to prioritize when the standard SAP processes should be used, and when it is better to use self-defined solutions. A BPM team should not accept processes as given and must analyse which approach is better suited. Not all standard processes are the optimal solutions for every company and a company should not submit to the IT system. But the use of standard process solutions could also be very helpful and reduce the budget required to operate an IT system. It should also be regularly examined whether IT innovations in the system could lead to process changes. Nowadays, new topics such as the digitalisation and the application of mobile devices can interact with a SAP. Until ten years ago, these subjects were not known by the SAP system, and the first process applications had to be developed themselves, whereas these applications are now integrated into a standard SAP system.

- *Ensure that all processes have been documented, analysed and understood, even if they are pre-defined by the SAP system.*

  The use of SAP standard processes does not absolve a company from the duty to document, analyse and understand that process. It can be the case that standard processes which run in a single system like SAP run with an optimised composition and are better coordinated than other processes, but nevertheless, each process should be analysed. Unfortunately, it is not always obvious which data is being stored and used within an SAP process because the SAP system is a very powerful tool. Technically, it is currently not possible to get a fast and actual process flowchart from an existing SAP system, and how customizing settings within a SAP system may change a process flow. Therefore it is very important to understand and analyse these SAP processes in detail. This is the only way to avoid incorrect or error-prone processes. A company should know exactly how its processes are running, and therefore a company should not be dictated to by an IT system or by the opinion of an ERP system provider. An analysis of the pre-defined

process must always be designed to enable a company to examine whether the standard process is usable or whether an individual process should be developed.

- *Establish a procedure that ensures that all interfaces are analysed for their BPM relevance, regardless of whether they are used between different systems or from and to the SAP system.*
  Interfaces between different systems often offer an increased optimisation potential for process improvement. Many experts recommend considering the processes from an end-to-end perspective. They have learned from their practical usage that, especially in the case of system breaks and interface connections, many data are transmitted in a different way than they are requested and needed. Interface problems often have to do with people, if they do not speak the same language. It could be helpful to agree a common language and know exactly which data is needed for the end-to-end process. It is also important to analyse the standard interfaces offered which are provided by the software provider. It is also valid here that an offered standard process must not be the best and optimal process for the organisation.

- *Ensure that all teams within a company, especially the BPM team and the SAP team, develop the same processes and process maps and that only one process map exists within the organisation.*
  SAP is a very powerful tool that communicates with many different systems. Therefore, it is not always easy to distinguish this system from other topics. Originally, the SAP system had a functional function, but through a BPM approach, this thinking changes to a process-oriented manner. A BPM team then tries to establish this process-oriented way of thinking within the company, including the use of the SAP system. Essentially, the situation should be avoided whereby different teams do not cooperate and develop two different worlds for the same requirement. For example, if a process map was already developed in a company, a BPM team should analyse, and if applicable also use, these maps. The situation of two different teams working independently on a process model for the company must be avoided for time and budget

reasons. Also for this reason, the BPM team should consist of a variety of different stakeholders in order to find out in advance what knowledge is available in the company.

- *Ensure that all necessary key figures are generated directly from the SAP system.*
  SAP provides many instruments for the generation and monitoring of KPIs and most BPM maturity models expect the analysis of KPIs. For many experts in this study, the SAP system is often the leading financial system. This may have grown historically, but it still offers many advantages for the analysis of KPIs. Many figures are already included in the SAP system or can be determined before the BPM approach was introduced because the SAP system has already stored many figures in the financial component. This offers the advantage that data can already be analysed before the BPM approach was introduced.

  Many companies are trying to implement quick solutions and find it much easier to create an excel list for their analysis than to generate the numbers within a SAP transaction. But SAP provides many predefined reports or could create measurements directly from the SAP database which are then more recent than an older Excel spreadsheet. Therefore it could be much more effective to generate this data directly from the SAP system even if the creation of the data needs more time for the first initial analysis. It may take longer to determine the required fields for an analysis within the SAP system, but for frequent use it is much faster to retrieve the numbers directly from the SAP system.

This list of principles makes no claim to be exhaustive and does not represent a ranking. On the basis of the analysed interviews and the documentation, these principles are developed directly from the analysis of the research interviews and documents, and are considered to be important by the researcher. Therefore, the following section presents a short critical assessment of this research.

5.3 Critical assessment of this research

For this research, the BPM approach was viewed very strongly from the IT point of view, even if it is recommended at different sections that the IT should only support a BPM approach. The documentation of the examined maturity models demonstrates that many of the evaluated BPM maturity models do not address directly the IT systems of a company. But even if the theory states that the IT should play only a subordinate role, the interviews with the experts convey a contradictory opinion. The experts confirmed that they did not recognize a possible connection between an SAP system, a BPM approach and the use of a BPM maturity model at first. But during the interviews, they recognize that there are possible connections and that the use of a SAP ERP system influences the BPM approach and could also influence the BPM maturity model used. This is especially true if an SAP system has been established within a company for a long time, and is, for the employees, a very important system for executing their daily work.

Only a few maturity models were analysed in more detail for this work, and maybe there could be BPM maturity models found where this behaviour is different. An analysis to even more BPM maturity models would not be possible with the available time and budget if it had the same extent and qualitative analysis as presented in this research. The small number of investigated maturity models can therefore limit the outcome of this research. It cannot be excluded that the investigation of other maturity models would lead to other results.

The investigated BPMM and CMMI models are very similar. Perhaps an investigation on a BPM maturity model which is not based on CMMI would have shown different results, but the SAP maturity model is also based on CMMI and has demonstrated many differences to the BPMM. It was very difficult for this research to find experts who were willing to participate and who were already using SAP, BPM as well as BPM maturity models. The exclusion of a certain maturity model would have reduced the number considerably, and therefore neither the CMMI nor the BPMM model was excluded.

On the basis of the interviews, it was not possible to make a distinction between the SAP components and the BPM models which are used within an

organisation. Such a connection between a used SAP component and a BPM degree model was disputed by all experts. There are SAP modules such as ‘SAP Finance’ which are better suited to support BPM maturity models, but this does not mean that there are still SAP components that are not at all suitable for the use of a BPM maturity model.

Some of the developed principles could be more differentiated and subprinciples can be further derived from these. One pertinent question is whether some subprinciples could not have been considered independently. For example, it is conceivable that the investigation about the digitisation and the use of mobile devices could be a separate principle, and should not be examined in the context of the SAP standard processes used. But if this topic is more important to a company, it is up to this company to analyse and expand this principle more specifically.

So far, no default KPIs have been defined or recommended for the individual principles. Which key figures can be determined for the measurements and lead to a good result should be analysed individually, because each company should think about its own behaviour and requirements. This independence of the measurement is similar to the analysis process in the eden maturity model. As in the case of the eden model, the principles are supposed to stimulate thinking about the company’s own processes and to analyse them.

Overall, these developed principles provide only a basis on which companies can make some kind of classification about the use of their SAP system within a BPM approach. Every company is free to further develop these issues. This research cannot ensure absolute completeness because each company is different in its needs and requirements. Furthermore, there are dozens of different BPM maturity models on the market. As already presented by a paper of Van Looy (2014) which listed 69 different BPM maturity models and without the eden model which was not included in that research paper and this paper analysed only some of these models.

Furthermore, the principles have not yet been tested in practice, and it has not yet been determined whether they result in a continuous process improvement for a company.

‘A thesis is never finished’ (Cryer, 2006) and the developed principles may not be applicable to every company, or may need to be varied for different organisations. Therefore, the developed principles should serve as a basis which can be applied independently of the BPM maturity model that is used.

6 Validation of Principles

Collecting data from multiple sources strengthens the validity of the data and is described in the literature as triangulation (Light et al., 2001). The final step of the data triangulation of this study examines, through a web survey, the principles that were previously developed. This chapter contains the findings and analysis of this web survey, and explains how far the participants in the survey agreed with the principles developed.

6.1 Background to the questions asked

Sub-section 3.5.4 has already described the basics of the search process for the participants of the web survey. In November and December 2017, a total of 495 people were directly contacted and asked to participate in the survey. The number of participants was therefore limited by the possible time period for the survey and its analysis. A total of 152 people followed the request from mid-November 2017 to mid-January 2018. The web survey that was offered is listed in appendix 9.3. It was available to anyone with the URL.

In general, the web survey was created in a way that allowed each participant to answer the questions themselves in the form of a self-completion survey. Overall, the survey questions are split into three sections. The first section contains general questions about the participant, the second considers the questions about the general developed principles, and the third considers the more SAP-specific principles. The distinction between general and SAP principles has already been made in section 5.2 and was adopted for the questionnaire. Each section is presented on a separate page in the form.

For a general classification of the participants, the first questions in the web survey ask about the personal background of the participant. It begins with three questions regarding their years of experience with the examined areas of ‘SAP’, ‘BPM’ and 'BPM maturity models'. As described in sub-section 3.5.4 any respondent should have practical experience in at least two of the three areas. For this reason, one completed survey was not used for further analysis because the participant reported zero years of experience in two of the surveyed areas. As a final result, 151 of the 152 completed questionnaires were used for this research.

Potential participants for this web survey were those such as users, process managers, researchers and consultants with a business background. To establish which profession the survey participants had pursued, one question was asked about the currently practiced professional position and another about the industry sector in which the participant worked.

As Höhne et al. (2015) have mentioned, many organisations use no BPM maturity model or use a self-developed maturity model. For this reason, one question was also asked regarding which BPM maturity models the participant used or knew best. This made it possible to determine whether the maturity models considered so far were also known to the participants in this survey.

The main purpose of the web survey was the clarification of the principles developed in the section 5.2 and to determine if these principles find support within the business practice. For this purpose, open and closed questions were mixed. First, all principles were assessed using a Likert Scale approach (Bryman & Bell, 2007), establishing whether the participant agreed to the principle or not by the four points:

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly

Due to the even number of answers and with no mid-point, a participant is forced in one direction to agree or disagree (Armstrong, 1987). All questions in the survey included the possibility of not answering them. The questions regarding the evaluations of the principle also offered the answer ‘don’t know’ to show that an answer did not have to be given. The absence of a requirement to answer the questions is derived from the ethical principles in section 3.10.

Bryman and Bell (2007) report that closed questions exhibit certain disadvantages if, for example, the question irritates the respondent or they want to explain their answer. For this reason, every question about the evaluation of the principle is followed by an open question in which the participant has the opportunity to make a comment about the established principle or to list possible improvements about the principle.

6.2 Questions within the section 'General introduction'

This section evaluates the answers given in the 'General introduction' section of the web survey.

6.2.1 Question 1-3: How many years of experience do you have?

Table 6.1 lists all answers given regarding the professional experience of the participants. As shown, the greatest experience is found in the field of SAP. One participant even had 33 years of experience, but nine participants did not have any SAP experience. On average, the SAP experience amounts to 12.41 years.

The BPM experience is less pronounced among the participants, who declared an average experience time of only 9.37 years. The least developed is the experience with BPM maturity models; the average experience for this is approximately 4.35 years and 57 participants did not have any experience with them. It is known from the previously conducted interviews that it is not uncommon to use a self-developed maturity model but to not call it a BPM maturity model. The proportion of people who actually use a BPM model but do not recognise it cannot be determined without being able to ask the participant individual questions.

No. of Years of Experience	*No. of respondents with SAP experience*	*No. of respondents with BPM experience*	*No. of respondents with BPM maturity models experience*
0	9	2	57
1	7	4	13
2	9	8	4
3	4	14	5
4	3	4	7
5	7	20	14
6	3	13	7
7	2	4	3
8	5	7	8
9	2	3	2
10	19	24	15
11	2	2	2
12	7	5	2
13	2	4	0
14	4	1	0
15	11	17	4

No. of Years of Experience	*No. of respondents with SAP experience*	*No. of respondents with BPM experience*	*No. of respondents with BPM maturity models experience*
16	7	2	0
17	4	1	0
18	3	1	0
19	3	1	0
20	18	6	4
21	3	2	0
22	4	0	0
23	1	0	0
24	0	0	0
25	6	4	1
26	0	0	0
27	2	1	0
28	0	0	0
29	1	0	0
30	2	1	0
31	0	0	0
32	0	0	0
33	1	0	0
Total respondents	**151**	**151**	**148**
Average number of years of experience	**12.41**	**9.37**	**4.35**

Table 6.1: Years of experience in SAP, BPM ans BPM Maturity Models

6.2.2 Question 4: Which BPM maturity model do you use or do you know best?

The following pie chart presents the answers given for this open question. Fourteen participants did not answer the question and 46 people did not use a BPM maturity model. Four people indicated using or knowing best two models. Each model, which was named only once in the survey, was summarised in the category 'other'.

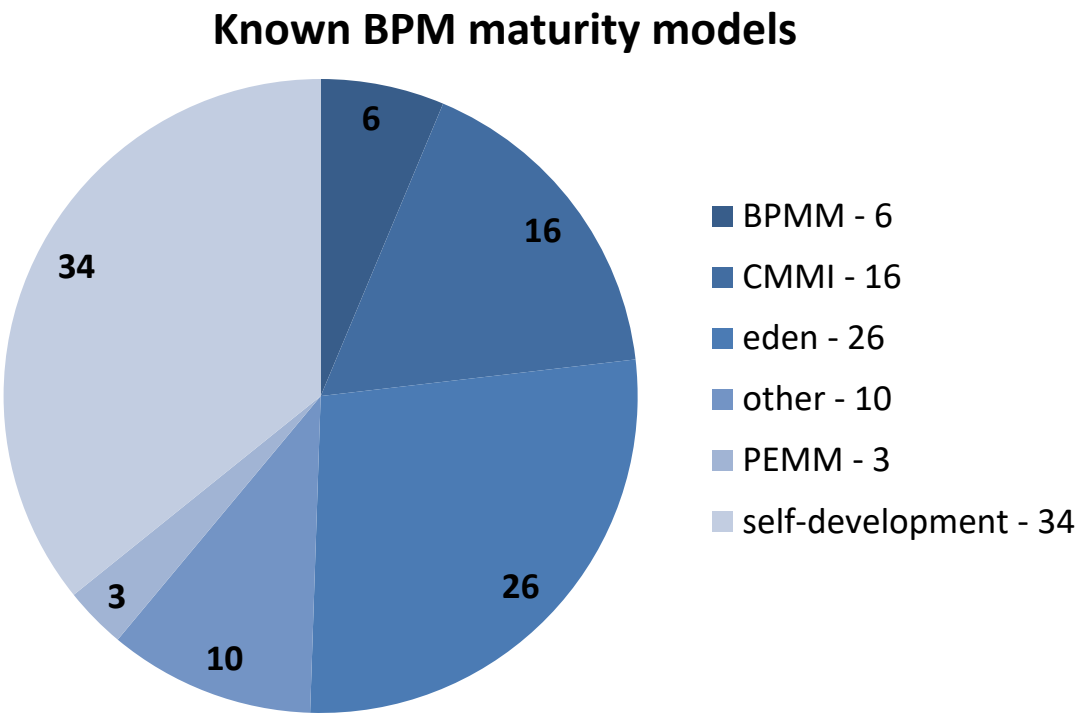

Figure 6.1: Known BPM maturity models

The three most well-known BPM maturity models are the eden, CMMI and BPMM models which are also reviewed in this research. In addition, many companies use their own in-house developed BPM maturity model.

This result confirms the assumption that the selection process for expert interviews led to the maturity models that are currently predominantly used in the German speaking market.

6.2.3 Question 5: What is the best description of your current position?

For this question, each participant was asked to assign themselves to a given position. This and the following question were asked to show in which areas the participants of this survey work.

Sub-section 3.5.4 described which kind of participants should participate in this survey. This question determines whether this circle of participants has actually been reached.

Over 83 percent of all respondents claimed that they work as users, (process) managers, researchers or consultants within an organisation.

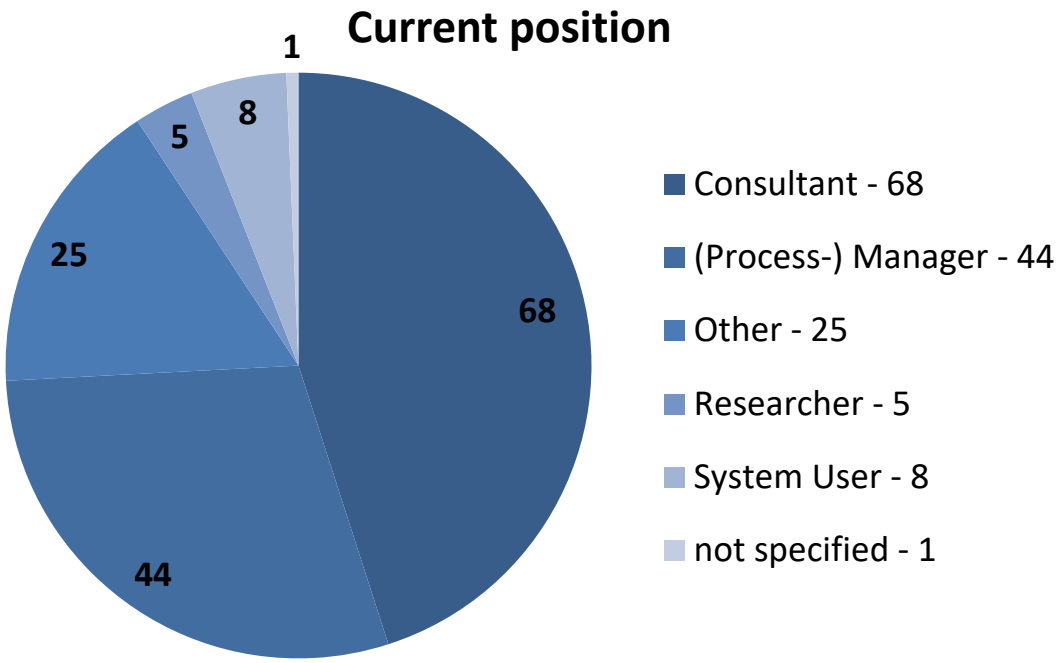

Figure 6.2: Current position

6.2.4 Question 6: What industry sector do you work in?

Finally, there is the question of which industry the participant worked in. The purpose of this question was to establish if the participants reflect the opinion of one particular industry or represent different areas. The previous chapters and the expert interviews have already suggested that the IT is very closely related to the introduction and the application of BPM.

This survey also reveals that the IT sector, with 42 indications, is one of the largest areas dealing with the examined topics. The sector of management consulting scored an equally high number. These two areas together received approximately 50% of the responses.

Due to the fact that this question was an open one, the answers of the participants were summarised by the researcher into appropriate industry sectors.

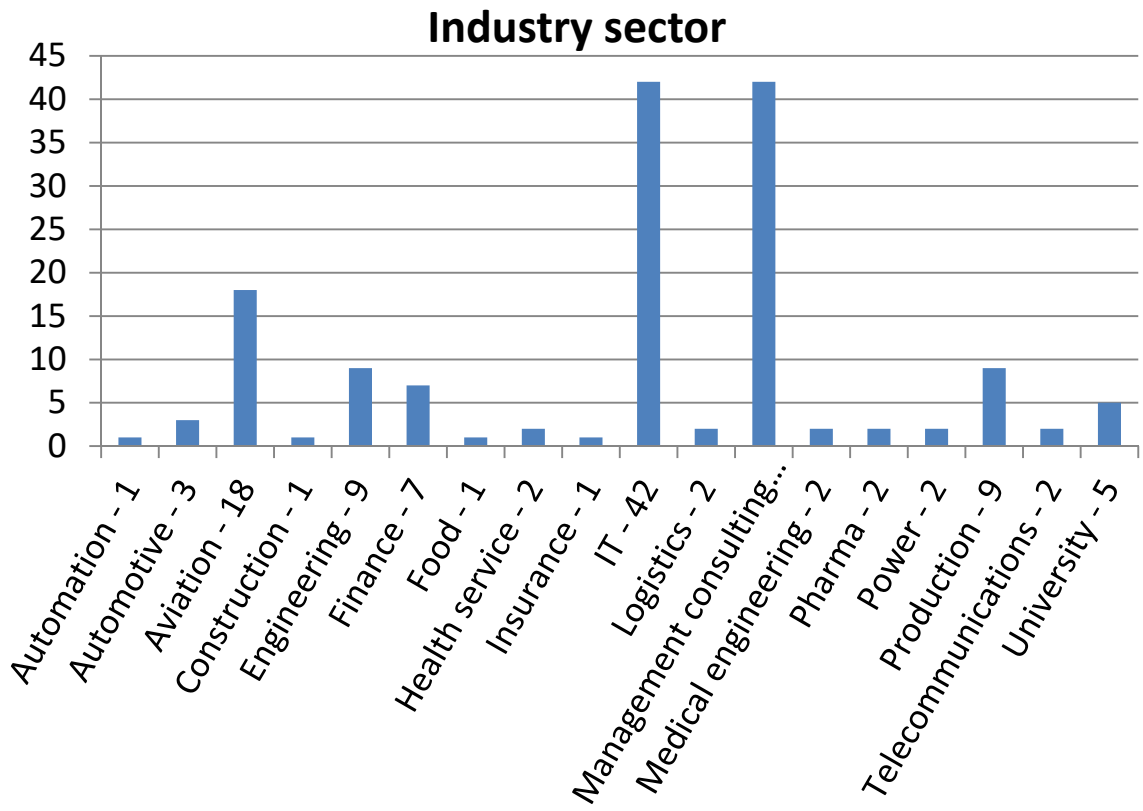

Figure 6.3: Industry sector

6.3 Questions within the section 'General principles'

This section evaluates the answers given in the 'General principles' section of the web survey. For each of the questions asked, one or two participants did not answer them and therefore the total number of answers is always less than 151. Each participant had the opportunity to comment on the individual principles. A summary of the most important comments (in the opinion of the researcher) is also presented in each sub-section.

6.3.1 Principle 1

The first considered principle is: 'Ensure that the concept and operation of process management is understood and owned by the senior management'.

A total of 88% of participants rated this principle with 'Agree Strongly' or 'Agree'. This means that the vast majority support the use and consideration of this principle.

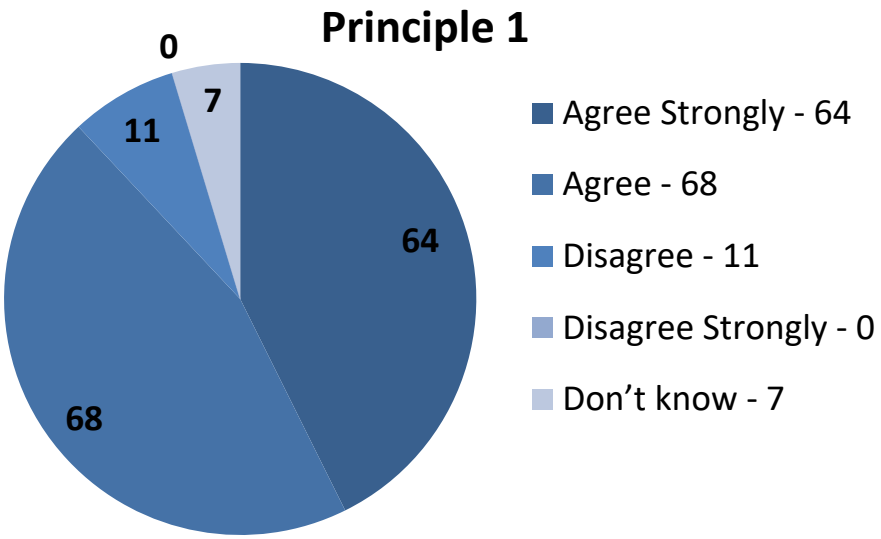

Figure 6.4: Survey respondents assessment of Principle 1

Overall, there were 60 participant comments for this principle.

One very important aspect is that in each case the top management should be convinced of the value and relevance of the introduction of process management, and should focus on the topic clearly. The way in which the introduction takes place should depend on the company. For a general and company-wide implementation of the topic, all levels of the company must be involved. It would be desirable for the top management to be the trigger or promote the topic. If only individual areas introduce process management, then an introduction of the topic may also be possible without the top management.

In addition to the top management, the operational sector is also important for a successful launch and a close link between the operational area and the management is important. For example, someone from top management may have the global implementation responsibility, even if he has only a basic experience of the subject, while someone in the operational sector is familiar with the day-to-day business.

Another important theme is the communication within the organisation. If the communication is adapted to the target group, the implementation can be much faster and more efficient and the acceptance of the employees will be increased. All employees need to understand the topic, and they need to understand why the topic is being implemented.

However, there is also the critical voice of a CEO who thinks it can be enough if the head of IT is pushing this issue forward. It is beneficial if the top management supports the topic, but it can be useful to use a bottom-up approach to ensure the broader acceptance within the company. At the beginning, it can also help to develop pilot processes that demonstrate how BPM works, and convince employees and management of the value of the initiative.

Summary
With the above-mentioned 88% approval, the principle has been very well received. The participants' survey did not provide new insights, and the existing knowledge was confirmed. The interviews also show that it is quite possible to introduce the topics of process management and maturity models through a bottom-up approach, but for a certain company size, a BPM team needs the support of senior management.

6.3.2 Principle 2

The second principle is: 'Establish a minimum level of maturity for each process in the company.' There was broad agreement with this principle, with over 89%.

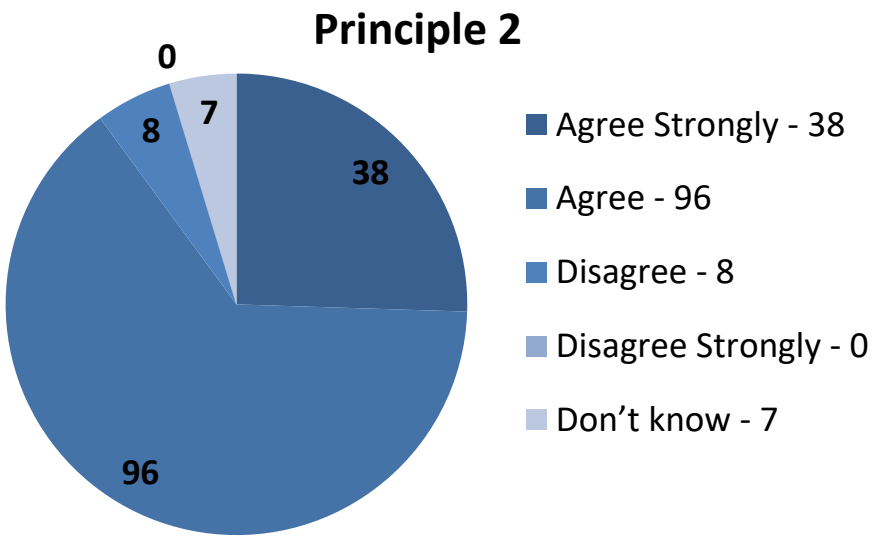

Figure 6.5: Survey respondents assessment of Principle 2

With 45 comments, the number of comments is lower than for the first principle.

It is critically noted that a company should focus primarily on mission-critical processes. The aim with a maturity model is always to reach the highest possible maturity level for all processes, but this is not always necessary. In

principle, every process can attain the highest possible maturity level, but it should certainly be discussed whether this is necessary, because it is very time-consuming in practice.

Developing all processes to the highest possible maturity level could be an unnecessary effort and will limit the resources of the company. For this reason, a cost-benefit analysis should be carried out during the process improvement. Core processes should get a high maturity level while secondary processes can have a lower maturity level.

For many respondents, the optimisation of operational processes according to the highest possible maturity level is not necessary. It is important to set ambitious but achievable goals with process optimisation and implement these objectives.

Many companies do not know how to shape their processes for the future, and only respond to the experiences they have already made. It would be much more desirable to optimise the processes to pursue new innovative methods rather than only reacting to past experience.

Summary
Overall, the comments are consistent with the findings gained during the interviews. It is also important for the participants in the online survey to distinguish between main and secondary processes. Main processes need to be given greater attention and a higher process maturity than secondary processes. One new observation is that innovations need in general more attention, but that has nothing directly to do with this principle.

6.3.3 Principle 3

As a third principle, the following statement is checked: ‘Ensure that the most appropriate BPM maturity model is selected according to the specific requirements and nature of the company’.

This principle also had an acceptance of over 78%, but 15 participants did not know how to answer. According to the comments, the participants chose the statement 'Don’t know' because these participants only know one BPM maturity model so far.

In addition to the broad agreement on this principle, a total of 36 participants commented on this principle individually.

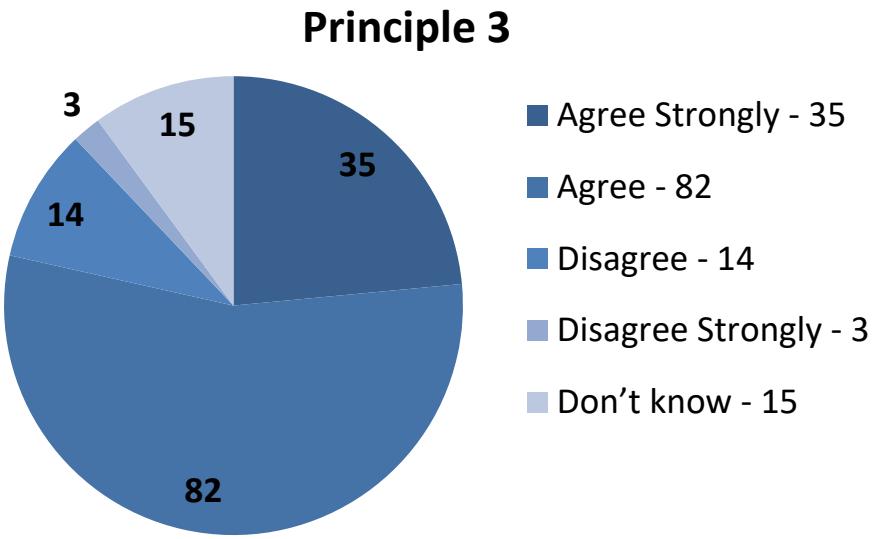

Figure 6.6: Survey respondents assessment of Principle 3

Some participants did not agree with the principle because, in their opinion, a BPM maturity model should provide such independence that it can handle a variety of business needs. If necessary, a model must be better adapted to the requirements of the company. It is more important to use a model seriously, because then any model can contribute to process improvements. It is recommended to change the maturity model as rarely as possible, because such a change has the disadvantage that it is no longer possible to make a rating over a longer period of time.

Some participants fear that in practice it is not always the most suitable but the best known model that is used, so it may depend on what knowledge the consultant has who recommends a solution. For example, it may be true that an adapted BPM maturity model is the best solution for a company, but this implies that the management must be prepared to pay for this individual solution.

Sometimes a maturity model is only used to meet the requirements of top management, and it is not used to support the business processes. In this case, many users do not care which model they use. Their goal is only to fulfil the management requirements. In this case, the management needs to know if company changes lead to further consequences. If, for example, a company

has a system change, then it is quite justified to question whether the right tools are still being used and the existing tools are compatible with the new system.

Summary
It is also pointed out in the comments of the survey that the user may only satisfy the requirements of a model and not question it. In contrast to the interviews, the online survey points out that BPM maturity models should be as independent as possible in order to support a variety of business requirements. This indication does not limit the value and relevance of the principle. Overall, there is a high level of approval, but this comes alongside the comment that a BPM maturity model change should be well considered and not commonplace.

6.3.4 Principle 4

The fourth principle is as follows: 'Establish a BPM team within the company which consists of different specialists who know the IT as well as the business requirements'.

This principle was one of two which received the highest approval, with 96 percent. In addition to the broad agreement, 36 individual comments were provided.

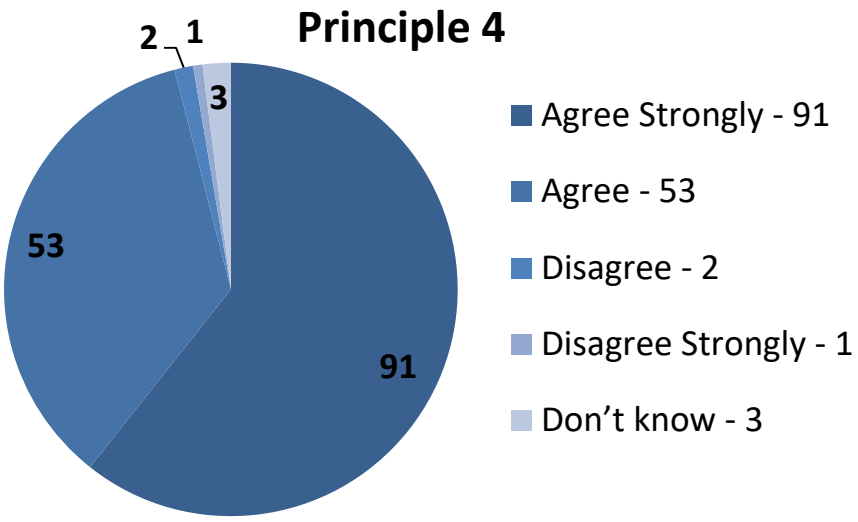

Figure 6.7: Survey respondents assessment of Principle 4

BPM affects all areas, therefore no areas can be excluded from the topic. The difficulty lies in bringing together people with a different level of education and expertise. This makes it necessary to invest in the training of participants. People from different areas can often provide ideas that others would not

normally notice. However, there can be difficulties in the interpersonal relationships when people from different social strata and with different ways of thinking come together. For this reason, it is necessary to properly manage such a team and to establish team building. For example, it can help to establish a separation of roles and responsibilities.

Overall, employees should be involved at an early stage to promote acceptance and provide each other with knowledge. It may be useful to include customers and suppliers in a BPM team, as processes are often adapted to customer requirements.

The IT department should support process implementation in BPM teams, but not play the central role. Systems, processes and organisations are inextricably linked. For that reason, it makes sense that IT understands the business point of view and vice versa. But if an IT department focuses on just one tool, the optimal process maturity can often fail to be reached.

One problem is that companies are often unwilling to spend money on such a team and therefore there is no BPM team. In this case, the management must be convinced of the added value of such a team.

Summary
This principle achieved one of the highest approval rates in the survey. The successful implementation can only succeed if the BPM approach is supported by many employees and these employees know exactly what is happening in the company, and can describe this. As with the interviews, it is pointed out that, for various reasons, it can be very difficult to lead such teams and to get the best out of them. The implementation of this principle in practice can therefore be quite difficult.

6.4 Questions within the section 'SAP principles'

This section evaluates the answers given in the 'SAP principles' section of the web survey. For each of the questions asked, between one to three participants did not answer them and therefore the total number of answers is always less than 151. Each participant also had the opportunity to give some comments on the individual principles. A summary of the most important comments (in the opinion of the researcher) is also presented after each sub-section.

6.4.1 Principle 5

The fifth principle states: ‘Ensure that management fully supports the use of SAP in the enterprise to the full extent.’ In total, more than 81 percent agreed with the principle by selecting 'Agree Strongly' or 'Agree'.

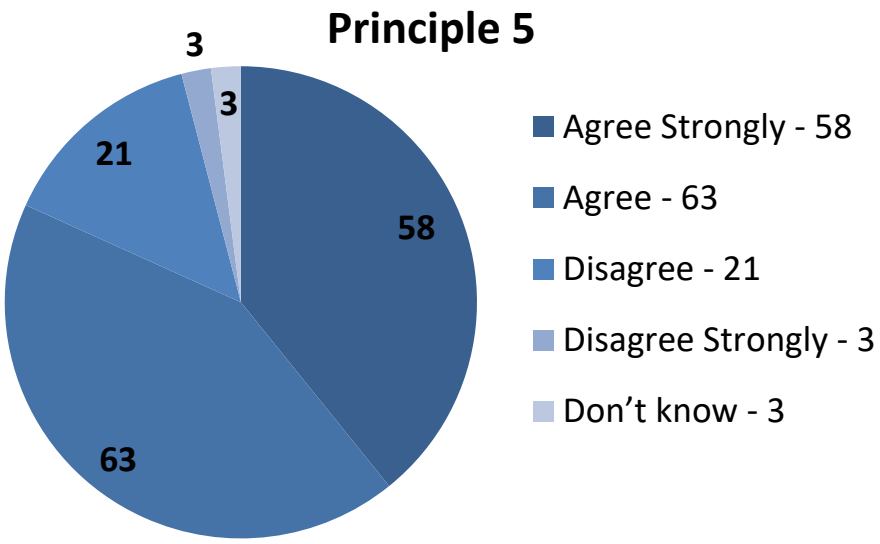

Figure 6.8: Survey respondents assessment of Principle 5

A total of 54 additional comments were made on this principle. Among other things, it was critically noted that the management should only specify the framework conditions but not any special IT requirements. Basic conditions may be that a standard IT program is used in the company, or that as little in-house development as possible is used. In-house development is still inquired into in the next principle; it is already mentioned in the comments on this principle, but the next principle then discusses the area more closely.

The decision of which ERP system is used must be made by the professional judgement of IT experts together with the financial decision of the top management. It is therefore important to involve the whole company in the process, in that they are fully briefed on the options and the rationale for key decisions. The IT must support the management and inform which software products can be used. The final decision is then taken by the management. When a decision is made, many comments mention that positive support from the management is at the very least helpful and desirable. As in the interviews, the commentators state that a project cannot be successful if the management does not act as a sponsor and proponent of the project. It is also critical if the

management itself does not use standard processes and applies a workaround with in-house development for their requirements.

If the decision was made in favour of a system like SAP, then the IT and management should determine when other systems may be used. The most successful outcome is when a company clearly positions itself to one system and only allows a few deviations. The consistent and systematic utilisation of a system is only successful if there are no additional systems available and the main focus is on one system.

In general, the opinion is that a system can only be operated optimally if it is supported and promoted by the management. In addition to the management, all relevant stake holders must support the use of the system. The support of the management is a fundamental factor for the successful introduction of a system. However, other factors such as employee acceptance or a good support team, contribute to the successful implementation.

Care must also be taken to ensure that adequate capacity, in terms of funding, time and staff for the technical operation and further development is provided after the introduction of a system.

Essentially, a company cannot rely on the processes implemented in SAP and must critically scrutinise them. The situation must be avoided whereby the employees believe that SAP always does everything automatically and correctly!

Summary
Overall, it was critically noted that management should agree framework conditions i.e. a basic specification, rather than any specific software. However, when it comes to the financial scope of a system implementation, the management must determine this scope. The participants support this principle when it is decided within the company that SAP is used as the main software of the organisation. This software decision is the basic requirement for this principle. For a better understanding, the principle can be extended to be: ‘Ensure that management fully supports the use of SAP in the enterprise to the full extent, *if SAP is used as the main software of the organisation*’.

6.4.2 Principle 6

Over 85 percent agreed with the following principle: 'Establish as many SAP ERP standard processes as possible at the company in order to minimise the complexity of system upgrades or enhancements'.

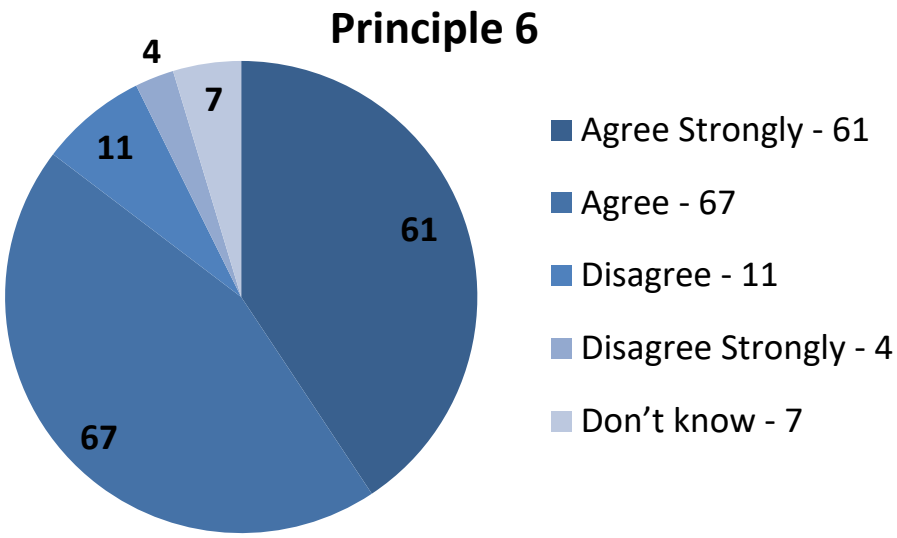

Figure 6.9: Survey respondents assessment of Principle 6

A total of 51 individual comments were made on this principle. It is critically noted that processes must be adapted to the business model rather than the processes being adapted according to the software used

Several comments illustrate that there are better solutions for many companies than the standard SAP system offered, but it is extremely difficult to decide whether a standard process should be adapted to the customer's requirements or not. The process must consider and integrate the established corporate structure. Some commentators recommend a mix of standard and customised processes that are continuously and accurately analysed and optimised. Long-time users of an SAP system especially are of the opinion that an SAP standard can never completely fulfil all customer requirements and therefore customer-specific changes are often necessary. It may not make sense to enforce the standard, but a simple statement could be: 'as much standard as possible but only as much as necessary'. If it is technically feasible, the SAP standard processes should be used, but not at any price.

For individual developments within the system, the future should always be considered, because an ERP system is not rigid and is changed regularly due to new requirements. Special processes make a company more resistant, but

these customised processes will cost extra money for any SAP customisation in the future. One comment noted that this principle is not desirable at the first introduction of a SAP system. The more SAP experience is collected, the more important it becomes to realise that the cost of system upgrades and enhancements will increase significantly if deviations from the standard exist.

‘Special requests’ of the requestor should always be questioned critically. In many cases it helps the user to show the standard process of the ERP system in order to clarify whether a special solution is really needed. The possible follow-up costs of such special requests are often not transparent and often not part of a budget. Often, customising changes are sufficient to map special solutions. It is therefore very valuable to know the standard processes and their setting options exactly. The level of knowledge of a co-worker can be decisive, whether or not a SAP standard process is used. In SAP, customising and user exits offer a variety of options for setting processes very individually. These possibilities should be very carefully analysed and used.

It was pointed out that, when using standard processes, an indispensable process goal must be achieved without fail. However, any adjustments that prevent additional complexity help to reduce errors. Reference is made in this connection to a LEAN principle which explains that a non-standard is always more susceptible to errors than a standard.

It is always necessary to take individual case considerations and decisions to determine what brings the best results for the customer. The business-differentiating processes must be implemented, regardless of whether they align with the SAP standard or not.

If a standard does not meet the company's requirements, the application will never find acceptance within the enterprise. Using the standard can reduce costs, but not necessarily bring the benefits that are needed.

Summary
The participants note that it is very difficult to decide whether a standard process or a better individualised process should be used. The principle does not say that the standard process must be used, but that as much as necessary should be used. The decision on what to use must still be made by the user.

However, attendees note that experience and knowledge play an important role in the implementation of processes.

This principle could also point to the special importance of SAP, as it has done in the previous principle. Starting with Principle 5, all of the following principles assume that SAP is the main software of the organisation. For this reason, this statement is omitted in both this and the following principles.

6.4.3 Principle 7

The seventh principle has one of the highest approval ratings in the whole survey and states: 'Ensure that all processes have been documented, analysed and understood, even if they are pre-defined by the SAP system'.

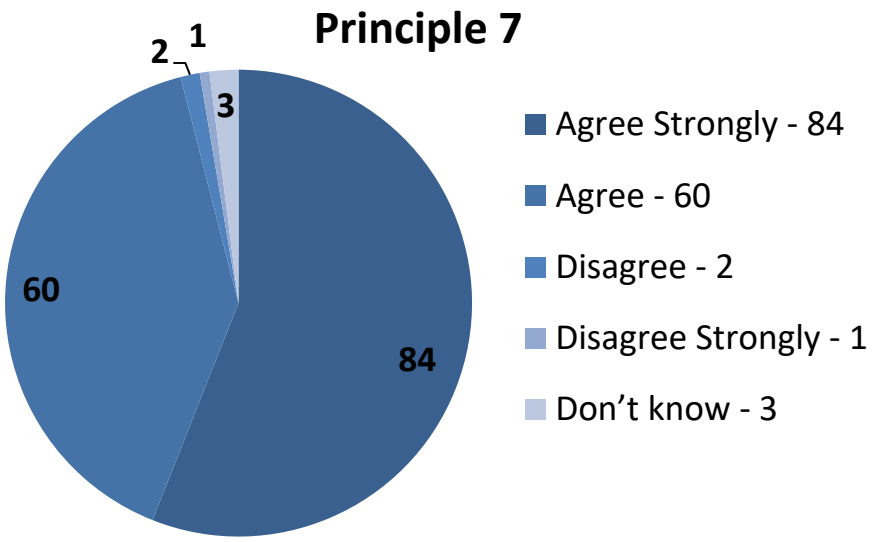

Figure 6.10: Survey respondents assessment of Principle 7

With an approval rate of 96%, a total of 38 people gave an additional comment on this principle.

Only one participant explicitly rejected the principle. He believed that the level of detail of the documentation should not depend on the IT system and that the competence of the people is much more important. It is also mentioned several times that not all existing processes must be 100% documented if this documentation is never used. Existing documentation and processes must be regularly analysed and compared in practice because processes often deviate from their documented status.

In order to understand processes and their sequences, it is important that employees receive training to understand the details of the processes and their

relationships. In addition to the SAP experts, at least the process owners should fully understand the complete process. Only through this understanding is it possible to critically scrutinise processes and make improvements.

For a better understanding and an efficient analysis, the visual documentation often helps to show the process flow. A standard process can be configured in many different ways by the system customisation. Therefore it is important to show how the specific usage in the company works. Just as the experts emphasised in the interview, the participants in this survey also state that it is very difficult to document the SAP standard processes without a very precise and time-consuming analysis.

In general, it is very difficult to find the right level of detail. Process documentation down to the last detail is not widely read by any employee because it is too large, but a rough analysis can overlook important details of a process. Without an analysis of the processes and their documentation, it is not possible to understand processes and to define and describe an existing delta. An assumption of errors or weaknesses is not enough to obtain an optimal process. The effort and usefulness of an analysis and its documentation must be proportionate to the application of this principle. Processes that support the value creation of the company or that are particularly mission-critical deserve a closer examination than other processes.

Processes must be checked regularly. This requires an understanding of the logic and relationships, and therefore the process documentation can be very helpful. The fact that a process is only used because the SAP system specifies it in this way should never be an explanation of why documentation does not exist or the process has never been reviewed.

Summary
The participants agreed with the principle. They considered that it is important to analyse processes and that there exist different methods to support process descriptions or process depictions. It is very difficult to find the right level of detail for the process documentation and every company has to find its own way. It was very important for the respondents that the processes were regularly analysed. For this purpose, the principle is extended with the word 'regularly' and is then defined as: ‘Ensure that all processes have been *regularly*

documented, analysed and understood, even if they are pre-defined by the SAP system'.

6.4.4 Principle 8

The eighth principle is: 'Establish a procedure that ensures that all interfaces are analysed for their BPM relevance, regardless of whether they are used between different systems or from and to the SAP system'.

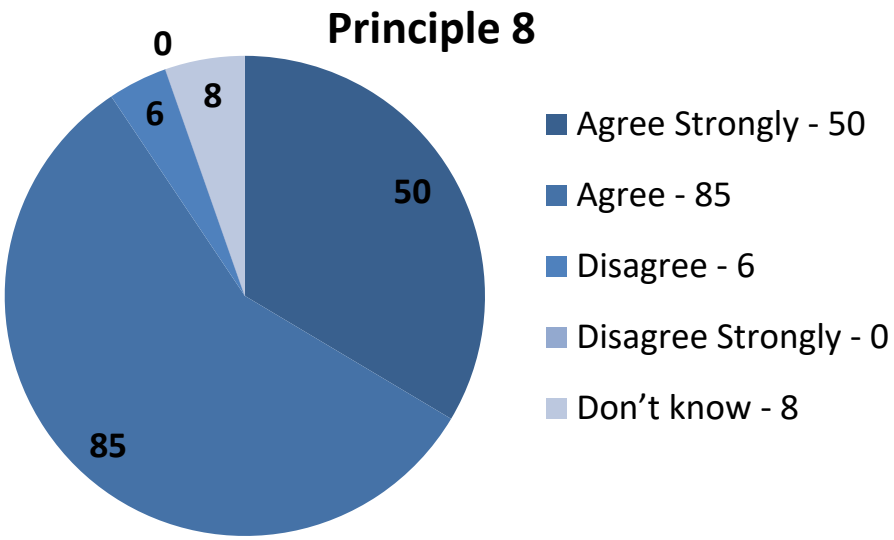

Figure 6.11: Survey respondents assessment of Principle 8

This principle received only 28 comments from the participants and has a high level of support with over 90%.

It is critically noted that each interface is very maintenance intensive and carries the risk that incorrect or no data is transmitted. The more different systems are used, the more precise analysis of the interface should be done. Not only data transfers between an SAP and a non-SAP system need to be considered, but also how and what data is contained within a single or different systems.

It would be desirable to minimise interfaces in order to exclude errors. In this context, reference is made to the LEAN principle, which states that data conversions should be avoided, and this applies especially to interfaces. In practice, SAP is not the best system in all areas, which is why other systems are always used and therefore interfaces are required. The transfer of data to customers and suppliers is inevitable. However, it is not only interfaces that should be considered in order to determine the optimal process flow and it is better to examine the overall end-to-end process.

If an interface is running stably, then a company does not want to change that interface again. A change always carries the danger of introducing an error. Therefore it may be that old interfaces use different and older techniques than new ones. But not changing interfaces carries the risk that necessary changes will not be regularly analysed. The participants therefore indicate that the principle should be extended to include the word 'regular', as the interfaces should be regularly reviewed for their BPM relevance.

For a regular check, test scenarios should be developed which regularly check the interfaces for possible errors, at least if the interface is not monitored and errors are not reported automatically. In addition, test scenarios can also be used to detect content errors that are not determined by automation and monitoring. For example, it can have far-reaching consequences if invoices are automatically sent to the customer, but content errors are not detected.

Usually, the interface request must be initiated by the BPM approach because the interface exists to serve a process and not to provide the technique. In this context, it should be noted that non-standardised interfaces in the experience of the participants are more maintenance intensive than standard interfaces. It should also be noted that an interface should be transparent and easy to use in order to minimise possible complexity and avoid errors. It always has to be evaluated whether there are any knock-out criteria that argue against the use of a standard interface, or whether the use of a standard solution is the better solution to improve the business process.

Summary
In addition to an SAP system, additional systems and interfaces are always necessary. An interface can be very maintenance intensive and should therefore be regularly analysed and tested. The participants referred to the use of standard processes in connection with this principle, but this type of analysis is already pointed out in principle 7. As in the previous principle, a regular interface analysis is important, and therefore this principle is also expanded by the word ‘regularly’ and is now: ‘Establish a procedure that ensures that all interfaces are *regularly* analysed for their BPM relevance, regardless of whether they are used between different systems or from and to the SAP system’.

6.4.5 Principle 9

The ninth principle also received a very high approval of over 95% and only 27 comments. The principle is as follows: 'Ensure that all teams within a company, especially the BPM team and the SAP team, develop the same processes and process maps and that only one process map exists within the organisation'.

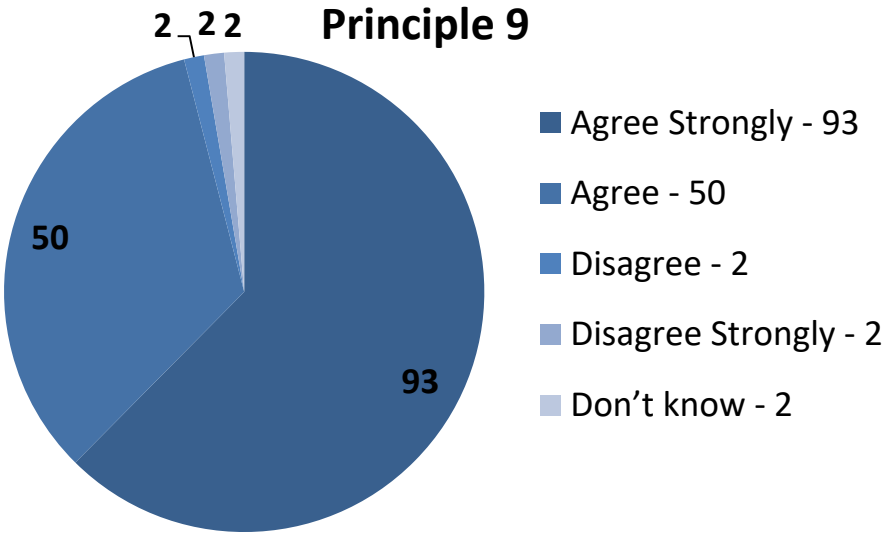

Figure 6.12: Survey respondents assessment of Principle 9

This principle is supported by many commentators, but in practice it may be the case that it is unattainable. One participant critically stated that the principle is unenforceable when processes involve different organisational responsibilities. Therefore, in business practice, it may be necessary to develop different process maps in different areas of responsibility to achieve process improvements. Or it may be necessary in an international company to consider country-specific process requirements and therefore develop the same process differently at several international locations.

It may be more realistic in some organisations to have individual BPM teams which adapt to individual end-to-end processes, otherwise a single BPM team which is responsible for a whole company becomes too big. In this case, a central BPM team for cross-process project management is essential. This team has to ensure that the company agrees on exactly one solution for overlapping topics. The special reference to the SAP team within this principle is supported by the participants. Many SAP teams want to create their own BPM world with SAP standardisation or upgrades, and that should be avoided.

Communication and interaction are key factors in implementing this principle and working with a wide range of specialist teams. Therefore, this principle can also have corporate political significance. It may happen that areas delineate themselves and therefore develop their own process maps and are not willing to cooperate. It is therefore helpful to establish links with persons and teams of the central authorities in the company in order to involve the process coordination and development. At the beginning of a project, a master list must be created for all processes in a company, and this can only happen if as many employees or teams as possible contribute to the overall picture of all processes in the company.

If different process maps are developed in a company, a consolidation is required and interfaces are needed. These interfaces can then again lead to possible errors. The development of two different process maps can only be advantageous if clues or inspirations for further process design are to be gained. For example, because of the diversity and complexity within a company, experts in different subject matter could develop a parallel process modelling for one single process. As a result, two different process models are developed because the experts have different perspectives. The results can then be further analysed and summarised into one single process and one single process map.

A prerequisite for this principle is the training of the employees. For the modelling of the processes, the users have to speak the same language, only in this way are the developed processes are read and understood uniformly.

Summary

The participants agree that an attempt should be made to adhere to this principle, although this is not always possible in practice. For example, there may be more than one BPM team in a company. Communication and interaction are therefore the main key factors for this principle to apply. The difficult implementation is also due to the political importance that this principle can have in the company. Contrary to the interviews, the survey demonstrates that it can make sense to have more than one process map for a short time. But in the end, these process maps must be combined into one and the principle is correct again.

6.4.6 Principle 10

With almost 75%, this principle had the weakest approval rating. The principle is: ‘Ensure that all necessary key figures are generated directly from the SAP system’.

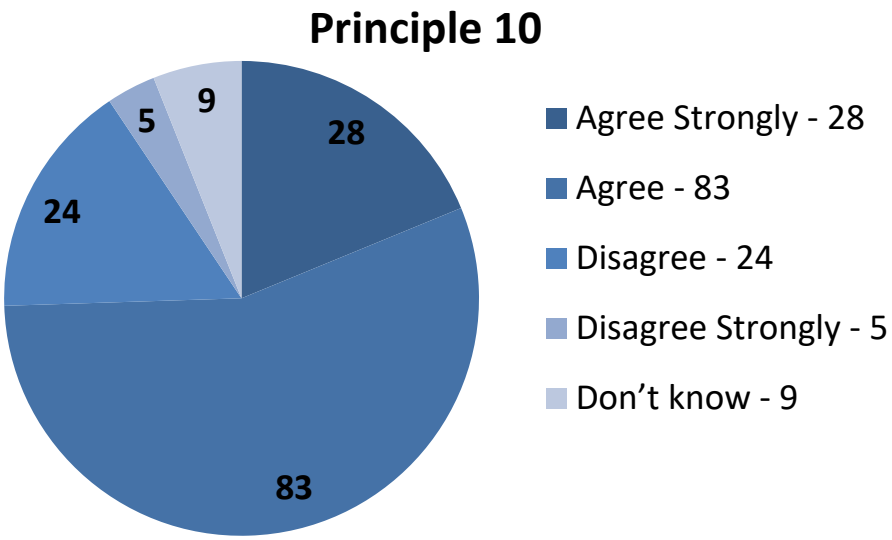

Figure 6.13: Survey respondents assessment of Principle 10

The partially negative attitude can be explained in more detail on the basis of the 51 comments in this section.

Above all, the contradiction arises from the fact that SAP does not necessarily have to be the main system that contains the most important data. The participants point out that KPIs should always be generated where they originate and to what extent SAP is used is important for this principle. If SAP is used to its full extent and is the company's most important performance indicator system, more participants would have agreed with this principle. In general, the situation must be avoided whereby a key figure is not evaluated because the main system does not know this figure and only subsystems contain it.

SAP often provides a very financial view of processes. Logistics and sales figures can also be defined, collected and evaluated outside the financial world. Then, when most of the KPIs come from outside the financial world, SAP does not have to be the main tool for key figures.

An evaluation of the KPIs by an SAP Business Warehouse or similar systems is considered more useful by some participants than a direct data analysis with

programs within the SAP R / 3 System. An SAP system can provide the basic data source, but the data analysis should be done in a system which was designed to analyse large amounts of data, such as an SAP Business Warehouse. Therefore, some participants recommend establishing an independent system that stores and evaluates all of the company data.

Monitoring KPIs only with the SAP system can be a first step. For a holistic view, data from subsystems can also be relevant. For the participants, it is important that all key figures can be evaluated in one system. Only then is it ensured that all are based on the same data. Some participants want to standardise the financial system to better evaluate the KPIs. As mentioned in the interviews, some point out that a figure exists only if that figure is stored within the SAP system.

If only one system is responsible for the evaluation and analysis of data, then this also helps to find errors or implausible numbers. The prioritisation to a central system accelerates the search because only one system has to be analysed and fewer interface errors occur. There is only one data source and no different figures from different analyses. On the other hand, viewing the data from another point of view can lead to different results.

When processes are running in SAP, the SAP system can supply the key figures to analyse processes. The comments mention that most data can be used directly from an SAP system and that it is possible to generate reports fast and flexibly within a SAP system.

Some participants come to the conclusion that only about 10% of the key figures implemented in the company are used. For this reason, it is also necessary to analyse whether the generation of unneeded figures leads to system bottlenecks and can be avoided.

From the large number of comments made here, it follows there must be an additional extension for the principle, because this principle applies whenever SAP is the leading system. The data base for the analysis should come directly from the supporting IT system which is primarily used. If, for example, SAP is the leading tool for financial data, then the financial data of the SAP system should serve as the basis for the financial KPIs.

Summary
The application of this principle assumes that SAP is the main system in the company. This assumption is not shared by all participants of the survey and shown by the comments. SAP is sometimes a pure financial system for companies, so if data is created in other systems then it should be generated from those other systems. Furthermore, only the KPIs that are really needed should be determined, which is often less than initially suspected.

The comments illustrate that this principle must be modified to make it clearer. For that reason, it is amended as follows: ‘Ensure that all necessary key figures are generated directly from the SAP system, *if SAP ERP is the main system of the company*’.

6.5 General recommendations

Finally, it was still possible for the participants of the web survey to make a general comment. Only a few participants took advantage of this opportunity. For example, one comment noted that the principles address the critical issues that participants face daily when dealing with BPM. Two other participants noted that the application of these principles is desirable, but in reality it is almost impossible to implement all of them.

It was also pointed out that every single question can be discussed for days. Therefore, a team has to deal with the question of how much time each principle has. In addition, it was critically noted that an application of these principles sometimes examines the company from one single side only, but the author does not explain exactly what he means by this comment.

Overall, the number of positive references to this survey outweighed the negative. The participants noted, for example, the 'very good and precise questions' or that 'the questions are very well chosen', but also added: ‘be critical with SAP’.

7 Conclusion

This conclusion chapter provides answers to the research questions, presents the contribution to theory and practice, discusses some limitations and reflects upon this research project as a whole. The final discussion concludes that such a research project is an ongoing work and that there are related research fields not analysed within this thesis which warrant further research.

7.1 Answers to the research questions

This section contains summary answers to the three research questions. Up to now, the research questions have only been considered for the individual case examples or documentation. For this reason, this section answers the three research questions overall and lists the variables that were measured during this research.

7.1.1 Research question 1

How are BPM maturity models used in the planning and implementation of ERP software projects?

In general, there are almost no prerequisites for the use of BPM maturity models. All models describe very neutral requirements regarding an IT system used in the company. For example, all BPM maturity models which are examined do not require the use of an ERP system. An exception is the maturity model of the SAP AG, which can only achieve the highest maturity level if the standard processes of the SAP ERP system are used. This model is the only one that requires special functionality.

In principle, no model specifies when it should be used, whether BPM is already established in the company or not. The literature describes very generally how a model is used and the experts have, through their practical use, had the experience that the eden maturity model is not the best choice for daily application. Overall, it can be stated that no documentation mentions any kind of ERP system. Only the documentation of the SAP maturity model creates a connection and describes SAP as the central business tool which must be used to reach the highest maturity model.

The expert interviews revealed that an ERP system already existed within a company and is used at least for financial transactions. Therefore, maturity

models which measure KPIs in the financial environment should determine these data directly from the financial data of the ERP system. In this case, an existing ERP system can be an important basis for data analysis. Otherwise, an ERP system can be useful but is not required for the effective application of BPM maturity models.

BPM and BPM maturity models are usually introduced after the introduction of an ERP system. Only two experts reported that BPM maturity models were established before the BPM approach was introduced in the company. All other experts reported that a typical approach is that an ERP system already exists and only afterwards a BPM approach and the application of a BPM maturity model is required. Therefore an existing ERP system usually has to adapt to the requirements arising from the BPM environment and the application of a BPM maturity model.

Only one expert reported that an ERP system was integrated at the same time as the BPM approach within the company. The difficulty in this case was that many ERP vendors do not consider their system in a processor-oriented manner. In the described case, almost 80 percent of all ERP vendors could not apply their system to the processor-oriented requirements and needed an additional functional description to determine if their system could meet the defined process requirements.

If a new ERP system should be established, it needs to be considered whether established processes must be taken over from the old ERP system. The experts state that in most situations it is better to re-design processes or to implement the standard ERP processes. To impose old processes on a new system in the same manner is often a bad approach. Unfortunately, this procedure is not necessarily analysed by BPM maturity models.

Many companies forget that ERP systems are not only a financial and order processing tool, but could also provide additional functionalities. For example, workflow functionality can be used to control process sequences within the company. But most analysed BPM maturity models do not analyse the ERP systems and these potential improvements are not analysed within the examined maturity models.

All sources indicate that the decision to implement a BPM maturity model should always be carried out by the senior management with a top-down approach. A company gets the necessary support only if the management recommends the use of BPM maturity models. A bottom-up approach is also conceivable but much more difficult to accomplish successfully. The same applies to the introduction and use of ERP systems. For many companies, the use of a certain ERP system is a strategic decision taken by senior management. According to the experts, the ERP system is then often the important and most valuable system within the company. Due to the application of ERP systems, the management hopes to achieve certain potential savings in the BPM environment if standard processes can be used and not need to be developed. A BPM approach can then be applied to these ERP systems and the functionality provided. However, a company should always consider how many standard processes it wants to use from an existing ERP system and in which cases it is better for a company to create its own processes. But this question considers only a very few models.

Summary
Both the practical experience of the interviewees as well as the documentation shows that usually an ERP system already exists in a company before a BPM approach is established. In most cases, a BPM maturity model is only used when the topic of BPM is already established to a conscious level within the company. For most companies, the application of a BPM maturity model is only an add-on that does not have to be applied and is the final step for the use of BPM in the organisation.

7.1.2 Research question 2

How does SAP impact upon the use of specific maturity models?

For most companies the use of SAP is a strategic decision. The management expects a stable and long term partnership if they use the SAP ERP system and the SAP system is the central and leading IT tool for the company. Often SAP ERP is the most powerful IT tool and important backbone system within the company. Some experts explain that only very few companies do not use SAP. There are industries where no one would consider not using SAP, reports one expert, because SAP is the market leader and *de facto* standard. This

dominance means that SAP is already in use at many companies, and BPM and BPM maturity models are subordinated. Many experts initially saw no connection between the three topics of SAP, BPM and BPM maturity models and maturity models usually do not analyse these connections. Only after the interviews had been investigated more closely did the experts realize the possible connections between the topics. Theoretically, an SAP system should not have any influence on a BPM maturity model but in practical use there are some dependencies.

Theoretically, a process definition can be done without any kind of system, but from a certain point a company is too big and needs an IT system for support. The SAP system provides some standard processes and the application of these given process behaviours can provide a good foundation within a company. A good maturity model should also draw attention to such standard processes but not all BPM maturity models analyse processes which are provided by a standard system.

Except for the SAP maturity model, no other maturity models generally analyse the use of standard processes and all examined maturity models accept the provided standard SAP processes. Most experts declare that an SAP system should not generally set the processes within the company. As a result of the research, it can be ascertained that a company should always think about whether pre-defined standard processes are really the best solution for the own organisation. Each company must determine for itself which standard processes are used and which customized settings are required. All processes within a company should be analysed even if they are introduced by a standard IT system like SAP. Standard SAP processes do not necessarily achieve the best result within a maturity model but companies nevertheless often expect this, because they spend a lot of money on the SAP system and the system is used in many companies. Sometimes particular processes exist in a company that justify a deviation from the standard process.

The assessment of process behaviours is usually a purely subjective perception which is analysed by a BPM maturity model. If a user is satisfied with a process, he has the right to give a good rating. Only in the case example of the SAP maturity model is this assessment different, because the highest maturity level

can only be reached if SAP ERP standard processes are used. Within this BPM maturity model, the use of standard processes is much more important than in other BPM maturity models. The overarching goal is to use processes in an unmodified SAP standard system, but every company has to clarify for itself whether this is a desirable goal.

Some experts pointed out that the application of SAP does not generally create an improved maturity level. SAP can be used without any business process orientation. If a process orientation is wanted, then a company must use its SAP system accordingly. There are many different ways to use an SAP system and an optimal business process can only arise through the customizing changes within the company.

Otherwise, some experts report that an intensive use of the SAP system can lead to a better maturity level if a company consistently uses a SAP ERP system according to the standard specifications and uses the predefined standard processes. Furthermore, an SAP system provides the functionality to determine, for example, KPIs for controlling purposes or generally supports the processes in companies. Many SAP transactions already contain data like throughput times that can be used as KPIs for a more precise process analysis. It does not matter whether the data is to be analysed daily or annually, because it can be retrieved at any time by the SAP ERP system. But there are also companies that use a standard SAP system, but these systems have not adapted the processes to current circumstances for several years. Therefore, companies should also check the actuality of the SAP system used.

There are some impact and constraints that arise when an SAP ERP system is used within a BPM maturity model. For example, the SAP system does not have the capability to display processes as a process map and how they are currently running within the SAP system. Customizing settings allows users to influence SAP standard processes, but how this change affects a process cannot be graphically displayed, and the tracking of SAP processes is often very difficult. For this reason, it is difficult to detect media breaks between different systems or to determine which data is being processed. The continuous development of SAP functionalities and the further development of a BPM approach in the company create the risk that both topics will be further

developed independently. This can lead to the risk that two independent process models are developed, even if both topics deal with the same processes. A maturity model should investigate whether several process models are used in the company. As a result, a BPM maturity model should ensure that in the future only one process model is used for all topics to avoid unnecessary duplicate developments.

Often SAP is described by users as too laborious, too costly and too inflexible. This is why alternative solutions are often developed by Excel or Access solutions, but these third party solutions often become more time-consuming and cost-intensive than they were initially assumed. Such a solution should always be viewed critically within a BPM maturity analysis and compared with a possible SAP solution.

The documentation of the three case examples CMMI, eden and BPMM does not mention the terminology SAP. Therefore, the documentation does not contain any indications that the use of SAP leads to restrictions or limitations in these BPM maturity models.

Overall, it is for some companies not the goal to always receive the highest possible maturity level. If the highest maturity level can only be achieved by adapting the SAP system, then a company must recognize that this can lead to a larger adaptation requirement in the future. A modified standard system means that the changed processes have to be fully tested and analysed every time the SAP system is adapted, even if it is a standard system update or a simple system enhancement.

Summary

Initially, the experts did not expect that an SAP system could impact upon the use of specific BPM maturity models, but in practice this is the case. A significant advantage when using an SAP system is that KPIs like throughput times, which are needed for the analysis of BPM maturity models, can be determined directly from the financial transactions of the software.

The SAP system is often an important IT system at companies, and therefore it has many touch points within a company. Some companies use, for example, the default SAP processes and these processes must then also be analysed by

the maturity model. Every company should critically question how much of the standard is required in order to avoid an exceedingly high effort for each system expansion.

7.1.3 Research question 3

To what extent (and how) is it possible to develop a comprehensive mapping of different maturity models to the SAP software system, indicating the implications for maturity model utilisation?

All documentation and all experts reported that their models have no limitations and can be used in all companies and branches. But the four considered models demonstrate that there are quite different types of maturity models that exist. Every company has to be aware of what it wants to achieve through the use of a maturity model and what is important to it. For example, an eden maturity model with pre-defined questions behaves quite differently from an SAP maturity model which tries to establish as many standard SAP processes as possible. Even if many models are based on CMMI, there are striking differences, and a company needs to know whether the model fits the company's goals, and if the analysis of the model reveals it to be as they intended.

The maturity models examined in this research contain some differences. Therefore, they can be broadly divided into three categories which can be described as follows:

Category 1: *Fixed models*
The eden model belongs to the first category and contains a questionnaire that is already fixed and does not require any adjustments to specific industry issues or interview partners. All questions are always the same. This questionnaire is recommended by some experts when a company has little BPM experience and has just begun. The application is relatively simple, because anyone who applies the model answers only these questionnaires. Through the limitation of 157 questions, the defined areas within the model are given and the time which is needed is reasonable. The final evaluation of the questionnaire is carried out by the eden association. This external evaluation is criticized by some experts because it is not an obvious method of how an evaluation normally takes place.

One expert explained that eden is a tool for beginners which just starts with the topic of BPM.

Category 2: *Individual models*
The application of the CMMI or BPMM models is considerably more complex. Both are similar and require much more effort. The user has to think about what is important and what is not important for an organisation. For this purpose, individual topics and possible process objectives are defined by the models as a framework. However, the guidelines are not to be understood as a pure best practice procedure. Within these two models, there is a framework that specifies what a company could consider in order to improve the processes and make organisational changes. Each maturity level 'installs practices that change the culture of the organisation' (Object Management Group Inc., 2008). Each company then has to determine for themselves how the improvements are evaluated and measured. An essential difference to the eden model is therefore the much greater complexity which a company has to deal with before it can apply such BPM maturity models.

Category 3: *Special interest models*
The SAP maturity model is also based on the CMMI model, but has made significant differences and therefore can be classified in a third category. This model is developed especially for the SAP AG and should demonstrate that the standardized SAP processes of the system are able to guarantee truly optimized processes in companies and are not only a theoretical construct. In contrast to the other models, the focus of this model is the use of best practices or standard SAP processes which originate from the SAP system. Within the examined maturity models, it is the only model that deliberately deals with SAP-specific criticisms, because other models consider the IT much more generally.

All the interviews and documentation demonstrate that no SAP application components or modules exist which can be better used for BPM maturity models (cf. 5.1.10) and no information was found that suggests that modules like SAP FI or SAP CO can be better or worse combined with BPM maturity model than other modules. Although a component such as SAP FI can support the measurement of variables positively, this does not mean that other modules are generally not suitable for the examined BPM maturity models. For this

reason, the BPM maturity models cannot be subdivided according to the SAP components which are used and it was determined that different SAP modules are not used differently in BPM maturity models.

Summary
All of the four investigated maturity models can be used within an SAP environment. Nevertheless, they have different characteristics and can be divided broadly into three different categories:

- *Fixed models*
- *Individual models*
- *Special interest models*

A link between the SAP modules used and the application of BPM maturity models was not found. No correlation could be found which shows that certain SAP models work effectively with the investigated BPM maturity models.

7.2 Contribution to theory and practice

One of the theories from the literature review states that a deployed IT system should not play a very important role within the use of a BPM approach and should only support the business transactions of a company (Li, 2010). However, the practical experience of the experts interviewed in this research thesis gives a different impression. Neubauer (2009) describes how ERP systems can influence the companies' business processes and this research thesis confirms this theory, from the perspective of an SAP ERP system. The interviews give the impression that an IT system has a much stronger impact on the BPM approach in the company than expected. This could be due to the fact that the employees' thinking is restricted by the number of years in which they used a special ERP system, or the fact that the company has some budget limitations or management decisions to adapt the IT system in order to run an optimized process. Therefore it make sense to examine the used SAP system in much more detail and to analyse how this system works with the BPM approach in the company.

Van Looy (2010) illustrates how BPM maturity models support the general usage of IT to improve process maturity and enable higher process maturity. The interviews also confirm this theory if SAP is used. For example, the experts

describe that KPIs can be determined directly from the SAP system for the key figure measurement of the BPM maturity model. Also, standardised process of the SAP IT system can be applied directly at the company and lead to process improvements within a company if simple standard processes are used as specified by the SAP system.

Vom Brocke et al. (2014) state that the use of IT is a fundamental part of BPM. This research thesis comes to the conclusion that an IT system such as SAP ERP can influence a company and its processes, if SAP ERP is used as a central IT system within the company, and a maturity model should consider the relationship of SAP and BPM. Unfortunately, not all maturity models which are examined in the context of this research consider this perspective. Therefore some principles have been generated in section 5.2 which can be used within different branches and industries to analyse the relationship. Based on the developed ten principles the senior management can analyse how successful a BPM approach is, when used within a company with SAP as a central IT business system. These principles can be seen by companies and management as a contribution to practice and support the use of SAP ERP, BPM and BPM maturity models in order to obtain the best possible efficiencies of all three.

The results of the web survey illustrate that the developed principles met with broad acceptance from practitioners. Some of the principles received approval rates from the participants of up to 96%. This positive feedback demonstrates that these principles are quite applicable in practice and provide a practical contribution to improving the interaction between SAP, BPM and BPM maturity models.

The following table gives a brief overview of which original literature references were complemented by the results of this research. The first column illustrates the author and year of publication. The second column refers to the topic or statement made in the original literature which can be complemented by new insights from the current research. The third column presents the results or unique contributions of this research which related to the literature and the last column gives an additional explanation of possible examples, limitations or gaps.

Author / Date	Topic / Statement	Findings of this research	Examples / Limitations / Gaps
Li (2010)	IT systems should not play a very important role within the use of a BPM approach.	Only theoretically is there no influence. In practice, an SAP system influences the use of a BPM approach and BPM maturity models. An IT system has a strong impact on the BPM approach.	The impact comes from a variety of factors such as user, business needs and management support. For example, it depends on how well users can handle a system, or how well a consultant knows a system.
Neubauer (2009)	ERP systems can influence the companies' business processes	This statement also applies for SAP ERP which can influence a company and its processes. There are companies which have the guiding principle: 'What is not in SAP, does not exist!'.	Budget constraints or management decisions can limit the adaptation of IT systems. These companies have a limited view of their own business. Not everything is manageable in SAP and there will always be solutions that are better and not developed by SAP.
Van Looy (2010)	Most BPM maturity models support the general usage of IT to improve process maturity	KPIs can be determined directly from a SAP system.	SAP often provides a very financial view of processes. When processes run in SAP, the SAP system can generate reports fast and flexibly to provide the key figures for a processes analysis. But KPIs should always be generated where they originate in order to reduce error probability.

Author / Date	Topic / Statement	Findings of this research	Examples / Limitations / Gaps
		An SAP ERP standard process can be used to quickly establish processes and minimise the complexity of system upgrades or enhancements. Standardised process of the SAP ERP system can be applied at a company.	Many companies often need better solutions than a standard process can provide. But standard processes should also be used. A simple statement could be: 'As much standard as possible, but as much as necessary'. A company cannot rely on the processes implemented in SAP and must critically scrutinise them.
vom Brocke et al. (2014)	The selection, acceptance and use of IT is a fundamental part of BPM	IT is only one part. There are also fundamental parts like communication and acceptance. The final decision about the introduction of BPM should be made by senior management with a top-down approach. The support of the management is a fundamental factor for a successful introduction.	Employees should be involved at an early stage to promote acceptance and knowledge. It is important to involve the whole company in the decision-making process in order to achieve high acceptance. All relevant stake holders must support the use of a system. The management should determine when divergent systems are used.

Author / Date	Topic / Statement	Findings of this research	Examples / Limitations / Gaps
Heilig & Möller (2014)	Standard software such as SAP ERP assists a company in standardising and automating processes to make them as efficient as possible	The use of IT standard processes can be a fundamental part in a company. But if a standard process does not meet the company's requirements, the application will never find acceptance within the enterprise. Even pre-defined standard software or processes must be documented, analysed and understood.	Using the standard can reduce costs, but not necessarily bring the benefits that are needed. It is very difficult to decide whether a standard process or an individualised process should be used. Processes have to be analysed regularly. It is important that employees receive training to understand the details of the processes and their relationships.
Hill, Pezzini, and Natis (2008)	BPM is a process-oriented management discipline. It is not a technology.	BPM is often introduced by IT departments, therefore many employees and companies understand BPM as a technology platform. For a general and company-wide implementation of BPM, all levels and sectors of the company must be involved.	Systems, processes and organisation are inextricably linked. For that reason, it makes sense to establish BPM teams who know the IT as well as the business requirements. There can be difficulties in the interpersonal relationships when people from different social strata and with different ways of thinking and different IT backgrounds come together.

Author / Date	Topic / Statement	Findings of this research	Examples / Limitations / Gaps
van Looy et al. (2013)	Further research could investigate the question of whether maturity models could be selected on the basis of IT business system alignment.	Users expect that a BPM maturity model provides such independence that it can handle a variety of needs. In practice, the most suitable maturity model is not always used. Not all BPM maturity model considers IT systems such as SAP and relationships between SAP and the BPM application.	Many users do not care which model they use. Their goal is to fulfil only the management requirements. Often the model is used which is best known to employees, consultants or management. SAP experts and process owners should understand the full process flow, regardless of system boundaries or system dependencies. Only through this understanding is it possible to critically scrutinise and improve business processes.
Markovic (2010)	The purpose of maturity models is to reach the highest maturity level for all organisation processes.	Not all business processes need the highest possible maturity level. This goal could be an unnecessary effort and will limit the resources of the company.	A company should focus primarily on mission-critical processes. A rule could be to focus on processes that make eighty percent of the company activities.

Table 7.1: Literature statements versus research findings

With the exception of the SAP maturity model, all other examined BPM maturity models analyse only very generally, or not at all, an existing IT system like SAP ERP as the central IT component of a company in the context of a BPM approach. Therefore the developed principles can serve as a complement to many models to investigate this relationship. For example, the eden maturity model offers the possibility to use complementary modules as a supplement. In

this case, the ten principles may be used in practice as a particular supplement to the eden maturity model.

As described in section 5.2 the ten developed principles can be divided and applied into two parts. On the one hand, there are general principles. On the basis of this research, these principles address topics that have been identified as important during the research, regardless of whether SAP or any other ERP system is used in the company or not. On the other hand, the specific SAP principles could be used as a supplement in all examined models, because these special SAP considerations are not analysed in any of the examined BPM maturity models. One exception is the SAP maturity model, but this model has a very strong focus on the SAP system. Under most circumstances this model makes little sense for companies that also use other non-SAP systems. Only for a company which absolutely and everywhere would want to use SAP standard processes, the rigorous application of the SAP maturity model can be useful.

On the basis of the three research questions, these ten principles have been developed which enable the management and all relevant stakeholders to show possible connections between an SAP system and a BPM approach. In practice, these principles can be applied to examine how a BPM approach operates within an SAP environment, and how a continuous process improvement within an SAP environment could be supported.

7.3 Reflections and lessons learnt

Finding experts for the interviews was an important prerequisite for the success of this research. Many potential interviewees were not willing to give interviews of the necessary length or had not had experience in all three subject areas in practice. It was also very important to most experts that they are listed anonymously in the research work. Also, the transcription of the digital recorded interviews took much longer than expected. On average, a transcription of a one hour interview needed six to seven hours. Unfortunately, not all maturity models provide detailed documentation which describes the BPM maturity model in much more detail. However, the practical experiences of the experts, which were analysed in this thesis, were much more extensive.

The analyses and output were generated directly from the results of the expert interviews. This was followed by a cross-comparison with the existing documentation. Due to this fact, the researcher has taken a learning role and has been directly influenced by the experts. Some experts reported that they made some kind of self-reflection on some questions during the interview, because they had not thought about some of the discussed considerations until now - they had not even perceived that a BPM approach is influenced by an SAP system. But the more they thought about it, and compared the interview questions with their practical experiences, the more the knowledge about the possible connections became clear.

Several interviewees reported that the implementation of a BPM maturity model is often too complex and time-intensive for the user. Therefore, as a result of this work, no new BPM maturity model was intentionally developed. The eden model consciously points out that complementary modules can be attached to the model (Allweyer & Knuppertz, 2009), therefore the developed principles could also be used as a supplement to the eden model and can be seen as a checklist or supplement for the existing BPM maturity model. But it is also possible to use the principles independently of any existing maturity model or without any kind of BPM maturity model.

It was slightly easier to find participants for the web survey than to find participants for the interviews. The use of the social network site XING proved to be a good source to find appropriate participants for the web survey. It was exciting to observe how many individuals unknown to the researcher were willing to participate in the web survey after being personally contacted. The individual comments of the participants in the survey were an important part of this research step and were helpful in improving and refining some of the principles.

7.4 Limitations and areas for future research

The expert interviews highlight that an SAP system is often used for a very long time in a company. A BPM approach is then often set up on an already used SAP system. Also, the BPM approach is often already introduced before a BPM-maturity model is practically used in a final step. For many companies, a BPM maturity model is therefore often used only as an additional tool and

specified in the planning and implementation of ERP projects at last. All results of this analysis are only as good as the experts who have been surveyed and participated in the web survey, and provided their experience. It should be noted that the experts who were interviewed for this research had different practical experiences, and for this reason, some interviews obtained more information than others. But due to some restrictions, like the available time and the word limit of this research paper (Bryman & Bell, 2007), it turned out that the eleven interviews were sufficient because many statements have been repeated across them. It is still possible that interviews with other or additional experts would lead to a different result if the experts interviewed had experiences with other BPM maturity models. The output could also be different if, in addition, academics were interviewed about the topic. Due to time and available resources reasons it was not possible to conduct more interviews for this research. However, the review of the developed principles by the web survey found a high degree of approval.

The analysed case examples are only a snapshot of the used BPM maturity models at the time the interviews were conducted. The answers are very dependent on how long the experts have already applied the subject areas and gained experience. Therefore, it is possible that the conclusions that emerged from these individual interviews are not actually generalizable, despite the efforts of this research, because too few models were analysed and too few experts were interviewed. These restrictions could only be supported by further research projects.

Due to the fact that the IT systems were mostly not mentioned within the documentation, only a small crosscheck to the documentation could usually be carried out. Most of the documentation about the BPM maturity models did not even mention the terms SAP and ERP. Therefore it was difficult to analyse the ERP and SAP influence within the documentation as the research questions expected.

As a result of this analysis, it is evident that many maturity models do not consider any link between an SAP system and the BPM approach. For this reason, the developed principles should help to suggest some interrelations between the topics. The developed guidelines must prove through practical use

that they are helpful and support a company. The web survey is only a first review and future research examine the applicability of these principles in more detail. This research is also closely linked to the ERP system of SAP AG. Further research could also examine whether these links between the subject areas also exist in other ERP systems or apply to some other kinds of IT systems. Future research may address these issues or could involve some other kinds of BPM maturity models. So far, this research has considered only a very small part of IT applications within the area of BPM. In addition to the SAP ERP system, there are many other IT systems in companies that support the development of BPM approaches, and these were not examined.

7.5 Final conclusion

The main findings of this study demonstrate that there exists a much closer link between an SAP system and the application of BPM maturity models, as some experts suggested at the beginning of their interviews.

The conducted interviews demonstrate that mostly no links between a BPM approach and the ERP systems used are illustrated within the documentation. The experts confirm from their practical experience that a deployed SAP system is often broadly anchored within a company. On the one hand, the thinking affects the employees, because they often think about their personal SAP process experience and how SAP handles processes in general. One reason for this is that companies have used an SAP ERP system for years. On the other hand, many financial figures are also stored within an SAP system and are very well suited for the analysis of key metrics within the processes. The management of a company also hopes to implement a long-term strategy through the use of a standard software solution such as SAP and to use established software, which has existed for several years on the market and supports the company.

The experts reported that the literature demonstrates no interaction between the use of SAP systems and a BPM approach within the company. In practice, however, this kind of connection still exists and the BPM maturity model that is used should analyse this. First, the question about the interrelationships between SAP, BPM and BPM maturity models surprised some experts. But the longer the experts were concerned with the questions and the context, the more

they realised that there are some connections between BPM maturity models and an SAP system which are usually unknown because the BPM maturity models do not analyse any SAP behaviour.

Remenyi et al. (1998) explain that a thesis within the field of business and management should give some form of advice for a manager. This form of advice is provided by the development of ten principles, and these principles can be used as management guidelines for practising managers and other relevant stakeholders. The development of ten principles provides practical advice for all companies using SAP, BPM and BPM maturity models. The application of these principles can lead to an improvement in business performance to the benefit of many stakeholders. The web survey demonstrates that the ten principles are accepted to a high degree and add value to practitioners working in the field; but every organisation is different and principles should always be evaluated and applied depending on the specific company context.

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9 Appendix

This appendix contains the 'Informed Consent Form', which each expert has signed, and a detailed overview of the interviews within the six defined categories.

9.1 Informed consent form

University of Gloucestershire http://www.glos.ac.uk/
The Park, Cheltenham, GL50 2RH

UNIVERSITY OF GLOUCESTERSHIRE
at Cheltenham and Gloucester

Informed Consent Form

Dear participant,

I am a researcher at the University of Gloucestershire andI would like to invite you to take part in a research study. The study is voluntary and you will only be included if you provide your permission. **The purpose of this study is to explore the impact of SAP on the utilisation of Business Process Management (BPM) maturity models in ERP projects.**

I would like to invite you to a semi-structured Interview. This interview will be recorded on tape and later transcribed on an electronic device. I will keep all data privately and secretly. The material will be stored and accessed solely by the researcher on local hard drives for up to 10 years. On request, parts or the whole interview can be stopped at any time. Each participant has the right to withdraw their statements and to protect privacy, interview data will be anonymized in the thesis and in subsequent publications. Once I have finished the study, I will present the results at conferences and publish in academic journals. When I publish the results, no participant will be identifiable by name.

This research is being conducted under the guidelines of the Handbook of Research Ethics (University of Gloucestershire, 2013). The research plan has been approved by the University, but the contents and opinions expressed in this research instrument are those of the researcher and in no way represent those of the University of Gloucestershire.

By taking part in this study, you may help coaches and scholars develop their skills. There are no known risks associated with taking part in this study.

If you have any questions or concerns, please contact the researcher.

If you would like to participate in this study, please read and sign the informed consent form.

Many thanks

Markus Grube

Email:

Mobil:

Page: 1 / 2

Title of Study: The impact of SAP on the utilisation of Business Process Management (BPM) maturity models in ERP projects

Investigator: Markus Grube, DBA Student, University of Gloucestershire, The Park, Cheltenham, GL50 2RH, UK

Supervisor: Dr. Martin Wynn, Reader in Business Information Systems, School of Computing and Technology, University of Gloucestershire, The Park, Cheltenham, GL50 2RH

Aim of the Research: The aim of the research is to investigate and analyse the interaction between the use of the SAP software package and the deployment of BPM maturity models. This will entail a comprehensive mapping of different maturity models to SAP processes and required changes in SAP implementation if specific BPM maturity models are used.

Do you understand that we have asked you to participate in a research study?	**Yes**	**No**
Do you understand the benefits and risks involved in taking part in this research study?	**Yes**	**No**
Do you understand that you are free to contact the research team to take the opportunity to ask questions and discuss this study?	**Yes**	**No**
Do you understand that you are free to refuse participation, or to withdraw from the study at any time, without consequence, and that your information will be withdrawn at your request?	**Yes**	**No**
Do you understand that we will keep your data confidential? Do you understand who will have access to your information?	**Yes**	**No**

I wish to take part in this study:

Printed Name: _____

Signature: _____

Date: _____

Preferred Contact number: _____

or

Email: _____

9.2 Detailed interview material

As a detailed summary of all interviews would exceed the prescribed size of the research, this appendix contains a closer examination and overview of the interview material. The following sections describe the working experience of each interviewee regarding SAP, BPM and BPM maturity models. The section also provides an overview about the practical experience, possible connections and dependencies between the topics. Overall, each interview represents the personal opinions of each respondent.

This section was developed to show how and in what context some statements were made during the interviews. Some experts reported that they made some kind of self-reflection on some questions during the interview, because they had not thought about some of the discussed considerations until now. For example, some practitioners had not even perceived that a BPM approach could be influenced by an SAP system.

As described in section 3.7 the questionnaire of the semi-structured expert interviews was divided into several categories. The goal was to obtain a better structuring of the interviews, and get a structural basis for the research questions which are conducted within the research. Each interview was therefore divided into six thematic categories and the answers of the experts were classified into these categories. These six categories are:

- Maturity model
- BPM maturity model
- BPM
- IT
- SAP/ERP-System & BPM
- SAP & BPM maturity model

The following section presents the statements which each expert gave in the interviews and concludes with a brief summary of the interviews. The brief overview in section 4.2 was determined from these summaries. Therefore this section was the basis for the analysis of the interviews. Due to the semi-structured nature of the interviews, not all questions were asked to the experts

in the same manner, but the experts made statements for each category, and the answers are presented in the relevant subsections.

First, a brief profile description of each of the experts is given at the beginning and a brief summary follows at the end of each expert sub-section. All interviews represent the personal opinions of each respondent.

For reasons of anonymity, the names of the companies involved were omitted and each expert was mentioned in the male form, even if the interviewee was a woman.

9.2.1 Expert No. 1 (E1)

This section provides a detailed summary for expert No. 1 (E1) using the six defined categories.

9.2.1.1 Criteria for definition as expert

Since 2003, E1 has gained experience in the BPM environment, for example as a process management consultant, BPM analyst and Managing Director of a competence centre for process management. Furthermore, the E1 is a founder and organizer of a BPM community and, as a lecturer, very active on the BPM topic. E1 has also been involved since 2006 in the development of the BPM maturity model called ‘eden’.

In his opinion, the main focus behind the eden maturity model is the idea of providing someone with a reality check for what business process management can be. The analysis at eden took place via a questionnaire with 157 questions, to analyse which areas of process management are already in use at the company. The eden maturity model can be operated for all types of business and is not designed for a specific industry. In addition, it is even suitable for small companies and also for global enterprises. E1 also has experience with this model in different industrial fields, such as telecommunications, IT service providers or public enterprises.

9.2.1.2 Maturity model

E1 suggests that, in principle, maturity models should help to consider various aspects within an organisation. It is not always possible to easily distinguish between different maturity models. The EFQM (European Foundation for Quality Management) model, for example, is described as a BPM maturity

model, however it is multidimensional. In addition to process management, it also considers other perspectives. The model considers the whole organisation, and also indicates topics that have nothing to do with processes. Eden can be seen as a potential complement to EFQM because the eden model considers the perspective of the process management in a much deeper manner than the EFQM model.

In general, a maturity model can result finally within a discussion about the topic. The model can fetch different groups, and produce as an outcome a structural result about a topic.

9.2.1.3 BPM maturity model

E1 recommends that, in general, BPM maturity models could have two different perspectives of observation, which should be distinguished. On the one hand, there are maturity models, which others call reference models, which look for content on processes and evaluate the use of functionality. These models obtain the highest level of maturity when the processes work and are designed very closely to the IT standard and, for example, the standard SAP purchasing processes are used. The other approach of maturity models does not focus on the substantive consideration of the effectiveness or the performance of process management. These models do not make a content analysis of the individual processes. They look at the framework of processes and consider whether everyone is involved in these process goals. Additionally, it is possible to analyse if the organisation has a good process control and if the process management is anchored in the culture beliefs of the company. The eden maturity model considers the second approach.

The development of the eden BPM maturity model began in 2006. E1 highlighted that, at this time, the BPM maturity models of Michael Hammer and the Object Management Group (OMG) were not available on the market. The eden model was developed through a BPM User Group who had used a particular kind of process management evaluation at their company. As a result of their experiences, the development of eden was not a systematic analysis of other maturity models. It was a pragmatic procedure affected by the substantial practical experience of the developers involved. The development of eden was based on other models involving people who have previously developed their

own maturity models, and this experience was incorporated into the development of eden. Many maturity models like the CMMI have a very clear specification of what is needed to progress to the next level. E1 advises that the eden maturity model aims to be different and does not have a clear demarcation.

E1 further outlines that eden is not a guide or a prescription that needs to be copied, but it should provide guidance in order to show what process management can be. It should therefore demonstrate the different varieties or dimensions of business process management. Eden offers the possibility to make a company aware of the different areas on process management. Consequently, each company can then decide whether the issue should be pursued in a short to middle or long-term perspective.

Eden does not cover the content of the processes. The model carries out no substantive consideration or efficiency or performance on the individual process level. E1 explains that eden analyses the more general conditions. Is the process well positioned so that he feels comfortable, is performant and controlled? Does the process have objectives and responsible persons and does the participant know the process? Another consideration is the question of whether the processes match the corporate strategy?

E1 estimates that eden developers are of the opinion that process management maturity models have to be more flexible to discover what degree of process maturity the company currently has. Additionally, the maturity model is intended to show what degree of process orientation is currently relevant for the company. Therefore, eden was not designed as a rigid model. It should have greater flexibility, in order to reach the next stage. That is one reason why the expert believes that CMMI is not seen as a competitive model, because the CMMI has tough restrictions for when the next maturity level has been reached. Unlike CMMI and also process audits, eden is not a pure measurement instrument, and provides the ability to understand the awareness of what process management can be. For this, the model provides information on different topic areas. Overall, the model has 157 questions in nine dimensions that need to be evaluated.

The interviewee concluded that the eden model can be used across different industries. He has personal experience of the model being used at telecommunications companies, with IT service providers and at public companies. In addition, the model can be used for either small companies with a few employees or global companies with thousands of employees - which was also a major claim in the development of the model. The model should be able to be used for any size of business and nearly every kind of industry.

This eden developer recommends adapting the wording of the eden analysis used for the companies' behaviour, for example to differentiate exactly what the word 'customer' means. Is a customer the internal customer of a department or is a customer an end customer on the market? In addition, how many years are meant by the term 'medium or long term'?

The application of eden would give a company an orientation of what process management can be. The practical experiences of the expert indicate that the performing of eden interviews can bring different groups together. The model asks questions of what individual groups actually mean by process management and which objectives could be pursued in the coming years. One further aim is then to structure these results and to develop an overall picture from the outcome of the eden maturity model, for example, to realize that, perhaps, the top management has a different understanding of process management than the IT department. Or that the word process management is, for one sector of the company, just the meaning of modelling processes, but other users view it as the use of workflow management systems. The aim of eden should be to use it as a communication tool and to provide clarity about terminology, and involve people. Therefore, the eden maturity model should be less about the measuring process and more about dialogue and communication, and gaining awareness of how the company should focus on BPM in the next few years and develop appropriate objectives.

E1 explains that eden consultants are trained at special workshops, because there is nearly no freely available documentation about the eden model. On the website of the eden organisation there is a small white paper available, but books and other publications are currently unknown.

9.2.1.4 BPM

The interviewee stated that different countries have a different understanding about the term BPM. Anglo-Saxons countries consider BPM to only mean technology, but the German-speaking market considers process management to mean a management discipline. Therefore, BPM is actually the whole management of process with all possible varieties and process-oriented corporate management for all business areas.

Business process management is an approach to discover how far the company has progressed with personal process management, what degree of process orientation is possible for the organisation and which factors of process management are relevant. E1 imagines that there are certainly companies on the market which are so resistant to change that they should not do any kind of process management. But there are also companies which have great potential for improving their process organisation.

Process management also depends on the people who perform it. From his practical experience, the interviewee explains that there are many people on the market who claim to engage in process management, but after closer examination it is clear that these people only do a bit of process modelling. E1 explains that ‘the documentation and drawing of the actual processes is not an insignificant part of process management, but that alone (...) does not make a process management’. The process management roles must be, for example, not only described, but also be anchored in the organisation and be lived. The whole organisation needs a process model, and not just a lot of process diagrams. The implementation of a quality management methodology such as Six Sigma in an organisation certainly does not make this organisation process-oriented. Process management involves more. The organisation needs, for example, strategic process goals, operational process objectives and process indicators. Processes must be defined not only as a process, but also be controlled and improved consciously as processes in the company. Thus, there are many points that define a successful process management in an organisation. Overall, the highest level of process-oriented organisation is achieved when there no longer exists an organisation chart at the company.

But the expert demonstrates that BPM also has several points of contact with the technology. If the company has recognised how the IT intends to further process orientated development, it automatically considers IT requirements. Today, technologies have such potential that many users cannot imagine what IT can do for the BPM. Therefore, IT should be involved as early as possible in the redesign of the organisation process. It is only when people understand what the technology offers and how IT can assist the process requirements, that it is possible to understand what needs to be changed at the process level to be more efficient and effective. IT must be involved in BPM changes, because many innovations are simply driven by IT.

IT can also lead to restrictions in the use of BPM, if an inflexible system is used - for example, if the IT used dictates the processes in a rather inflexible way without any customizing, or the IT system can only be modified with extremely high costs by external consultants. In this case, IT quickly receives a negative reputation. Therefore, IT should also be addressed in a maturity model, and the eden model has his own dimension for IT questions.

9.2.1.5 IT

E1 outlines that IT is just one of nine dimensions to be assessed in the eden model. The questions regarding the IT dimension are very general. For example, there are questions about the cooperation between the Business and the IT department, or to what extent is the IT the service provider for the internal process management. Most IT issues relate to the cooperation between IT and business, and there are questions about using BPM technologies, for example whether there are technologies to simulate processes or to operate workflow management.

There are no questions within the eden model about standard systems such as ERP or particularly SAP. The question is rather, how does the organisation deal with the system and with the implementation of a system? If all aspects of IT were involved in the eden model, then a very application-specific criteria would have to be considered. E1 believes that each ERP in the world and any standard software in the world would then have to be considered. But the aim of the model is, in the expert's opinion, to obtain a maturity model which is neutral and independent of any industry, independent of process type and regardless of

IT system used. Rather, the eden model considers the interaction between the IT and process management and how closely process management and IT work together, as well as the question of whether the IT department sees itself as a service provider for management.

From the perspective of the IT dimension, and also from the SAP viewpoint, there exist no restrictions that would not allow the maximum level of maturity to be reached in the eden model. Even if all questions regarding the IT dimension of the questionnaire are negatively answered, then it is still possible to reach the highest maturity level, because the IT dimension is only a very small part of the model and there is not a large emphasis on it.

The eden model is strongly focused on the user. If the user recognizes an SAP system as a well-functioning workflow engine, it is absolutely acceptable within the eden model. The perception of the respondent about the system which controls the processes is evaluated, and if the respondent is satisfied, then he has the right to review that with a high score in the eden model.

Organisations which use the process management technologies are not necessarily process-oriented. The use of a suitable IT which supports process management does not automatically lead to the use of process management as a management method: perhaps only process-oriented and flexible infrastructures are established at the organisation. The interviewee estimates that a maturity model like eden could help to uncover other aspects of process management in an organisation.

E1 believes that organisations of the future should react in a very agile and flexible manner. Therefore, in the expert's opinion there is a need for 'a rapidly changeable flexible IT infrastructure' for the future. The rate of changes in companies is faster, and the existing infrastructure can no longer follow this speed. But 'a flexible IT infrastructure needs also corresponding processes'. No high dynamics are expected from a payroll accounting process. On the other hand, processes that have a direct and permanent interaction with the market, or processes where creativity is required, should be flexible. The customer service is, for example, such an area. Customer services do not need a

maximum of standardisation, they need rules and efficiency and especially the flexibility and creativity to respond to market demands.

The interviewee also emphasises that process management initiatives which start from the IT department, should start with the IT department themselves to introduce process management. An approach that is developed by the IT department can make it clear to the other areas in the company that the IT department is very serious about the implementation of process management within the organisation, and sets a good example.

9.2.1.6 SAP/ERP-System & BPM

The interviewee estimates 'that very few companies that use eden do not use SAP'. The large organisations especially use SAP and he thinks that the reason for this is that SAP is the market leader for ERP software systems. There are, certainly, industries where no one would consider not using SAP. The use of SAP is a strategic decision for many organisations because they need a stable partner and suspect that SAP could be a long term business partner.

E1 explains that many companies 'use especially SAP implementations or SAP standardisation and harmonisation projects to measure the process management' and introduce the process management into an organisation. The connection of such projects may include, for example, the creation of SAP customizing requirements from new defined target processes.

However, in his opinion, ERP systems are constructed in a functional manner. There was, for example, an organisation which has described the complete organisation procedurally. With these procedural requirements for the ERP vendors they have aimed to introduce a new ERP Software. But most ERP vendors need a functional description to make an appropriate offer of their software. E1 explains that in his opinion nearly '80 percent of all ERP vendors' cannot make an offer on the basis of process oriented descriptions. The company therefore instructed a service provider to translate the process descriptions into a functional requirement catalogue. Only after the translated descriptions did they have sufficient offers to choose an ERP provider. In this case, they decided to use the SAP ERP system.

In general, the expert highlights that there ‘are companies which use SAP and are very process-oriented, and there are companies that use SAP and work still like in the Stone Age’ of IT. This means that these organisations have established SAP, for example ten years ago, but did not develop it further. Some companies only have a lot of process optimisation potential through the fact that they use new SAP transactions instead of the company's own developed Excel and Access solutions. These companies must use the experience of external consultants that SAP can be developed further. They must demonstrate that there are things that perhaps did not exist ten years ago, that are now part of the SAP system.

E1 also knows, through his experience, that some companies use SAP very consistently and do not allow other systems. These companies have faith in the standard SAP and use nothing else; for example, they use no graphical process modelling tools, because SAP did not provide such tools at that time. It is of course also possible to closely connect the maturity of the process orientation with SAP and all processes are therefore done only with SAP, and no third party systems are permitted. But this can also be accomplished with any other ERP system and not only SAP.

9.2.1.7 SAP & BPM maturity model

In the expert’s opinion, a restriction between the SAP system and the BPM model is not evident. If process management is carried out as a management concept, the IT infrastructure is of only secondary importance. Sometimes, when optimisation is concerned, and increased efficiency and versatility, then of course the IT infrastructure plays a very important role, in order to promote the desired process management with IT.

There are processes, such as strategy processes, where it makes no sense to use SAP. If, for example, there is a need to coordinate management board appointments, then Outlook is of more use than a SAP system.

The interviewee knows that SAP has its own BPM maturity model, and estimates in that case that a higher level of application of its own SAP software leads to a more mature process. But that is a completely different perspective than the use of the eden maturity model, because the SAP maturity model assumes more the content of the processes.

Several years ago, there existed a special ARIS Solution for SAP to model business processes. In retrospect, it was the ARIS process model of IDES Scheer in the expert's estimation that provided well-made marketing, with process templates which are based on the ARIS process model. These process models were a kind of blueprint which could be applied. Although the approach was a prefabricated model example which can be used within the ERP environment, usually individual customizing was needed. As a result, the modelling and customizing very rapidly developed apart.

E1 suggests that a bilateral interface would be very useful within a coupling of SAP and process models. On the one hand, there must be combination between the process model-design and the SAP customizing. On the other hand, there must be interfaces between the SAP customizing and the process model that is designed; for example, settings in the SAP customizing could automatically change the process model. The interviewee knows that problems often arise when both sides are no longer matched with each other, and only diverge on one side as soon as practical operation is carried out. It is possible that the SAP Solution Manager could be used in the future for that requirement and could play an important role for that purpose. Up to now, the SAP Solution Manager has only been a central tool to support the SAP application management and enable the organisation of error analysis and troubleshooting. However, the Solution Manager has nearly no functionality to support BPM requirements and does not provide an overview, for example, to link the customizing of the SAP system with the process models of the company in any way. The SAP Solution Manager is already used as a central management tool to manage the SAP system landscape and has the possibility to display process models. E1 wishes to extend that tool to provide a solution which demonstrates how customizing changes can affect the process model.

SAP can be a nice addition to the eden maturity model. The eden model recommends no integration with any other technology, but the model addresses the criteria for the dimension 'measured', as meaning many things in the direction of measurability, process indicators and process controlling. These points can be supported by SAP. In principle, it does not matter for the eden maturity model which system and which technologies are used within an

enterprise. The eden maturity model does not want to investigate the feasibility or usefulness of standard software.

Finally, the interviewee recommends that the eden model should be used within an organisation to clarify what they want to achieve with process management. If the enterprise then takes the decision to establish more process-oriented aspects, it can have a direct and immediate impact on the IT. Then, new requirements are made for IT, for example, for activity based costing or process controlling reports which the ERP system can provide in real time with the reliable indicators.

9.2.1.8 Summary for expert No. 1

Process management is an approach for which finding answers is crucial: Where is my company regarding this topic? Where do I want to move to? What degree of process orientation is relevant to me? It should be noted that process management is more than just describing and modelling processes. E1 points out that the German-speaking market, unlike the Anglo-Saxon one, understands BPM to be a management discipline and not just a technology. The expert mentions that BPM is more to do with process modelling and process description. The outcome should also be concerned with strategic process goals or process indicators.

Through the application of eden, a company should get an orientation for what process management could be in general and what the objectives of process management could be. The model demonstrates the understanding of process management in the enterprise, and in what direction the further development of the topic should go. Eden should be understood as a communication instrument to clarify and define the definitions of the subject and to generate awareness. The application of the model can bring together different groups and engage a discussion, as well as create an overall picture about the use of process management at an organisation.

The eden analysis is more about general conditions. In most cases it does not make a content analysis of the individual processes; rather, it examines the process framework and whether everyone is involved in the process goals. The model analyses the process control of an organisation and the culture beliefs of process management in the company. The eden model was not designed as a

rigid model, and has the flexibility to allow the next maturity steps to be reached. It is not a pure measurement instrument and, through the evaluation of 157 questions in nine dimensions, it provides more than merely the ability to understand what process management could be.

The eden model can be executed neutrally, which means regardless of the industry or process type. IT plays a subordinate role in the model. For the model, it does not matter which system is used in the company. The model looks in more detail at the people and not in so much detail at the systems, and delivers a self-image. IT is viewed within the enterprise by the question of whether the system has the necessary flexibility. It appears to E1 that eden will need a more flexible IT infrastructure in the future to react more quickly to possible market changes. The model does not care if the ERP system comes from SAP, Oracle or other manufacturers. Flexibility is also provided in order to reach the next maturity level.

Furthermore, E1 outlines that IT is just one of nine dimensions to be assessed and that the questions are very general. There are no questions about the ERP system or in more detail about the usage of SAP. The reason for that is that the eden Developer Group wants to create a model which is neutral and independent of the IT systems used. E1 believes, that from the IT or SAP point of view, there exist no restrictions that would not allow the highest maturity level to be reached.

E1 recommends applying the process management theme if an implementation, standardisation or harmonisation project is already carried out at the SAP environment. He also indicates that companies can use SAP very differently. SAP could be used in a very process-oriented manner or even with many additional and self-developed Excel and Access solutions instead of existing SAP transactions. A used SAP system does not lead to a better process orientation if the SAP is used in a rudimentary manner. If process management is carried out as a management concept, the IT infrastructure has only secondary importance. Therefore, there exist strategy processes in which it makes no sense to use SAP.

E1 suggests that a bilateral interface would be very useful within a coupling of SAP and process models. Any combination between the process model-design and the SAP customizing could be very helpful. Unfortunately, it is not conducive when both sides are no longer matched with each other and diverge as a result. Overall, SAP could provide good support to measure processes and determine process indicators.

9.2.2 Expert No. 2 (E2)

This section provides a detailed summary for expert No. 2 (E2) using the six defined categories

9.2.2.1 Criteria for definition as expert

E2 has experience with the use of maturity models but more experience with the handling of SAP and BPM topics. Since 2009, he has acted as an engineering consultant, process engineer and process optimisation expert. In his professional practice, he was involved in the general optimisation of SAP sales order and offer processes and was also involved in the optimisation of sales processes by LEAN and Six Sigma methods. He has also gained practical experience in process analysis and process modelling in the field of mechanical engineering.

E2 knows the eden model but has not executed that model within his organisation yet. For him, the application of a certain maturity model is irrelevant, because even the application of other methods likes LEAN and Six Sigma results in a variety of process improvements. One important thing for this expert was not to mention any names of companies in which he was previously active.

9.2.2.2 Maturity model

E2 suggests that maturity models are currently ‘a very up-to-date topic’. Their usefulness and attraction for him come from the need to consider where the organisation currently stands with process management within his own organisation.

E2 estimates that, currently, companies do consider and use maturity models. It is expected that the idea of maturity models will continue to be used by many companies in the.

The special feature of maturity models is, in his opinion, the analysis of the current viewpoint and the future orientation of the organisation itself regarding the use of business processes. The analysis and evaluation of an organisation by different criteria should lead to the target oriented and further development of his own organisation.

The maturity model idea, of examining how good the organisation actually is, does not yet exist in his own organisation. But there exists even now the idea that the organisation must change different things to get a useful BPM approach.

9.2.2.3 BPM maturity model

The interviewee highlights that, currently, there are different approaches in several areas to achieve improvements in his company. For example, the company uses a lean approach for the production and finance sector to track some improvement potential. He further describes that the sales sector has introduced a new division that will deal with processes, and define and implement a new enterprise process model. There are, at the moment, many ongoing projects that are being worked on. But the overall concept behind these projects is not known and a BPM maturity model could be a very helpful tool for this. The impression that he gets is that the departments work on different organisations and do not know each other. The production has performed the measurements for years and there are lean management in the sales and finance sectors. Here, BPM should be seen as a holistic approach and that is what the expert is currently missing.

It would be useful for E2 to measure how well the process management is aimed at improvement. That target-performance comparison could lead to a target-oriented development of the organisation. When a BPM is introduced as a management method, the organisation should think from the beginning about where they want to go with it. Furthermore, the organisation should consider how to measure the BPM progress, and that is why the expert supports the use of a BPM maturity model at his organisation.

9.2.2.4 BPM

From the expert's point of view, BPM involves the 'planning, controlling, directing, organizing and optimizing of enterprise process models and

processes in organisations’. In addition to that, BPM includes not only the further development, but also training and ensuring that the currently defined processes are established well within the organisation.

E2 suggests that the first step of a functional BPM should be a record of processes and a new created or restructured process map. Now, the company is still on the way to being more process orientated. From the SAP introduction seven or eight years ago, there still exists processes documentation, but they are not documented very well and in depth. There exists no uniform documentation, and the organisation has grown considerably in recent years and also become international. Due to the growth of the organisation and the variety of changes in the company, there is no standard in business process documentation and usage.

The expert’s organisation currently has a large project in which they define new process standards; these standards should then be placed in the various organisations. The first step is all about the recording of the processes. At present, the company is not talking about the control of processes, because they are not that far yet. There is a software tool for working with process maps, and the organisation is engaged in its processes. But so far, the link to the company's objectives is missing. If, for example, the goal is to grow by twenty percent, then E2 believes that the BPM must be applied and used to change the actual used processes and to develop those processes further to achieve the goal.

BPM should be used as a ‘tool to achieve the company's goals’, and the ‘BPM objectives should be aligned with the corporate goals’.

9.2.2.5 IT

The interviewee suggests that the use of IT is not a prerequisite to making a successful BPM; in fact the use of IT can be a handicap. It takes ‘less time to open a paper based notebook’ than to draw something on the computer. The documentation of ideas is easier and faster without an IT system and those involved are ‘free in thoughts’. But if the organisations grows, then it ‘makes sense to switch to digital’ BPM tools. In a large organisation it is no longer possible to draw a paper based process map on a wall. If a process map is part of a computer system and anyone can access it by intranet, then this is an

advantage. But in very small companies, it ‘may be much easier and more striking when the process map is simply painted on the wall.’

E2 estimates that there exist other possibilities other than the IT used which impacts the BPM introduction into an organisation, for example, how the changes in approach take place by individual persons or within the organisation, or even just the understanding of the employees that the organisation wants to change towards a process organisation. This could also include infighting between different department managers.

9.2.2.6 SAP/ERP-System & BPM

E2 explains that first the SAP system was introduced within his organisation, and later the BPM approach was adopted. This BPM approach has grown alongside the normal work and pure departmental structure at the beginning.

In the expert’s opinion, SAP could be ‘a very helpful tool’ in business processes because it maintains structured predetermined processes. SAP could be helpful for a BPM approach, but also obstructive. A sales process in the company, for example, does not differ so much from sales processes in other companies. The interviewee advises that SAP has summarized the know-how from different approaches and integrated that into the SAP ERP system. Furthermore, SAP recommends that way because dozens of other companies also do it like that. This SAP approach can assist greatly in the setting up of new enterprise process maps.

If the organisation wants to install some special behaviour within the process, a programming or customizing change is required for the SAP system. The IT can be a limited resource at some point, when employees want to work differently in certain areas, and in the way that SAP provides it. It means that the organisation could only adjust the different processes with a lot of time and money. E2 uses the sales assistants of an organisation as an example. Sellers could have areas where they should act freely to pursue a better distribution strategy. There could be certain differences in the processes between different customers in order to have the best response to the customer requests. An SAP system may have restrictions that do not support all the customer’s wishes and could handle different sales behaviours for different customers. E2 estimates that SAP is very detailed in many areas and brings a predetermined structure.

The interviewee recommends that it makes sense to have a deeply structured and guided process at a production process which is completely synchronized. If machines are only attached to each other, the organisation must act less flexibly in that scenario because no one demands special flexible customising behaviours. But working in a creative field or in the sales area, where people work in different ways, a given system can appear to have many limitations. Everyone can use the given processes, but if you want to do something special, then SAP may have certain restrictions.

SAP is ultimately a tool which could support the BPM approach. An important focus is the management aspect behind the idea as opposed to the IT support behind the idea. BPM should be a management issue and the general idea is that the organisation wants to further development their processes. The organisation should be controlled by the BPM theme, which is ultimately an important requirement, not the computer tool which should only support the BPM activity. The SAP ERP system is an impressive system used on a daily basis, and a big tool used at the organisation. But in E2's view, they do not make BPM with SAP. SAP will not be seen at the organisation as a potential BPM tool provider. The expert explains very generally that the organisation uses another tool provider to draw business maps and record the processes.

SAP 'always seems a bit lazy' to the expert. Other systems such as the CRM solution from Salesforce appear lighter and more open. That system creates, in contrast to SAP, the impression that it is easy and faster to customise a pre-made process.

The newly developed processes of the organisation should not be based on the development of the given SAP processes; rather, they should be created by a self-sufficient development that sets the creativity free and should not be influenced by a given system. At the end of the process development, it should then be understood how SAP can implement these new created processes into the ERP system. E2 outlines that SAP is very present in the minds of employees if new process models are developed. In consideration of the new design, the employees involved often find evidence that this new developed design is not working with the standard SAP. Participants then infer that SAP must be customized, if the process has to run in the new defined way. The

organisation will also use SAP as an ERP tool in the future, and with such statements from the employers, E2 suggest that the SAP system affects the development of new process flows and ‘restricts the creativity a bit.’

9.2.2.7 SAP & BPM maturity model

The interviewee predicts that a central SAP ERP system and a BPM maturity model can work together well. But it also depends on ‘how the maturity model looks’ and ‘how the criteria are’ to evaluate the process maturity.

When organisations search for a suitable BPM maturity model, whether the organisation wants to create comparable results to other companies could also play a part. If an organisation wants to compare the process maturity to other companies, it can be difficult to really compare that, if, for example, many special solutions have been implemented in the SAP for the company. The differences probably also come from the different customizing and in-house developments.

There are currently a lot of in-house developments at the expert’s organisation. E2 expects some saving potential if more SAP standards are used in the future. But this means that the organisation is then closely linked with the SAP system and no longer has as much room to develop their own processes.

9.2.2.8 Summary for expert No. 2

E2 points out that a BPM maturity model should consider the current status of process management within the organisation in question. The model should analyse the current point of view and the future orientation of BPM within the organisation. BPM should be seen as a holistic approach and the BPM maturity model should measure how well the process management is established at the organisation. It can be a very helpful tool to understand the idea behind a BPM approach and get to know the various circumstances in the company. This also includes the analysis of how established the currently defined processes are.

E2 suggests that the first step of BPM should be a description and a process map of the new or restructured process map. There often exists only very rare, or non-existent, process documentation from an SAP introduction. This documentation must then be mostly made up, especially if the company has

grown or developed further since the introduction of SAP. In that context, the organisation should align the BPM objectives with the corporate goals.

E2 indicates that the use of IT is not a prerequisite to making a successful BPM. It could also be possible that an organisation does not need any IT systems, but if a company grows then it make sense from a certain viewpoint to use any kind of IT software to support processes.

Like many other companies, an SAP system was used first in the company and the BPM approach followed afterwards. An SAP system could be very helpful for business processes because the system contains predefined processes, but these structured and predetermined processes could also be obstructive. A sales process could be the same at different companies, but also very different if the salespeople are very flexible with their customers and the system does not support this special kind of sales process for a better distribution strategy.

The SAP ERP system is an impressive system used on a daily basis, and an important tool used at the organisation. Therefore, SAP is very present in the minds of employees if new process models are developed. The employees involved often have evidence that this new developed design is not working with the standard SAP and these thoughts can block the development of new processes. Furthermore, E2 mentions that SAP always seems a bit lazy in comparison with other systems and this can also influence the development of new processes. But the SAP system is not seen and used as a BPM tool in the company. The organisation uses another tool provider to draw business maps and record the processes.

E2 believes that a central SAP ERP system and BPM maturity model can work together but dependencies may exist regarding the IT business system and how criteria are used to evaluate the process maturity. A company should also consider if a maturity model should be used to compare the maturity level with other companies. But the differences could depend on their own software developments and different customizing settings of the SAP system that is used.

There are currently many in-house developments at work and E2 expects some saving potential if more SAP standards are used rather than so many own

software developments. A maturity model should therefore also examine the possible deviations from a standard system such as SAP, but eden does not investigate these behaviours.

9.2.3 Expert No. 3 (E3)

This section provides a detailed summary for expert No. 3 (E3) using the six defined categories.

9.2.3.1 Criteria for definition as expert

E3 gained his first experience with a maturity model at an international overseas project in 2006. He has gained work experience as a business development and process manager at international locations since 2008. As a former IT Director, he has also collected practical SAP experience.

Currently, he has practical experience with the eden maturity model. A working group from different parts of the company has now applied eden to the organisation. That utilisation was not an official analysis of the whole organisation and was only placed within the members of that working group. The selection of the eden maturity model was the decision of the head of the working group.

9.2.3.2 Maturity model

E3 expects ‘two core functions’ from a maturity model. On the one hand, a maturity model should show how to ‘measure the development’ of the BPM at company in question. On the other hand, it should benchmark it against the BPM of other organisations to compare its current state. It is important to note that it does not matter for a maturity level if a company executes a poor maturity analysis. It is more important to achieve the maturity model aims of the organisation and to push the organisation with the maturity model and bring it further.

When using a maturity model, users should be faced with issues ‘that affects their work environment or the organisation’. This creates the possibility that the questions of a model may focus on topics that otherwise might not be considered. A maturity model also creates ‘transparency about the current position’, due to the fact that users have to answer questions. Wherever users replied with ‘No’, or scored badly, it can then be seen as a hint that the organisation can do more in that direction.

E3 suggests that a maturity model should generate alertness and ‘call attention to blind spots’. It should then assist in a collaborative and advisory way, without making any provisions or revealing someone’s mistakes.

E3 believes that it can be perceived as a negative point that the user may not be aware of the whole dimensions of a maturity model at the beginning. It can raise the issue of which questions a maturity model is good for and how the question and usage of the model could lead to the topic. The user cannot quantify and qualify the benefits of the question and can only guess how that question may help the organisation. The more often a model is applied, the more a user can understand the questions correctly and apply them. The user learns on the basis of the questions a better reflection about the own company's situation. It may therefore be beneficial to answer the questions together in a group at the first usage of the model, to interpret together how the question could be understood. To discuss the questions of a model in a group gives also the opportunity to reflect and consider the questions or topics of the maturity model. That can avoid misunderstandings of questions and application errors. But a group usage of a maturity model could also lead to different results than a single survey would have achieved.

An additional suggestion for the use of maturity models would be an even further differentiated use of roles. A manager looks at an organisation’s behaviour from a different perspective than someone in a clerical role. Nevertheless, all get the same questions. E3 suggest that it would make a maturity model more valid when ‘role-specific questions are asked’, depending on whether the respondent is charged with managerial responsibilities, or deals, for example, with the execution of processes.

The maturity models have always received negative attention, because they show in detail everything that is not working. The result of the maturity models always showed negative things and ‘what still does not work’. Perhaps the question of the models should be structured in a more positive way which avoids the loss-making characteristics of the result, and frames the issues of the maturity model in a more positive light. It is much better to show what results can be achieved with a successful maturity model, than to show the difficult path to reaching a successful maturity. It could therefore be more helpful

to the users to change the kind of questioning in order to obtain a more positive character to the question.

9.2.3.3 BPM maturity model

E3 highlights that BPM maturity models could be used to gain an overview of the whole organisation. But this cannot be the only benefit. How the BPM maturity models can be used should be decided, along with which intentions the company has with the model, and how the analysis supports the company.

It is important to set up the maturity model in a wide and varied manner to consider several points. E3 outlines that the behaviour of an auto industry is different than an energy industry or a food manufacturer. Therefore, a model should not be too heavily focused on one area. For example, IT should be a part of a BPM maturity model analysis, but only one part and only superficially; not too detailed.

The use of BPM maturity models can also lead to anxiety. The results of the BPM maturity models can be seen ‘more as a review and not as a definition of the business position.’ But nobody wants to receive a poor result from a review. Therefore, the results of a BPM maturity models could be viewed as incorrect by the department in question in order to avoid being a worse part of an organisation.

As a practical example within the application of eden, one result of the analysis was that the role of ‘process responsibility’ was presented as a critical factor. That role was not established and exists only on paper, because the executives still thought about the line management of the organisation and not about process management. This means the process owners ‘saw the limits of their line’ and had no overarching thinking in other areas. The beginning and end of the process was still linked to the beginning and the end of the previous line management. Therefore, it was a good challenge to ask how the processes are designed. Are they adapted to the functional organisational structure, or do they already work across the organisation?

One positive aspects of the eden maturity model was that questions were completed very quickly. Using another model, it took much longer. Normally a businessman does not take the time to spend hours to read and answer

questions. A fast and easy to use BPM maturity model could obtain advantages over other models.

The introduction of BPM will typically require a long period of time, therefore a BPM project can stoke anxieties within an organisation and its users. If a BPM is introduced over the years, many changes in the company are carried out. A good maturity model should help to minimize the fears, rather than causing an even greater shock and making some come to the conclusion that the organisation may never be able to implement the results of the BPM maturity model analysis.

Whether a BPM maturity model is successful, also depends on the corporate culture. The results of BPM deployment can be rejected by all employees, if it is all about the measurability of processes and whether the company is not fast enough. The principles of the organisation must also be paid attention to. If they have the principle ‘we do the best we can, and we do it all ourselves’ then the measurability of the execution time of processes does not have mandatory support. Even if SAP delivers the execution time for individual processes, the organisation should not publish that, if the corporate culture says something different.

The users in Germany make no distinction between the terms BPM and BPO and only know the meaning of BPM. The basic understanding in Germany about the term BPM, relates also to the structure and culture of an organisation. The organisation also handles the modelling and deployment of processes and SAP use process behaviours for the ERP handling. E3 estimates that the culture of their organisation is an important consideration for the BPM behaviour.

9.2.3.4 BPM

E3 argues that BPM as a Business Process Management discipline should manage a company and its operations. The central idea is the continuous improvement of the whole organisation and their processes. Many different components contribute towards improvement. There should be a common understanding established within the organisation about the meaning and application of BPM, which can then be used as a means to improvement. The question then arises how ‘internal sequences could be made to short, narrow,

simple and accelerated' processes. That means that processes should preserve resources and be of a high quality. The main purpose of the process behaviour is to provide a quality standard and make it possible to obtain the further development of the organisation.

The BPM view should apply to the complete organisation and beyond. The process management view means not only looking within the company, but also in all directions outside of the company. This means the collaboration with suppliers and customers or dealers, or whatever is in between. E3 demonstrates one example from Michigan where a bakery implemented process management. That company specified all suppliers and all their own 'stores and shops in supermarkets and malls as part of their business'. They invited their own customers and employees from the malls and stores into their process workshops. Finally they 'have had a dramatic cost reductions and performance improvements' thanks to this attitude of integrated process management within their organisation.

Perhaps a company initially begins only with the documentation of individual processes and the optimisation of these processes. To start with, this may be a good first step. E3 estimates that this is a kind of BPM but not the full expression of BPM usage. There exists a potential which is then exploited only partially.

For the expert, it is not a bad thing to only start with the optimisation of individual processes. BPM involves quite a lot of things, for example 'change management, attitude changes, leadership changes or a systemic organisational development'. Each workshop or any process analysis within the organisation which is about the topic process leads to further BPM development.

E3 defends the position that the human resources department should be very deeply involved within the change process. The BPM topic is about systemic organisational development and also about change management within the company. The best way to assist people with these issues of change should be an independent body that also knows how to deal with people. The human

resource department ‘together with the IT department could be an all-star team to implement BPM’ at an organisation.

Process management changes often miss a form of communication. Typically, BPM changes took place at the middle management level with a lot of changes of behaviours, applications and human resources. E3 highlights that just the fear of losing influence is a major barrier to the implementation of processes. The middle management must be persuaded to think about process management in a positive manner as a management tool for guiding, and not to think in functional limitations.

E3 determines that BPM means the development of people. Systems and processes come only after that. A process is useless if it is only drawn on paper. All the changes of a new process must be carried out by the people of an organisation.

9.2.3.5 IT

E3 emphasises that, in many cases, the IT department is still linked to the finance department. He explains that the IT is controlled by the finance and is limited consequently by the estimated costs and the figures of the finance department. It is often the case that, nowadays, a doubling of the number of users or quadrupling of applications have to be operated with the same personnel. The interviewee outlines that the IT world is becoming more complex, but that the IT department must operate with the same personnel expenses. This gives the impression that IT is only driven by a cost point. In the context of BPM, there are many changes involving people and leadership, and therefore the human resources department and the IT department should combine in a better manner to report to the management board.

But if the IT department introduce a maturity model, it may well result in a negative suspicion. They have already tried to convince the users about standard processes, if they have introduced new ones. Therefore, it is advantageous if the maturity model is not established by the IT department. Although a maturity model linked closely to the SAP system would be considered as a disadvantage by some people, E3 raised the question of what drives people to accept changes.

The practical use of the eden maturity model has shown that at this company, IT has limitations that affect the costs. Therefore, they strongly recommend the use of standard processes, because they have to map the whole complexity of the world in their systems and could not provide that any longer.

The IT questions of the maturity model have also demonstrated that the maturity model would not have been complete without them. Nowadays, many people could no longer work without any IT support. Therefore, IT ‘must be part of the maturity model’ and a model must include some IT questions. But a maturity model that focused too much on IT behaviours, or a maturity model that does not include IT questions, would not be right. IT is an issue which has a great influence on the working environment for most processes.

The first functional unit, which deal with BPM at E3’s organisation, was the IT department. All the BPM changes within the organisation started from the IT. The other units who execute BPM at the organisation were the production and logistics. It is not the case that the whole enterprise of E3 now uses BPM as a management method. The main reason is that the management board has not supported the BPM changes from the beginning. In the meantime, the finance and organisation manager have assisted the BPM alignment. This manager wants, through the use of BPM, more efficiency, leaner processes and a general cost reduction.

The interviewee suggests that BPM has a lot to do with the attitude that represents a company, and this attitude is not reflected in the IT system, but in the minds of employees. If the organisation is built on an open hyper-communicative corporate culture, then there is no need for the introduction of a BPM culture and the subject is self-adjusting. But above a certain company size, an organisation needs some IT support because a certain formalism is then necessary to bring transparency into the organisation.

The IT which is used in a BPM environment makes a difference, because the IT department has the great advantage that it is involved from the beginning to end of each process. The IT department also know the crossovers between departments and implements them in such a manner that it can gain a good overview of the process and the interfaces.

9.2.3.6 SAP/ERP-System & BPM

A mental link between SAP & BPM does not exist at E3's organisation. SAP systems are seen only as a transactional supporting tool. That means that the SAP ERP system performs only complete operations to conduct business. The IT department understands that, but not the rest of the company. Most employers see SAP as a transactional system to support the business behaviour of a company in many different program steps and with a large database in the background.

SAP is a 'tool, an IT support for documents', which passes a transaction of program steps and documents from one station to another within the company. Therefore, SAP 'has not been linked to the concept of BPM' and there are mostly only contextual links between SAP and BPM at the organisation.

However, the interviewee sees a few points of contact between SAP and BPM. SAP has hardcoded best practices and processes that are stored in a very rigid system. If an organisation defines completely independent processes for the company and SAP is used, then this process must be adjusted, because they do not agree with the SAP standard processes. Although SAP promise that customers can program nearly every change they want, that is a theoretical construct. E3 highlights the fact that a company gives itself a massive workload if it changes the standard SAP processes. Every SAP release change, every upgrade and every service call needs some extra 'consideration. If the processes 'deviate from the SAP standard' the organisation 'needs more people' to implement such things.

The department does not want to experience the limitations that occur when there are deviations from the standard SAP system. If a user buys an app from the App Store then he wants to operate it intuitively. This is also expected increasingly from SAP. Of course, a SAP system is much more complex, but a user does not always want to read a lot of books to understand what he is doing.

If the organisation is modelling the ideal process, then the IT staff knows their transactions, and keep the SAP standard flow in mind. Therefore, the IT department is trying to lead the various departments for the SAP standard process. This paternalism has caused departments not to invite IT if they are

thinking about new processes, because they often feel compelled to use the SAP standard process. This has meant that the IT department was invited to many projects much too late, and that behaviour lead to many more costs for the company in order to develop a useful process.

If a company is much closer to the standard, then life becomes easier and requirements can be better fulfilled. But the departments observe that they are not free to act regarding new processes because the IT department dictates how to run processes. An IT department added late to the process leads to a highly customized SAP system, with all the costs that are associated with that complex SAP system. Therefore, IT often has no lobby because they produce costs and will possibly advise how processes should be designed. In many cases, therefore, the departments are fighting against IT and that leads to compromises in the use of ERP Systems within a BPM environment. But a BPM must not be understood as a process design which is built to use the best or the standard SAP process behaviour! BPM and SAP have to *support* each other.

SAP is not seen by E3 as a BPM tool. A BPM tool is much more than just the software that visualizes processes or stores some process descriptions, and SAP is not the best option for the visualisation of processes. The BPM software should be a tool and modular system that provides various aspects of BPM and considers the tools to use the systems for a successful BPM. Additionally, a BPM tool should accompany and support the company to change their processes. The problem with SAP is that it still need human IT support, who can code the changes in the complex SAP system. But if an IT change is required and that change result from the BPM usage, then SAP can block the BPM requirement.

If SAP and BPM are used then an organisation should always be aware that companies which uses SAP have slower rate of changes and think mostly up to the next release upgrade. SAP is a very complex tool and has a look and feel that does not support the idea of dynamic processes at a company.

Today's society is used to apps on a cell phone; this leads to a decreasing willingness of people to handle such a complex and old fashioned system like SAP.

9.2.3.7 SAP & BPM maturity model

SAP had already been established first in the company, before the BPM implementation in individual departments took place. The application of the BPM maturity model eden was performed at the beginning of the BPM implementation. The aim was to regularly apply the eden maturity model in the organisation. Therefore, the second application of the eden model should be executed in the near future. This should determine if there have been improvements in the BPM environment in the past two years. The company would like to see if there really are improvements after the introduction of BPM is done, and how the BPM status will now be reviewed. But in principle, the organisation and the departments involved are still in the introductory phase of BPM.

The department missed during the application of the eden maturity model, or even with the use of the classic SAP system, the output of more instructions, tips or best practices. The user would still be free regarding the decision of the BPM usability but it would help to show a possible means of BPM usage. For example, if a food manufacturer operates in the digital world, then the company needs to consider how the company keeps fit for the digital world and how to deal with digital consumers. The classical approaches of B2B or B2C are becoming increasingly blended with each other. These new ideas are sometimes contrary to the old SAP system. Maturity models, but also the SAP ERP system, must adapt their role to the new digital behaviours. Both need to prepare for this digital world and show how far the world has already progressed today. The internet has already changed customers. There is no longer the same willingness to pay more for extras. A customer now only spends additional money for status or well-being optional equipment or for personal product customisations. There exists often not only one possible solution, which is defined by a standard process. The construct is increasingly softened, and nowadays there exist several standards with various diversifications. An organisation must therefore be able to serve all the different market requirements.

Both maturity models, as well as the classic SAP system, are lacking in their support of BPM change and gaining progress on the issue. A maturity model needs to show the next steps. This means the question of how, what and where

can the organisation improve their BPM. Even within an SAP system, that would be an asset. As there exists on Amazon purchase proposals for different products, such as ‘Customers Who Bought This Item Also Bought…’ then a similar proposal in the SAP environment or with maturity models would offer great support. An ideal complementation for a maturity model would be if the answer to questions leads to possible actions which could now be introduced at the organisation.

The topics BPM, BPM maturity models and SAP match well, but these things might have a better interaction and lead to other things. Many projects fail because they are not scheduled as a change and only as a technical project. The projects do not realise that they are dealing with people, and this could be supported by a maturity model or a process visualisation.

The use of BPM maturity models, as well as the impact of SAP at BPM projects, leads to changes at the organisation. But these changes also affect the employees of a company. Therefore, the IT department and the special departments of an enterprise should not be the only ones involved; the human resources department should be involved as well. A BPM must not be applied in a manner that avoids any difficulties with the SAP system. An IT department certainly wants to introduce the standard SAP process, but the department has its own idea of the ideal process for an organisation. Therefore, the interaction of SAP and BPM leads to a potential of conflict at the stage of implementation. Each implementation needs people who can support the implementation and mediate any conflict situations. This can be done by a special department, but a maturity model can also support the BPM changeover and stimulate more communication between the involved parties or, ideally, both parties together can do that.

If a company uses an SAP ERP system, then it is used in many key areas of the organisation. It would be good if the maturity model and the people involved consider the SAP system used and the company has only a small chance to change the SAP system. For the company, there must be life-threatening or extremely painful financial advantages or disadvantages to want a change of the SAP system. Maybe they can reduce the use of IT systems, but it is unlikely that they would replace the important SAP system. But if they want to cover

new areas of IT, and do not want to use an additional SAP module, then that can result, from the IT viewpoint, in an increase of complexity within the IT system used.

For a CEO or a CIO who must select an IT system, SAP is also a kind of insurance. It has a well-known name on the ERP market, and everyone hopes to do nothing wrong if they implement an SAP ERP system. If the company implements a No-Name system then that can quickly lead to more uncertainty about the use of unknown systems.

9.2.3.8 Summary for expert No. 3

E3 indicates that a maturity model has two core functions. A maturity model measures the development of the BPM at the own company and benchmarks the BPM behaviour to different companies. A maturity model also creates transparency about the current position of an analysed topic. The outcome of a maturity model should generate alertness and find blind spots which would not have been otherwise recognized. But, E3 argues, the users of a model do not at first know why they have to answer these special questions. Only when a model is used more often, can the user understand the questions correctly and learn to reflect the questions in an appropriate manner. This can be a good reason to answer the questions of a model in a group. In this way, the questions can be answered together. Alternatively a consultant should support questioning and explain the understanding of the questions. E3 also notes that the same kind of questions could be answered differently if the same question is asked for a manager or a clerical, because both have a different role-specific view about a topic. Furthermore, E3 complains that the kinds of questions are often negative and should be structured in a more positive way, because it is much more constructive to find out, through a maturity model, what is still working rather than only showing things which are still not working.

E3 expects from a BPM maturity model an overview about the whole organisation and their BPM understanding. He considers it important to set up the maturity model in a wide and varied way to assess several points. The results of a BPM maturity model should be handled as an organisational review and the questions should also include the corporate culture of a company. It is very positive if a model can be carried out quickly, in the manner that eden

does. Normally, no one has the time to read and answer questions over many hours. The eden model especially can be used for different industrial fields and different areas.

The basic understanding of BPM on the German speaking market concerns not only the modelling and deployment of processes. BPM also includes the structure and the cultural behaviour of a company. The central idea should be the continuous improvement of BPM and to establish BPM as a management discipline to manage a company and its operations. Therefore, BPM includes amongst others the change management and the systemic organisational development. However, BPM should not only look within an organisation, it should also deal with collaborations external to the company and their processes. Overall, each workshop or process analysis can support a company to improve the meaning of the topic BPM.

Furthermore, the BPM theme should not only be supported by an IT department. BPM deals a lot with the change management, and this topic should be supported by a human resources department. This change needs considerable communication and also the development of people within an organisation. For this reason, it seems E3 considers it a reasonable solution to combine the HR and IT department for a better BPM approach. The first change affects people; systems and processes come only afterwards. It must also be noted that the IT world is becoming more and more complex. But IT is often driven by a cost point, even in the context of BPM. IT is controlled by the finance and is limited by the estimated costs of the finance department.

E3 indicates that, in general, a maturity model may result in a negative suspicion, if the IT department introduces that model. With regards to a maturity model which is implemented by the IT department, users often expect to be able to only use standard processes. Users think that their processes are something special, and the standard processes cannot fulfil their behaviour, even if the use of standard IT processes is recommended by many experts. The same negative behaviour applies if a maturity model is linked closely to a SAP system. E3 notes that what drives people to accept changes should always be considered, especially if IT claims the process.

But a complete maturity model does need some IT questions, but IT must be part of the maturity model, but not too much because otherwise all the BPM changes and the use of maturity models within the organisation start from the IT department. BPM and maturity models have a lot to do with the attitude that represents a company or the BPM topic, no matter whether it comes from the IT department or from management.

E3 indicates that SAP has not been linked to the BPM concept. Most employers see SAP as a transactional system to support the business behaviour of a company or as an IT support tool to manage documents in an electronic manner. There exist only a few interfaces between SAP and BPM. One example is the best practice approach which is provided by SAP and can be used well for BPM. But even if SAP promises that all best practices can be customized, companies should consider exactly whether this is necessary. Every SAP release change, every upgrade and every service call needs some extra consideration if some kind of extra in-house development exists.

SAP is, for many companies, a really powerful factor and always in the mind of the employees if they create new processes. The creations of new processes are therefore often influenced by SAP, because the software has been used by companies for years. E3 explains that it is therefore difficult to develop a new process close to the SAP standard in order to have as little effort as possible during release changes, but to develop a new process in a manner so that the process is not too strongly influenced by the SAP considerations.

A general disadvantage of SAP is the complexity of the software. Today, every user expects IT software to be easy to handle, in the manner of their smartphone apps. SAP systems are of course much more complex but a user does not want to read a lot of documentation to understand the basic principles of software. For E3, SAP is not the best opinion to visualize processes and also not accepted by many companies as a BPM tool. A BPM tool should support the company to change their processes, but SAP still needs human IT support who code the changes in the SAP system. SAP is too complex and does not currently have the look and feel to support the idea of dynamic processes at a company.

In most companies, SAP has already been used much longer than the BPM approach. For E3, it is therefore a good idea to carry out a maturity model at the very beginning of a BPM introduction. Perhaps the SAP approach has already established some kinds of processes. The second application of a maturity model could then determine if some improvements in the BPM environment have been made.

E3 missed, with the eden model, some kind of instructions or best practices as an outcome of the model. It would help to show some possible methods of BPM usage. This is especially necessary if the new BPM approach is based on an older SAP system. E3 expects that the answer to maturity questions leads to possible actions which could be introduced at the organisations.

Also, the use of BPM maturity models in combination with the use of a SAP ERP system leads to changes at the organisation. These changes also affect the employees of a company. Therefore, not only the IT department also the human resources department should be involved in the application of a maturity model, and the HR department can mediate some conflicts.

E3 also missed, during the maturity model, the digital approach. Both the SAP ERP system and the maturity model need to prepare for new digital behaviours. The internet has already changed customers and this will have any impact on BPM processes and the SAP system, but the eden model does not investigate that digital approach.

Ultimately, it can be observed that the application of a maturity model probably does not lead to a total change in an ERP system. There must be, for the company, life-threatening or extremely painful financial advantages or disadvantages to want to change the ERP system used, even if an SAP ERP system is in use. To use SAP is a form of insurance, because it is a well-known name in the ERP market and everyone hopes to do nothing wrong if they implement an SAP ERP system.

9.2.4 Expert No. 4 (E4)

This section provides a detailed summary for expert No. 4 (E4) using the six defined categories.

9.2.4.1 Criteria for definition as expert

E4 has already used BPM maturity models at several companies in Switzerland as well as the 'Lean Management' method. He has participated at a certification program in process management at the Object Management Group 'OMG' and there he was introduced to the Business Process Maturity Model (BPMM). E4 used that maturity model at different companies, but emphasizes that no details about the companies or sectors are to be made public within this thesis. Switzerland is a relatively small market and people could easily come to conclusions about which companies are involved.

In practice, E4 has over 15 years of experience as a Senior Project Manager and Business Process Manager. He gained experience, amongst others, at international process and change management projects with Lean and Six Sigma and as an IT and Process Consultant.

9.2.4.2 Maturity model

E4 highlights a maturity model as a method which can be used to measure the maturity of something. Furthermore, it is an indicator about the direction in which the further development of an organisation should proceed to achieve the goals of the company. A maturity model must match the business objectives and corporate strategy to ensure the necessary developments are in the right direction.

The interviewee highlights that in practice, it is unlikely that the highest process levels of the used maturity model will always be reached. If an organisation uses a maturity model, it is used instead to gain continuous improvement and gradual progress.

9.2.4.3 BPM maturity model

A BPM model offers the possibility to measure the business processes of an organisation and identify indicators about possible directions for a further process development.

E4 highlights that the usage of BPM maturity models is also an over-hyped topic. BPM maturity models demonstrate a strict framework with reviews and indicators and specify which processes reach which process level in the maturity model. Furthermore, a BPM maturity model represents strategy

suggestions of which changes an organisation needs to direct all processes to a higher level.

For E4, the BPMM of the OMG is the best maturity model he knows. It is also a complex maturity model and it is rarely used anywhere, because of its complexity, but it does include all the details which are needed for a good BPM environment.

The interviewee executes process management in Switzerland at several companies. He realized that in Switzerland many organisations prefer to use a self-developed maturity measurement. This is normally ‘a checklist of ten points’, and this checklist is then used at the company. In E4’s experience, a Swiss organisation prefers checklists rather than a maturity model. E4 personally used the BPMM approach as a background to receive a good check list.

In Switzerland, the eden maturity model is not as successful as in Germany and is also quite rare. His reason for using BPMM is that everything is described as the following approach, ‘the organisational point of view, the strategic point of view and everything about the processes not only the processes themselves’. For E4, the BPMM is the reference at international level but even he thinks that the model is too complex. Furthermore, he feels the model is an international standard, even if BPMM is no longer developed because it was not as successful in America.

BPMM is as simple as CMMI and also based on this. The interviewee mentions a PDF description of approximately 600 pages, which is in his opinion too detailed, but he recommends the first 100 pages which provide a good impression about the model.

E4 himself has used the model in several industries. He explains that the BPMM can be used independently, everywhere and across all kind of industries, because it was made to be very generic. It contains nothing too specific, even if there are some special analyses in the area of finance, but that can also be used for other industrial areas. BPMM can be used to ‘model a process with key figures, with controls, evaluate risks and give instructions’. The experience with the BPMM resulted from a certification program in the process

management area which was offered by the OMG. For E4, the model has a lot of potential and considers, for example, the business strategy of a company.

In the interviewee's opinion, the BPMM maturity model can be used across all areas with no restrictions. The model is so broadly defined and so complex that it is really a fit for all. However, he explains that the model can be used in a more simplified way, to remove some complexity.

Putting the personal perception of E4 aside, there exist more problems on a human level. The topic process management often encounters problems of comprehension in the top management. Maturity models are then the next level based on process management and make the issue even more difficult. 'The management doesn't understand why measurements [should] be made about processes, where the business runs already successfully for years'. The members of an organisation must be prepared for the topic of maturity models.

The goal is never to boost all processes to the highest degree of maturity. That is not a realistic opinion for the interviewee. The only goal is not to describe everything or to model everything. In practice, the goal is to focus on the target and the core processes, allowing end-to-end processes to be considered which bring added value to the company, and then these processes can also be optimized. What the company produces should be considered. The optimisation is performed only for the processes for which the customer pays. The rest can be optimized later like, for example, IT, human resources or material costs. These can also be optimized continuously but the first step is always focused on processes which are close to the value chain.

Maturity models have the disadvantage that almost all processes have the same weight and are considered with the same importance. E4 explained that the lean approach put more value on the question of what is more important to focus on. This should be also a good opportunity for a maturity model. It should focus on the important processes for the company and start the optimisation for these processes. The result of the topics six sigma and maturity models is quite similar: The processes are defined, controlled, optimized and measured. Only the beginning and the focus of the approaches are different.

9.2.4.4 BPM

For E4, business process management can include a lot, though it is often an over-hyped topic and people do not know exactly what it means. In his opinion, BPM includes individual modules and a classic circle: process definition, process modelling, process measurement and process optimisation or the steps measure, control and optimize. There are people who claim this is just the process modelling, but for he expert, this is not enough. Other people put everything into the topic BPM, including lean, six sigma and even more topics. But this is a bit too much. BPM contains a classic circle which aims to define, model, compress, measure, control and optimize processes and the result is then a wide scope regarding the topic.

The idea that the BPM topic only contains a structured development about all processes is not necessarily the practical experience of the expert. From practical usage, it is clear that BPM mostly concerns the main processes and is then really focused on two or three main criteria of these processes. For the practical usage, the question arises of how important is the issue from the compliance and top management perspective.

The expert claims that in Switzerland, the issue of cost reduction and also compliance in the insurance and banking area are important topics about process management. For him, the areas that are mostly considered are the logistics or IT processes and also human resources. The general rule is for a company with thousands of processes to classify and prioritise the processes and then deepen the selected ones. The interview does not consider it practical to model a complete organisation; this was, in his opinion, just for a short time a theoretical exercise, and is in practice much too expensive to do.

9.2.4.5 IT

The interviewee argues that there are basically two sorts of improvements that exist within a process environment. Process simplifications without any IT support is a purely organisational change, but on the other hand there are all kind of process improvements which need IT support like measuring of indicators or digitalisation. The use of IT is not a requirement for the BPM approach, but the results are usually better, faster and more automated if IT tools are used. Basically, IT should be involved if organisations use maturity

models. As soon as any forms of inspections, values or reporting are required, then IT is an essential tool which can support these requirements. Due to service management or similar areas, IT is already quite process oriented.

E4 understands maturity models to not be an IT subject. The IT department should examine how they can support a maturity model with values. This means which data from which systems or interface can be obtained and how they can be optimized if necessary. Mostly, the IT department has their own processes which are already described and, for example, modelled with VISIO or BPMN. It follows that IT has usually no problems with understanding BPM and maturity models if they are involved, and requirements are explained in a timely manner. But in practice, the IT department do not usually get the capacity for comprehensively supporting process optimisations.

If the IT department supports the use of maturity models, a company can handle the maturity model better and faster, for example in the defining and measuring of indicators. But even without the support of IT, process improvements can be achieved if, for example, organisational processes or interfaces between teams are analysed and improved. IT support is a helpful thing to have, in order to aid the usage of BPM and maturity models and to intensify the topics and make them faster.

There are different approaches concerning IT. The lean approach focuses on the process optimisation and the streamlining of processes with little IT effort and as little IT support as possible. The ultimate aims of a lean company are: ‘optimized processes, controlled processes with as little IT system as possible’. E4 gives the example of TOYOTA, which has kicked out SAP and no longer uses a standard ERP system: ‘Other companies do the opposite and say they digitise everything up to the last point.’ In that case, the processes are controlled by extremely complex systems such as SAP. The interviewee thinks that this is a bit to complex, because people no longer have control over the processes. If the system has a problem then they have no overview of all the process behaviours, because the processes are digitized very deeply within the system. Finally, E4 suggests that maturity models are not generally suitable for controlling the IT behaviours of a company and new tools are needed which can support this complexity.

9.2.4.6 SAP/ERP-System & BPM

An ERP system is a back office to orchestrate or manage the whole company. E4 outlines that an ERP system is an important backbone. But there are also problems with ERP systems like SAP, because these systems have some preconfigured processes with given procedures and it is easier for the company to adapt to the system than to develop their own processes and implement these into the system. The process exercise should be independent of the system. Combining it with a system makes it more difficult, because the company is then more dependent on the system. But if, for example, a maturity model suggests that the process owner should review the process annually, an ERP system does not often support these kind of review processes.

The SAP ERP system is seen negatively by E4, because the system digitizes and measures a lot. This is, of course, a positive thing, but makes it difficult to change the running process on a platform that does not allow this or restricts the change processes. The interviewee notes that a system like SAP is a mega or core system which covers nearly 30% of the company. But there is still '70% optimisation potential in other processes which are not covered by SAP'. An ERP system should handle certain processes such as orders. In addition, SAP offers much more tools, like an HR module, an insurance module and a banking module. The aim of SAP is to cover a wide range of business processes with their ERP system. However, the scope of BPM is to cover the whole company. The ERP system is used, for example, only for logistics and operations, but the BPM approach is stretched over the whole company. E4 suggests that ERP processes have a better maturity because they are digitized, compressed and are under the control of the system. But these processes are more difficult to change. This is different to other areas which do not use an ERP system. Processes which are only within an ERP system are often more precise than others which have interfaces before and behind the ERP System and are viewed as an end-to-end process.

9.2.4.7 SAP & BPM maturity model

E4 advises that by using a maturity model, it can, for example, be observed that everywhere where an ERP system like SAP is in use, the processes run better and with more maturity because they are digitized, and the system has them under control. It may look different in other areas. With the maturity model, the

BPM approach can be used for the whole company and, at minimum, the same maturity level as in the ERP environment can be attempted to be reached. The interviewee explains that the key should always be the end-to-end point of view and not the organisational point of view on the company. Furthermore, interfaces that communicate with other systems must be considered, and not just those within the ERP environment. The aim should not be to model the IT processes and to optimize them. Rather, what the company produces should be considered as well as what the end product is, and then interfaces to the ERP system are recognized. As a reaction to that, a closer look at these interfaces should be made. A look at the ERP system demonstrates that all processes are running well, but when examining the value chain as a whole, there are also system interface to other systems and an organisation normally has potential for optimisation at these interfaces. E4 asserted that if the introduction of the SAP system already costs twenty million, then the company expects that the system has built in processes which are already optimized. But the ERP system does not normally have a view on end-to-end processes and 'the ERP is only a part of the whole company. The value stream between the various systems must be considered as well.'

An SAP system uses predefined processes which normally do not have to be changed so frequently. But, if processes are considered from end to end, then a lot of potential for optimisation arises in the BPM environment, especially at the interfaces between the various divisions or systems. It is not even necessary to look at the process in more detail, because the optimisation potential exists already upon the first view. The practical experience from E4 demonstrates that potential exists in the distribution, between departments or within the back office. For example, they use incorrect forms or input wrong data and there exists enough potential to optimize much more organized behaviour at the interfaces between the teams. Until the end-to-end examination is completed, a second step could be the analysis within the IT systems that are used.

The interviewee states that no SAP changes are expected if a maturity model is used. Before or after the central SAP system, there is so much optimisation potential and this should be analysed closer and optimized, before more complex SAP system changes are made.

9.2.4.8 Summary for expert No. 4

E4 describes a maturity model as a measurement instrument and indicator for further development of a company. Companies can use a maturity model for continuous improvement, but it is unlikely to always reach the highest process level.

For E4, BPM maturity models are an over-hyped topic and represent strategy suggestions, the changes of which an organisation needs to reach a higher process level. With the BPMM, the expert uses a very complex maturity model which contains a large amount of potential for detailed analysis. Most companies in Switzerland would prefer to use a self-developed and easier maturity model or a ten point checklist rather than a maturity. The eden model is rarely used in Switzerland. However, E4 still prefers the BPMM model, because the model explores the organisational and strategic point of view and everything about the processes, and is an international standard model. The model is based on CMMI and can be used independently at several industries. The model has a lot of potential and can consider the business strategy of a company. The complexity could be a disadvantage, but the model is so broadly defined that it really fits all requirements.

E4 further indicates that the problems in the field of BPM maturity models are often on a human level. The management, for example, do not understand why an organisation should measure the BPM maturity for processes which have been running for a long period of time. That means that the members of the organisation must be prepared for the topic.

A realistic goal for a maturity model is not to always reach the highest maturity level for all processes. Rather, the main goal should be to describe and model every process and to set the focus on the core processes of a company. The core processes are the processes which the customer is willing to pay for. All other processes can be analysed and optimized later. But that is one main disadvantage. Almost all processes have the same weight and importance in a maturity model, but a company should set the focus first of all on important processes.

E4 also calls attention to the fact that BPM is mostly an over-hyped topic and people do not know exactly what it means. For E4, BPM is a circle with for

steps: process definition, process modelling, process measurement and finally process optimisation. But in different countries, the focus has been on different areas. In Switzerland, for example, cost reduction and compliance are important issues for process management.

The use of IT is usually not a necessary requirement for a BPM approach but IT supports the BPM process considerably and the results are more often better, faster and more automated if IT tools are used. Essentially, IT should be involved in the BPM approach because it is an essential tool which supports the BPM requirements and gets faster results with, usually, less effort. However E4 also gave two different examples regarding the IT usage. TOYOTA, for example, rejected SAP and does not use standard ERP systems anymore, but other companies do the opposite and digitise nearly everything into a SAP system. As a disadvantage of an SAP system, he claims that it is a bit too complex and that people do not have control over the process any longer and has to analyse a variety of IT details.

In general, an ERP system is an important backbone. But if predefined processes exist then it could be much easier for the company to adapt to the system, than the other way around. E4 suggests that ERP processes have a better maturity because they are digitized, compressed and are under the control of the system. But an ERP system like SAP has another big disadvantage related to BPM. The aim of an SAP system is to cover a wide range of business processes, but the scope of BPM is to cover a whole company and their processes. If an ERP system is, for example, mainly used for logistics and operations, then it misses many other processes which are not covered by an SAP system. For BPM, an organisation should always analyse the whole end-to-end process, which usually also involves communication with other systems. E4 concludes that an ERP system only has a view about some parts of the end-to-end process and the value streams between the various systems are not considered.

An SAP ERP system is also often seen negatively by some users, because they expect predefined processes which are difficult to change and these changes costs a lot of time and money. But E4 also knows from practical experience that a lot of optimisation potential exists between the existing interfaces at other

non-SAP systems or within the back office. Therefore, E4 recommends first the analyse of all optimisation potential from outside of the system before SAP or used ERP processes are analysed and changed.

9.2.5 Expert No. 5 (E5)

This section provides a detailed summary for expert No. 5 (E5) using the six defined categories.

9.2.5.1 Criteria for definition as expert

E5 works in the service sector and has used the BPMM maturity model of the OMG. E5 has over 18 years' project experience and over 8 years' experience as a process manager and consultant. During these projects, he always came into contact with SAP applications. Through his work, he gained practical experience not only with the BPMM maturity model, but also in the areas of BPM, Lean and Six Sigma.

9.2.5.2 Maturity model

Essentially, E5 believes that 'there is no bad or wrong time to introduce a maturity model.' However, it is absolutely essential to have the commitment, and the will of the management or supervisory board to introduce a maturity model. From the practical experience of the interviewee, introducing a maturity model in a bottom-up way is never successful. In his opinion, the introduction must happen in a top-down manner; the commitment has to come from the very top management. The idea that any small department of an organisation can introduce a maturity model and have the support of the management and employees does not meet the practical expectations of E5.

The first use of a maturity model records the existing maturity and current state of an organisation. The result, for example, could be that the company recognises that its maturity is not as developed as was previously expected. The result of the maturity analysis can then lead to the impressions of why people think that a certain maturity has not been reached by an organisation. A maturity model can also identify areas which have not been previously considered within an organisation and focus on these new areas.

A very important point when choosing a maturity model is the effort required for the implementation of a model. There are solutions on the market for which companies have to buy the knowledge of consulting companies. These

consulting companies then need, for example, about twenty people and three months' time to interview all the employees, or at least every manager, for about two to three hours. This procedure is in practice not feasible, since the effort is too large and involves too much time and capital.

In general, E5 supports the statement that a maturity model is a quality assessment tool and improves the work of an organisation.

9.2.5.3 BPM maturity model

In general, E5 sees a BPM maturity model as an evaluation model that involves an assumption of which management practices are required to achieve a better process orientation of a company. Furthermore, a maturity model is an assessment that helps to identify which gaps exists in the BPM implementation, and where the management of a company needs further development to reach a better BPM position.

For the expert, there are small differences between the different maturity models and the level of detail. A model evaluates each process and how this process is performed, or examines the complete organisation and how the board conducts the company. For example, it may focus on the HR department on individual processes or whether these processes have full documentation with subsequent planning for the next steps.

For the experts, the main approach of BPM involves the possibility of linking multiple disciplines that traditionally run side by side. These are, for example, the compliance issue and the Governance Risk Management. E5 favours the BPMM, which best addresses this holistic approach about the different ideas, because there are 40 process areas which are evaluated within the model. The model considers, for example, all areas on product management. For E5, this is an important topic, because the processes for products or production or service provision arise from the creation process in product management. Moreover, the model also covers topics like the connection between the processes or the risks between the processes. The BPMM offers, as a technical advantage, a combination of various topics. So far, the experts know of only BPMM that can offer such a combination of various subjects.

E5 asserts that openness is the main practical advantage of BPMM. Other models on the market - such as eden - have only half or maybe even non-transparent software behind which they perform the review. Such models have a pre-formed way which prevents the understanding of why and wherefore things are rated, or prevents the making of own adjustments to the model.

The expert's aim is not to create any kind of benchmarking with other companies. He would like to find points where he can indicate for the management some areas in which a company must improve.

The ideal would be, of course, a newly founded company with no existing ERP system, for which all the processes needed to be relaunched. Usually, however, the company already exists, and uses an existing system, but 'there is no wrong time to introduce a maturity model.' For example, a maturity model can identify that a company works very well with the processes that are specified on the ERP system. But a maturity model can show also other things. The question is, perhaps, what has been completely neglected? What is the end-to-end process that brings benefits for the customer? Perhaps the process chain or process flow is not known by the company as well as the relationships in the ERP system, and no board has ever defined end-to-end viewing. In this case, the result of the maturity model can be to analyse the poor areas of an organisation. The introduction of a maturity model can support the well positioned areas of an organisation and highlight areas which need to be worked on.

The interviewee considers that a maturity assessment must be conducted differently in an insurance company or in a car manufacturing organisation or a bank. E5 thus highlights the openness of BPMM for different industries. Perhaps the model can no longer be called BPMM when points are weighted differently, but E5 argues for the freedom to fine-tune the model.

The introduction of a process culture is a multi-year endeavour. It may take up to ten years before a company has implemented the process suitability. That is a long time and it needs some measurability to be able to identify every year to the management board that the organisation take the next steps and makes progress. To show these ongoing steps, a maturity model is required. This model can also be applied if absolutely no process is defined. Then the review

is indeed pretty low, but can also be demonstrated. A year later, it could be evident that processes have been identified and perhaps even targets have been defined. Therefore, E5 recommends defining the maturity model and making an initial assessment if the decision is to introduce a process strategy in the company. E5 further recommends to start first with the introduction of a maturity model, and then afterwards with the processes.

Within a company, it can ‘be legitimate to bring certain areas of the company much further than others.’ From practical experience, E5 knows of a case where just one department used the BPM and won a prize, but all others departments were not interested in it. It may be the case that a maturity model is only used in order to compare an organisation itself with other companies, and to get a prize or the certification of a particular model. But much more important for the experts is the question of which target audience is to be achieved with the model. The use of a maturity model can also have many more practical benefits than simply winning a prize. The central core issues should always be ‘What are the processes used for? Why am I doing BPM? Why [do] I draw a process?’ Ultimately, the question is what is the practical effect created by the application of a maturity model? A practical benefit is obtained when the management has adopted a process strategy and wants to know how the current status of the company is, and what steps are necessary to bring forward the process strategy. A maturity model needs a target audience, and the target audience is the management. If the management does not care for it, then the company should apply no maturity model. If only a single department in an organisation wants to use a maturity model, then that is not enough. The only correct requirement is that a board of directors or the management has decided that the organisation use a maturity model and wants to know where the company stands strategically.

The result of the use of a BPM maturity model can be that an ‘ERP system does not do what the department actually needs’ and does not support the processes optimally. The expert outlines that often, the department specific needs have not yet been expressed, because they have been using what IT has delivered so far. This depends on how strong the department is. Is the department satisfied with the tools delivered by IT, or is the department so clearly

established that they make clear IT requirements? A maturity model can provide new thoughts here for the department.

The BPMM Model derives from the CMMI. Based on this formation, E5 believes that the IT origins of this model can be recognized. For example, there is a whole area which deals with Configuration Management. This could be a reasonable consideration within the field of software development with different releases of a product. But other industries, such as banks and insurance companies, have nothing to do with the topic of Configuration Management and how to develop the product further. Therefore, E5 excludes the subject of Configuration Management if he uses the model in the field of financial services. He explains that the model is consistent and right for him, but is not always able to match all subjects in all industries. Therefore, he does not use some parts of the model.

In the expert's opinion, it is quite possible with BPMM to first consider the whole company, but then focus in more detail on further sub-processes in a drill-down approach. The model BPMM is quite scalable, it may ‘not necessarily [be] the ideal model for the single process’, but it is quite possible that it may. According to E5, however, ‘BPMM is more suitable if at least one team or a unit’ considers it.

In practice, the use of a BPMM model can be quite extensive, and requires more resources than the company is willing to give. Therefore, E5 applies the following procedure: First, he examines the company carefully in order to specifically find twenty to forty interviewees to catch a ‘clean image’ of the company's result. This procedure offers the option of obtaining a budget with less investment: ‘This may not be the one hundred percent picture, but with the eighty percent picture, which can be created with a fraction of the effort, I have just come very far.’

The expert's experience is that IT technologies such as SOA or Lean will usually have a positive effect on the results of a maturity model. SOA provides the requirement to obtain flexible IT and means that the requirements can be implemented simply and quickly. If LEAN or Six Sigma are applied in the company, then there is, at least partly, a culture of discussing goals and

processes. Customer objectives are then defined within the company, and should be achieved by the end-use of the methods. There already exists a culture of improvement and a higher maturity level can be achieved after the first evaluation. This may not be the case for all areas of a maturity model, but for the areas where a LEAN or Six Sigma approach exists and has been concerned with improvement topics. Even if a workflow is designed and configured as an end-to-end process in a company, there already exists a dominant process of thinking within the company that can be placed. The presence of these elements indicates that the organisation is probably a little further developed and of a higher level of maturity than other companies on average.

9.2.5.4 BPM

For the expert, the topic of BPM concerns performance and not organisational structure. BPM provides a service for the customer or even for the production of a product. This implies objectives that are not set to the team or department, but on the process. BPM provides objectives which control the process and include performance due to the process goals of an organisation. The organisation should therefore adopt the ‘silo mentality’, and think more globally about their processes.

E5 does not limit the topic of BPM as a pure efficiency issue. BPM should not only consider that a single process should be more efficient, but it considers how such processes are carried out and how an organisation could run in a more process-oriented manner. E5 observes different topics if he observes BPM behaviour, for example the entrepreneurial objectives, management and administration, quality, costs and the customer's benefits. BPM does not automatically mean the processes need to be drawn. The interviewee considers that a company could certainly make BPM without drawing a process.

First, an organisation needs a survey regarding the actual awareness of BPM. Examples of the questions include: How are processes organized? How do you work? The result of this survey leads, in most cases, to any form of IT-adaptation coming at the end. The thoughts regarding process changes come first and the IT changes are always the second step. The motto should therefore be: ‘IT follows process.’

9.2.5.5 IT

The practical experience of E5 mainly concerns the IT problem with banks and insurance companies. Many systems have been in operation for over twenty years and the programmers, who built the systems at that time, are no longer available, and it's difficult to adapt to these old systems. This may lead to a problem in the future if a system is adjusted and these changes based on the evaluation of the maturity model.

In general, IT should play a secondary role within the maturity assessment. Of course, there is always the question of how these processes and the objectives which are defined could be implemented further. The application is therefore directly related to IT, but the BPMM model does not evaluate the IT used. However, the practical implementation of processes usually makes the direct involvement of IT necessary.

An extremely high level of maturity could be achieved in the BPMM maturity model without any use of an IT system. The model does not evaluate how efficient the IT used is, it evaluates whether objectives are defined, and whether processes are designed in accordance to these objectives. It considers the management approach that is anchored behind the process-related thoughts in the organisation. In practice, it may be possible that the processes are more cost-effective without the use of *any* IT. Carpentries, for example, may have no proprietary software but can also apply the BPMM model. If a chair is assembled, or a table for a client is specially made, these processes can be done without any IT support. But ‘in 99% of cases’ organisations use IT to support the processes.

The interviewee prefers, during the use of a maturity model, that IT does not become the focus. But the topic of BPM is often driven from an IT area, and many employees view a BPM expert on the same level as an IT professional. However, E5 personally does not want to be seen as an IT professional. His focus is on the following questions: How do you work and what can be deduced from that work? Of course, these may result in IT requirements, but the processes are *not* made for IT. In BPMM, the question arises of whether the ideal processes, or the processes which are desired by the process owners, are implemented in practice. Thus, the IT question is asked indirectly and is not

addressed directly. If the question arises of whether the budgets are there for the process adjustments available, then those process requirements are implemented in 90% of cases by the IT department and implicit in the question is whether they have the budget to implement the desired process changes.

Ultimately, the IT department receives a request to implement certain works in the process and the IT software has the demand to support the required end-to-end process flow. This may have a huge influence on how the used software works, or if a required process is not customizable in the existing system in the way that the process owners would like. Perhaps there comes a point where it is determined that the IT system used cannot meet the needs of the company. Perhaps it is concluded that the IT system is not able - with the current budget, or the existing system - to implement the requirements in a reasonable timeframe and with reasonable costs. Finally, the use of the maturity model can lead to the conclusion that, at present, the wrong IT system is in use.

9.2.5.6 SAP/ERP-System & BPM

Certain IT systems can be adapted more cost-effectively than others. In the expert's understanding, adjustments of the SAP system are in general more expensive. Essentially, SAP provides a basic set-up that works, but may not be optimal when an organisation looks in more detail at certain processes. Therefore, there is a certain pressure to make adjustments and compare these with the costs that would cause such an adjustment. The interviewee claims that SAP is probably not a flexible system and probably not a cost-effective when it comes to customizing. A company already has a working system if SAP is used. This means that the company has to ask whether they should spend time and money adapting the existing SAP standard processes, or whether the process should be better adapted to the business processes requirements.

The desire would be to have a super-BPM suite in the company where process can be drawn and then converted semi-automatically into a workflow system. Then, a reaction would be significantly less expensive. However, this idea is rather theoretical because such complex systems are not used in practice.

The BPMM considers forty different areas. One discovered area is the process area: Are the processes defined? Are they clear? Are they known? Are they documented? In this area, an organisation is extremely well managed through

the use of an ERP system if the manufacturer of the ERP system releases its process description. That means that if an ERP manufacturer discloses its process description, for example, as a flow chart or other description, then this area is well covered within the maturity model and the company has achieved a lot there. On the other hand, the questions of the maturity model used are also regarding what the company position is and what is the strategic objective for the organisation which can be broken down to individual processes. These objectives could then support the used ERP system - or not. Maybe the process used has to adjust because the current system process never results in the efficiency or the quality which the company has strategically aimed for. Theoretically, of course, an ERP system is customizable, but in practice this would not be not possible due to time constraints, costs or resources. The idea that an ERP system such as SAP has no impact on the used processes is more of a theoretical one, because practically it can happen quite a lot!

Standard software packages, including SAP or other systems, are often used in the IT department, and their use creates a quandary: The processes are not optimal, because the processes have been considered by ERP suppliers who do not actively operate in the banking or the insurance sector. The business is constantly evolving; there are new products or new distribution channels. This means the organisation would have to adapt these processes, but that costs money and takes too long. Therefore, users and IT departments often think around the standard software. That means they leave the process as it is and create Excel or Access solutions or other hand-crafted lists. This means the new added processes are, ‘far from the optimal processes’. An organisation could not implement the necessary and redeveloped processes, because the resources are lacking.

When a process is to be redefined, the persons responsible often think about the old sequence in the IT system. Within the procedure of process redesigning, E5 tries to question the processes in the company in a way that does not use the old system as a guide. The respondent often answers questions about the process flow by: ‘I go to the image or the mask xy in the system’. To separate these people from the system and to examine the expertise is enormously difficult. People often think about the system, and an investigator therefore has

to engage these people in a professional reflection on the process and to question this, rather than the system behaviour. E5 believes that it is more difficult for employees who have already worked for a long time in a company and have used a piece of software. For example, new employees who have worked at a competing company can interpret more from the process flow of the IT software. These people can ensure a better transformation between the old ERP system, which they experienced at their old place, and the new software in the new company. These employees can do a better abstraction and look more at the process knowledge and not be strictly caught within the process flow of an IT system.

9.2.5.7 SAP & BPM maturity model

Theoretically, the IT system should not affect the process. Of course it is possible to customise an SAP system in any manner, but this could cost a lot of money to build the ideal path, which would then lead to a high maturity and a higher level in the maturity model which is applied. First, the targets are set and the processes are defined, and the customizing is then a secondary issue. Only the customizing could implement a process in a SAP system in the way that process owners ideally define it. In practice, however, the question is all about budgets. The interviewee argues that SAP customizing could be infinitely expensive and is not done in most practical cases. It could be the case that a feedback replay and IT do not adjust the processes and request the manager to adapt its processes to the SAP system. This procedure is suboptimal and of course therefore maturity limits arise. But this is the practical aspect coming into play. Theoretically, a SAP system should not affect the ideal processes, but in practice this can happen frequently.

E5 knows many companies which have an IT budget, and prioritise projects. If the organisation believes that the process is not important enough to sacrifice the IT budget, it remains the same and is not adjusted by IT implementations. This means that the process will not operate on the ideal scenario which was introduced at the beginning by the process owner as its optimum process. In practice, it may well happen that the optimal process implementation does not take place due to budgetary restrictions. From practical experience, E5 reports that the user often creates Excel spreadsheets or Access databases and works around the SAP system with extra lists.

In the main, there are no technical restrictions to changing an SAP system in accordance with the process guidelines, but in practice, there could be serious reasons to do that. It could be that time, money or resources are no longer available to change a system. Therefore, in many cases it is not possible to reach the highest maturity level due to these restrictions.

BPMM is similar to the CMMI and has a maximum of five maturity levels. According to E5, it is possible to achieve, through the use of ERP software, at least maturity level three regardless of any possible budget constraints. In his opinion, the maturity level three is in a standardized range of process applications which can be implemented with an SAP system. But that also means that some targets have been set at the management level. Level four needs more knowledge through measurements and indicators and requires an available budget to reach these measurements and objectives.

Models such as CMMI or BPMM only proceed in full steps at any level and that appears to the expert to be a little bit too blunt. He would like to show in practice whether an organisation has just reached the level, or is pretty close to reaching the next level. Therefore, E5 evaluates in practice the ratings up to two decimal places. This offers the possibility of demonstrating from year to year which progress has been made, without a need to change a whole level in the review.

E5 notes that there is also a need to analyse the standard ERP processes for the practical behaviour of an organisation. In practical terms, it should not be the case that an organisation has resigned itself to the ERP system and would not even create the requirements to adapt the existing ERP processes. It should also not be the case that a company adopts a strategy that is specified by an ERP system. That would be, from the expert’s viewpoint, poor corporate governance and an inconsistent strategy by the company. If a company aligns its objectives to an ERP system, then it would lead to a lower rating in a maturity model due to a lack of applied strategy. In practice, there is the risk that that behaviour occurs, and an organisation follows the business processes of an ERP system. But if a review is carried out and the company's strategy, objectives and the achievement of objectives is examined, a maturity model will notice that the ERP system and not the organisation set the objectives. Then it will someday be the case that the existing processes of the quality or the

customer satisfaction can no longer reach the goals which predetermine the strategy, and then there is a need to make adjustments in the ERP system.

9.2.5.8 Summary for expert No. 5

For the expert, a maturity model is a quality assessment tool and improves the work of an organisation and must be introduced by a top-down approach. If only a single department in an organisation wants to use a maturity model, then that is a wrong approach to introducing one. The execution needs commitment from the management of an organisation because the management want to know where the company stands strategically.

The first use of a model acquires the current state of the maturity and the next use can demonstrate the improvements of an organisation to the management and its employees. In general, there is no wrong or bad time to introduce a maturity model but E5 recommends an initial assessment at the beginning of a BPM introduction to introduce the process strategy in an organisation and then start with the new BPM approach. The BPM approach then handles the processes of an organisation and the question of how the organisation can run in a more process-oriented manner.

A maturity model can also identify areas which have so far not been previously considered and what the actual awareness of the BPM topic is. Of crucial importance for E5 is the required effort of a maturity model. There are models that exist which need a lot of time and money for their execution and this is, in practice, not feasible.

A BPM maturity model assumes a better process orientation of an organisation and identifies existing gaps in the BPM implementation. A difference between BPM maturity models affects the reviewed processes; a model either evaluates each process or the model analyses the complete organisation and all processes.

The main approach for the use of BPM maturity models is the possibility of linking multiple disciplines that traditionally run side by side. E5 recommends the BPMM as the best model approach to evaluate the process areas and a variety of criteria in the area of product management and also for other topics which he knows in the multitude only from the BPMM model.

Another practical advantage is the openness of the model. Other models have a non-transparent software behind which they perform the review, but they don't describe why and wherefore things are rated, but *this* model offers the possibility to understand and influence the decisions.

The analysis by a BPM maturity model should be especially used to indicate areas in which a company must make some improvements. A typical result should be to explore the end-to-end processes that bring benefits to the customer. It is not important for E5 to use a maturity model as a benchmarking tool and compare the own organisation with other companies. It is much more important which target audience is to be achieved with the model and that the model should be justified to that requirement. The management normally wants to know from a model what the current status of the company is, and what steps are necessary to bring process strategy a step forward.

In general, the BPMM has diverse areas that can be analysed, for example the configuration management, but not all industries need all the provided areas. E5's opinion is that each industry or organisation needs some differentiation in the implementation of the questions, and E5 has the freedom to fine tune the model or avoid using all areas of it. But what must be retained in any case is to identify the next steps for a better BPM approach at the company. A possible procedure is to first consider the whole organisation by the use of BPMM, and then scale the model in a second step and focus in more detail on further sub-processes. It is important for E5 to remember that the use of BPMM can be quite extensive and require a lot more resources, as expected at the beginning.

From the IT point of view, the application can lead to departments being unsatisfied with the tools which are currently provided by the IT department. It could be that an ERP system does not do what the department actually needs, or that the requirements of the department were not satisfied because they have used what the IT has delivered and have not defined their own requirements. But the IT requirements should be always a second step of a process. The first thought should be regarding the processes, and the second about the IT used. That means that IT should always follow the process.

E5 estimates that IT technologies such as SOA, LEAN or Workflows will usually have a positive effect on the results of a maturity model. If SOA is applied at the company, it provides flexible IT. The use of Lean or Six Sigma changes the culture of a company in the sense that employees are willing to talk about changes, goals and processes. Furthermore, any workflow usage leaves dominant process thinking within the company. All disciplines promote some form of improvement culture within an organisation and E5 believes that a higher maturity level can already be achieved after the first evaluation.

A lot of companies have a general IT problem about the history of the systems, because systems have been operating for over twenty years and the programmers are no longer available. This can lead to many difficulties in adapting these systems to new requirements. But the IT should always play a secondary role within a maturity assessment. The BPMM allows the achievement of a higher level of maturity without any use of IT. This model evaluates the IT used only indirectly, and analyses more the practical implementation of the processes. Normally these implementations are supported by any kind of IT system and that leads inevitably to the fact that an IT system is affected and the BPM is often driven from an IT area. An IT department and the IT software used should support the required end-to-end process flow, and this requirement influences how the software should work. That means that process implementation results in IT requirements, but the processes are not made for IT and BPM specialists are not necessarily IT professionals. The use of a maturity model should support the analysis, if the existing IT system supports the BPM process in the right manner.

In E5's experience, a standard SAP system provides a basic set-up that works. If an organisation use standard SAP processes, then these processes are well managed through the fixed requirements of the ERP system and an organisation achieves some benefits from its use. But these standard SAP may be not always the optimal solution. Theoretically, an ERP system like SAP is customizable, but in practice this may not be feasible due to time, cost, resources or other operational constraints. SAP is probably not a flexible system and not a cost-effective solution when it comes to customizing changes and IT changes due to process reviews.

That an ERP system such as SAP has no impact on the used processes is more a theoretical idea. From the practical experience of E5, it can happen frequently. If employees are asked about some processes, they often answer on the basis of the 'IT screen mask'. It is often difficult for them to think about the real processes and not about how the system fulfils the process. It is hard for many employees to make a transformation between an IT system and the process behind that IT. These people have been familiar with IT for many years and do not know the real process behind the IT screens. Another fact is that many processes remain as they are when new requirements are made; a new Excel table is created instead of implementing the requirements in SAP. For many users, this approach appears simpler and more cost-effective. This solution is then far from an optimal process, but many users think that the SAP customizing costs too much time and money to build the optimal process. Many prejudices concern the budget and the expected expensive SAP customizing. Furthermore, it could be that a changeable process is not important enough and does not get the time, the money or the resources to be changed in the SAP. This lack of budget can also lead to a solution which involves self-created Excel or Access databases being used alongside the actual IT system.

E5 highlights the fact that each standard ERP process needs an analysis for the practical behaviour of an organisation. If an organisation does not analyse the ERP processes, then there may be a risk that an organisation follows the business processes of an ERP system. A maturity model should notice if a company aligns its objectives to an ERP system, and this should lead to a lower maturity level.

The BPMM derives from the CMMI and also has a maximum of five maturity levels. E5 believes that the standard use of an ERP system can lead to a higher maturity level. In his opinion, the use of an SAP system with the pre-defined processes can be lead to a maturity level of three, if the provided processes are used as offered by SAP and no further adjustments are made.

Finally, BPMM uses in its original form only full steps at any level but E5 calculates each level to a rating with up to two decimal places. He would like to show if the beginning or the end of a step has been reached and also to demonstrate if each use of a maturity model leads to a higher level.

9.2.6 Expert No. 6 (E6)

This section provides a detailed summary for expert No. 6 (E6) using the six defined categories.

9.2.6.1 Criteria for definition as expert

E6 operates as an interim manager with BPM topics and has lengthy experience with ‘process-oriented management’ in various industries such as mechanical engineering, plant and rail vehicles. In total, he has over 20 years’ experience of process environments. Furthermore, he has developed his own BPM maturity model for a company. The experience gained from this is incorporated into the eden model and their development team, which he joined in 2006. In addition to the practical experience which he gained in various companies and authorities in the area of BPM, he also has experience in Six Sigma and Lean Management.

9.2.6.2 Maturity model

E6 expects from a maturity model that it is, ‘a program to install a management program.’ The aim should be to identify what should be implemented in the company in order to be more successful. Furthermore, a model should indicate the current status of a company. The special feature of the eden model is that respondents define themselves by a moderated self-assessment mid-term status, that indicates in what areas, in their opinion, the company should develop more.

A maturity model helps to determine the areas in which a company has more differences, and in what subjects more work therefore needs to be invested. The goal should be to have at the end ‘a large program management of individual activities and micro-projects’ which can be implemented by the company to become successful.

A maturity model provides the advantage that, for example, a manager can assess if there have been subject changes in the environment. In many cases, he cannot understand what his employees do and how he can assess the work. Here, a maturity model highlights the strengths and weaknesses of the analysed topics, and how far the subject is already established in the company. The eden model has the additional idea that follow-up work could be generated, and a basis for discussion is formed from the use of the model in order to push

the further development of the company. A maturity model provides external consulting firms the opportunity to generate follow-up work after the evaluation of eden Models and support a company in achieving a better maturity.

A good maturity model highlights the maturity of the topic without making them afraid. It should demonstrate positive examples and indicate a proven way for how the company might proceed. A maturity model should therefore support an organisation to define what can be changed in the next two years.

According to E6, it is in practice not always the goal to achieve the highest level of a maturity model. After all, if a company decides for itself to achieve a lower level, this could still be an improvement!

A basic idea behind the use of a maturity model is also the controlling idea. A company then searches for a framework to monitor who is doing what, and how far the implementation has already taken place.

E6 believes that a maturity model has a need to be developed further; they should consider future changes and adapt them. For example, previously bills were entered only on a screen in an SAP system. These days that can also be done on a tablet or other mobile devices. These are technologies that have evolved in recent years, but must also be considered. If a maturity model is not up-to-date with the times, then this could prove to be the death of the model. Of course, there are also many other reasons why a model is not used, for example, political motives within the company, because the model has been selected by other employees. A maturity model should be a driver. But a model cannot be a driver, if it does not understand new technologies or market requirements.

9.2.6.3 BPM maturity model

Before the BPM maturity model eden was developed by E6, he was involved in the development of another BPM maturity model for his organisation. In an engineering plant, a model was introduced in 2006 to monitor the process management activities of the group. This old model has had questioned criteria in different maturity groups. Some dimensions of this model have been integrated into the eden development. Both models lead to a reporting system that evaluates the criteria of the survey. The original idea behind the launch of

the first developed model was the use of the BPM maturity model as a pure controlling instrument. The results of this maturity model lead to the following practical questions: Why are some areas a step further more advanced than others? Why do they behave in that way? This model served, among others, as a reference for the eden model. The identified gaps of the original model were the lack of communication and the weak role of management. Both are expanded more in the eden model. Furthermore, the development team realized that there was only minimal challenge regarding the IT area and so an expansion was also needed for that area in the new eden model. Nowadays, the original model is no longer applied at the organisation. It was suspended a few years ago, which probably had something to do with the personal changes of the company. For the expert, it is always very puzzling how large organisations lose their knowledge. Obviously the original model is affected by the loss of knowledge and, for E6, that is one reason why the organisation no longer uses that model.

E6 further indicates a new maturity model, which addresses the subject of digitisation. The principles and the procedure are similar to the eden model, and E6 argues that it would be a wonderful addition to eden, because, according to the processes, the digital issue can be promoted. In contrast to eden, digital procedures are queried and questions include, for example, ‘How do you deal with social media?’ and ‘Which access points are given to external customers to get access to digital information?’ The digitisation model has no questions about the process behaviour but it uses the topic BPM as a pre-requirement for the digital usage. According to the eden definition, a digitalisation maturity model could therefore be used as a possible complementary module. A complementary module could be used to enhance special behaviours. Digitisation is suitable for eden model users who have a high level of maturity and want to progress.

E6 describes the classification levels at the eden model as follows, if it has a level from one up to ten. At level two, the BPM has a strong focus on a person, but if the person works no longer for the organisation, then the BPM no longer has a purpose. At level three to five, possible process relationships already covered in the company are linked with procedures that belong together. Level

six to seven is reached when the first system is designed in the company but has not yet been implemented. The subsequent levels eight and nine are only reached when the system is implemented and additional key figures are introduced that analyse and measure the processes. At the end, level ten is the ideal state of an organisation. This means the company has established ‘a self-improving system independent of people.’

E6 takes the view that it would be good to have a maturity model that covers many topics in the areas of IT, quality assurance, communication and change. Likewise, many people do not have the time to fully deal with the issue and complete hours of interviews or questionnaires. Here, the eden model with its 157 criteria is kept very small in contrast to other models, although it covers many topics. The issues are often not considered in great detail.

Currently, E6 feels that the IT behaviours in the eden model are not comprehensive enough. Special IT concerns such as SOA or enterprise architecture structures are not considered, but should be. The expert’s opinion is that the issue of digitisation, which is currently becoming increasingly important, must be integrated into the eden model. Overall, the IT is currently positioned quite weak in the eden model. There are basically only a few IT criteria. First, it is asked if there is an IT tool for modelling, and whether IT is used to support the BPM development. E6 believes that these IT considerations could be strengthened. The question about interface breakthroughs in IT is not, or only very generally, considered. The model pays no attention to how interfaces between IT systems are modelled or how to deal with media breaks. The intention is not particularly thought out regarding the IT issues when talking about BPM, for example in the modelling of processes. E6 states that the model needs some additional questions regarding how the IT considerations in the context of BPM would also be implemented.

The model does not consider so far whether ERP systems are already used. But at a certain level of maturity it would make sense to anchor an ERP system in the company, and to reference this system. It is conceivable that, for example, from a maturity level of two the BPM activity should be built on the existing ERP functionality. E6 explains that the use of an ERP system is a good start, to avoid having to reinvent the wheel, and to get first IT functionalities. The

existing ERP system is then examined in greater detail in the next levels of the model and could be modified to adapt the desired processes to the ERP system. In many cases, only an ERP system is introduced first, and the interface investigations between the ERP and other systems follows afterwards. Adjustments to the ERP system are only made in the highest maturity levels. Investigations into the reduction of interfaces to reach optimal process and the highest possible degree of maturity are made afterwards.

If eden is developed for the future, it must be ensured that the model is not too complex. A model must be manageable, and this is already difficult because currently it already has 157 criteria which are rated. E6 believes that most users would like to have a simple BPM model that can be performed quickly and without a lengthy engagement of resources. Already, he has observed that companies have developed an ‘eden light’ model for themselves. But it is not the purpose of the model to drop some individual issues or leave some areas out. There are new practical behaviours which need to be reflected, and these new topics need new criteria in a BPM model. The world is indeed more complex, but a model with 300 criteria would not work in practice and could not be manageable. On the other hand, E6 also believes that there can be no less than 150 criteria to evaluate all BPM-related areas with a model. Even companies which have tried to leave some criteria out have realized that, in practice, the excluded area had to be readdressed in order to enable a comprehensive BPM investigation.

The eden maturity model offers two procedures. On the one hand, there is a quick and moderated self-assessment. In this review, the employees of the company evaluate the organisation itself in stages from one to ten, regarding certain criteria. The second procedure use external experts, who observe the organisation in a more comprehensive way and make an external classification.

The model recommends translating key points of the questionnaire into the language of the corporate entity or region, because the eden model partly uses its own language. For example, in the field of engineering, the staff are more likely to speak of engineering processes rather than business processes. Another example could be the area of government, where the local chief is called the administrator and not Chief Executive Officer.

A maturity model like eden provides answers to the question of how to start the BPM implementation within the organisation. It also helps to assess what is important for the company, and what is less important to achieve already low maturity levels. Each company is different, but by using a maturity model, the rate of change is individually adapted to the culture of the company. First, mini activities can be defined, and this experience then shows how fast a company is willing to make changes. Consequently, the maturity model is the implementation vehicle for the strategic topic of BPM. In the expert's view, the model of Michael Hammer considers a more academic structure in which the principles are highlighted, but it lacked something. Here, the eden model has evolved, though it has not included new buzzwords such as the topics 'Internet of Things' or digitisation. However, the 'great things about maturity models are to make complexity easy manageable.'

E6 supposes that most maturity models have a disadvantage compared to the eden model. These models are often developed from theoretical considerations, because a university or a consulting company has pursued a certain aim. In eden, all criteria were deliberately designed by practitioners. Eden originated from an association of people from different companies who exchanged their practical experience with BPM. This group of experts essentially developed the criteria based on these questions: 'What are you doing so well? What work successfully for you, and what am I missing or what is missing in my company?' In eden, therefore, criteria are only included that have come from practice and have been really proven - that's what makes eden substantially different in the expert's view. Criteria which have a more academically theoretical sense, but a very small practical relevance, were consciously not included. Topics that have been proven in practice were, on the other hand, already included.

Unlike CMMI, no concrete processes are mentioned by eden. Eden operates independent of industry. Therefore, eden proposes no processes, or recommends specific requirements processes or supply chain processes. If companies want these kinds of maturity models, they can use other reference models. If companies want more regulations on how to make their BPM, they should deal with other reference models on the market. For example, the ITIL Model for IT processes, the SCOR Model for Supply Chain or the CMMI for

Engineering Companies. Some models still differ in their content. The CMMI model, for example, even distinguishes between service processes and product processes. However, E6 advises not to use these kinds of reference models. Their major disadvantage is the fact that organisations think less about their own processes when reference models are used. It is better to consider themselves how an organisation wants to work with processes. If an organisation is only depreciated by a CMMI model, then this is not a procedure that can allow the company to work out its own strength. If companies consider what they need themselves then that is, in the expert's opinion, the best approach to deal with BPM and to develop the topic.

Eden is not a basic training manual for how BPM works. Before using the eden model, E6 recommends using at least one such manual about BPM to understand important elements such as processes, targets, role figures or process owners. It is not the job of eden to provide this basic information, and eden is not a tool for beginners. E6 recommends that a user should first learn the basic concepts of BPM and then use a maturity model. If a company already has a little knowledge about BPM, then it makes sense to operate with the eden model. The model can then open their eyes regarding the different things in the BPM environment. A company can realize things that were, perhaps, not initially considered with the BPM topic.

In a first process analysis, it may be helpful to measure the central value-added process in a company. But to achieve the highest possible degree of maturity, all processes should be measured by the eden model. The model can measure different processes like value-added processes, but also the management and support processes of an organisation. The trick is to apply the model in a manner that avoids losing the overview and getting mixed up in all different kinds of processes. It is ‘the discretion of the BPM approach of the company, how far they want to go’ and what processes they want to analyse.

9.2.6.4 BPM

Very few companies start from scratch with the topic BPM. Most organisations already have some BPM activities in operation. For example, a process map or a few individual processes. Perhaps IT has even come in contact with BPM, and the first processes are painted as an introduction to the BPM subject. E6

sees BPM as a philosophy or a strategy to run a business, especially if the customer orientation needs to be encouraged more. BPM is also a method to operationally implement customer orientation.

BPM is, in the expert's opinion, used when classical hierarchically controlled entities note that they cannot do any more or notice deficiencies in the customer orientation and are looking for something new. BPM is, for the expert, not an IT issue; it is a pure business issue. If companies think in processes and about end-to-end processes with the customer at the end of the process chain, then BPM is the new way to run their business. Each company can decide for itself whether the structuring into different departments in the enterprise is completely abolished, 'or use a kind of a hybrid way between process orientation and department orientation'. Basically, the company should conduct the business in a process-oriented way.

BPM is only a keyword. When BPM is mentioned, many CEOs think of process maps. Perhaps some also consider it to mean the responsibilities for processes within the companies and the process owners. But that alone is not enough; BPM means more. Many companies underestimate the role of management: the management must practice the BPM concept every day. If the management does not exemplify BPM in all facets, then the topic will not work. This is the same for Lean Management or other topics. The use of BPM should be focused as a top-down approach from management. It is true that there are small success stories of a bottom-up approach, for example if an IT department draws some process maps together with a business department to understand process flows and behaviour. From this collaboration, a process map may arise and a general BPM approach can be established within the organisation. But from the practical experience of experts, it is significantly more successful if the management exemplifies a top-down approach of the BPM concept.

From the expert's viewpoint, it is critical to separate the BPM and BPO approach. If an enterprise wants a BPM approach, there is a need to think about the organisation's culture and a reorganisation of the company. These issues are 'inextricably linked' and should not be considered separately.

9.2.6.5 IT

BPM can also be carried out without using any kind of IT tool. In practice, there are companies that have found a way to describe their processes only on a short Excel list, and are completely satisfied with this solution. However, it is certain that these companies will eventually reach a limit where they realize that it is no longer possible to use a BPM approach without any IT, and that the use of some IT tools is desirable.

In order to handle the complexity of BPM, for example to represent processes, the users must consider the fact that different stakeholders interact with each other. In this case, an organisation needs IT to model or filter different behaviours. Process analyses are easier with IT and an IT can handle process simulations and different situations. Many people do not know what is possible with IT, and what IT tools can provide to operate BPM. In addition, an IT department also has its own interests and want these to be included when it comes to an implementation of BPM.

E6 recognizes that the IT sector of the eden model has some catching up to do here. For example, current IT topics, such as digitisation, are not considered. The consideration of ERP systems or whether predetermined ERP processes are used is not requested in the IT criteria. With regard to the topic of ERP orientation, it could make sense for these issues to bring the ERP systems focus into the maturity levels, for example, whether standard ERP processes are used in the company. So far, the eden model can only confirm that the highest possible maturity is achieved when the employees generally assume that they receive the best possible IT support for the subject of process management.

Until now, the role of IT within the eden model was often used in the sense that IT should support a BPM approach. For example, the IT is used as a modelling tool, or a simulation tool or to measure indicators. In general, E6 cannot imagine attaining the highest possible level of maturity without any form of IT support.

Within the development of eden, the role of IT was only considered in general. IT should help to obtain a maturity model or simulate the process, or determine time-evaluations or indicators of a process. Issues such as Workflows, SOA, CRM or the use of standard systems were not intended at that time. E6 believes

that it may need to be reconsidered whether all components are included that are needed today for an overall BPM maturity check. E6 further believes that gaps have emerged over the last years. For example, in 2006 a mobile approach was impossible to imagine, but IT has made further developments over the years, and therefore the role of IT has become too weak in the maturity model and needs further developments.

The application of a maturity model changes the IT used because it stimulates the way of thinking about it. Depending on how many IT specialists belong to the BPM team, the subject is more or less viewed through an IT lens. Essentially, a BPM team should have a basic knowledge of how IT tools and processes could be combined. For example, they should know that processes can be modelled much easier with IT assistance or that processes can also be transmitted in a workflow system.

9.2.6.6 SAP/ERP-System & BPM

E6 believes that the topics SAP and BPM can have great potential for conflict. A company must potentially accept old guidelines if they use SAP, which were, for example, created by a migration project for a new SAP release. In practice, E6 refers to an example in which a BPM and a SAP project team worked in parallel rather than with each other. In this example, there was already a large and central BPM activity in the company, so a new SAP system should have been implemented. But the SAP team designed ‘nothing more than a new world’. This new world then existed parallel to the BPM world ‘with its own resources and own modelling experts.’ The interests of the teams were different and they were working side by side. For example, the purchasing process had already been designed in the BPM project, but the SAP team developed it again and in much greater detail. In the expert’s opinion, the company should aim to reduce the separation ‘between the SAP people and the business.’ The practical problem is often that there is usually no time to analyse the process in more detail if there is an SAP migration project. According to the expert, business consultancies offer at the market the launch of a new SAP release without examining the individual company processes. For this transformation, templates are considered without optimizing the existing processes in the company. In the expert’s view, there is a lack of a framework that better links these two worlds in practice.

If a company wants to introduce the BPM topic, it is not necessary to introduce a maturity model from the beginning. In the first year, it is certainly enough to simply deal with some issues, learn the concept behind the BPM and collect their own experiences. Perhaps a process map should be developed, or an individual process can be modelled in an in-depth way. After one year, many questions will then arise and it makes sense to deal with a maturity model. The model can then show which issues are still missing, what deficits there are, and what things are already well implemented within the BPM environment. Of course, a company can also use a BPM maturity model from the beginning, but this is like using a sledgehammer to crack a nut. It is better to have some experience with the subject first, before a model is used.

In the main, an ERP system is already used in the company, it usually has its own world. This means the system has developed its own model and offers its own tools. In particular, SAP offers many business processes. Then, a company may notice that an ERP system is very different, and the system works differently than its own understanding of BPM. A company has therefore developed in this first year a sense of the complexity of the subject, and then uses a maturity model to make sense of this. E6 imagines an ERP system as more of a resource-oriented tool. The system deals with the finance or with the people, but not with the processes behind it.

In practice, E6 states repeatedly that certain SAP processes are not being questioned at eden. Employees often express the opinion that SAP automatically does all the necessary things and there is therefore no need to think about the SAP processes. Many people follow the SAP requirements and do not consider why a process must be performed in the current manner. Ultimately, no one knows whether the current process flow is correct or if a different behaviour would be better for the company. In addition, E6 criticized the inability of SAP to print process as a process flow. Consequently, it can, in practice, not always accurately determine how precisely a process in the SAP system runs. The third point of E6's practical experience is that he consistently recognises that predetermined processes can be manipulated. He cites the purchasing process as an example. If certain signature rules are dictated by an ERP system, then employees always find a way to manipulate these rules.

It is often the case in a company that media breaks exist within a process. For example, a company wants to design a purchasing process. This should begin with the entry of the order and finish with the booking of the incoming material into the warehouse management system. However, in practice it is often the case that SAP is not used as warehouse management software, and is only used as ordering tool. Now this is not an SAP or ERP problem, but often certain things are forgotten when an ERP system is used. The opinion is often that all you need is to buy an ERP system, and then certain things works on their own. The use of an ERP system forces people to not consider what the employee or the company actually needs, or what makes the company specifically effective. Here, the use of a maturity model can support a reflection on the used processes.

9.2.6.7 SAP & BPM maturity model

A maturity model forces a company to think more about certain things and not to accept things as a given. In principle, consideration should be made as to whether an end-to-end process exists, and this results from the company's strategy. In addition, a company must then think about their processes, and at least make a rough definition. A maturity model could force an organisation to think about how the process can be digitally translated, and how these can be best handled with an ERP system.

In practice, it is the case that more and more errors occur when a company diverges from the standard tools. As a result, maintenance is then also more expensive. But the organisation must consider that the use of IT tools generally restricts the thought process of the employees. System processes are often viewed as non-changeable, especially when prescribed by SAP. But if a company wants to deviate from the standard, then there is a need for the IT and the business department to meet each other to investigate what is best for the processes. Overall, a maturity model could force a company to think about process behaviours and comply with certain standards. This can relate to the modelling, interfaces or description standards. A maturity model could be a pure process model and describes how things should be respected.

First, SAP can be used as a standard tool to use the advantages which are offered when processes are already predefined by a system. No company has

the money or the time to implement the ideal state at the beginning. Here, SAP provides the opportunity to make a careful approach in stages. Theoretically, it is also possible to set up a new ERP system with the optimal processes. But then there is a need that all processes have already been defined, and a new SAP system is placed within the organisation. In most cases there already exists an ERP system which can be used and an organisation can already build on that. A billing process does not have to be reinvented. It can be assumed that this process has fully developed in the last few years, and always works. The expert claims that it makes more sense to use proven standard processes. The employees in the company should be focused more on processes that are truly unique to their business. However, E6 emphasises that the use of SAP may not lead to thinking about the set of SAP process. Furthermore, the use of SAP should lead to the discussion 'what is important to me, what makes our process difference' - or makes them not different. It is not only the use of maturity models, but also the use of SAP for which the first impulse should be to reflect on processes and to establish them within the organisation.

A maturity model would be interesting in the SAP world if it could push the SAP system forward. The model should, in practice, support problems stepwise and improve the company. Just because a company uses SAP, it is certainly not in an optimal position. E6 believes that an SAP system is only used at its best when it has been adapted by customizing changes. In practice, it may not be the case that the optimum maturity level has been reached if there were customized changes to the system.

Generally, an SAP system supports the use of a maturity model, because E6 assumes that certain standard processes are already established. E6 also considers that the use of standard processes are not obtaining the highest possible level of maturity. For the highest possible level, the company-specific behaviours should be identified and then necessary customizing applied to the system. Many companies would like to have as many standard processes as possible, especially in the ordinary processes. But for complex processes, there must be the possibility to make company-specific changes towards a greater ability to serve customer requirements, and to be able to distinguish the company from other competitors on the market.

An existing SAP system is not seen by the expert as a disadvantage in deploying a maturity model. SAP is now a standard tool on the market, and the available IT maturity criteria of eden are formulated to be IT neutral. For E6, the most annoying SAP behaviour is the impossibility of creating a real process map from the actual SAP data. Most users consider SAP as a ‘big box’ and within that box, something happens. Unfortunately, no one knows exactly what happens inside the SAP system. It would be desirable to be shown what the process looks like and how it is actually implemented within the SAP system. There is a danger that a parallel world is developed through the lack of knowledge about the SAP system, and the processes within the SAP world are not always developed or considered accurate. Through this behaviour, SAP is forcing people to not think about what they do, and only to think about how they input data. By the terms of the system, the thinking process of the people involved is limited. Many people just want to ‘insert something, and forget what they really make.’ These people involved are not questioning why something is done or who has to work with the input data in the next steps. The result of a maturity model can be that the current employees have no basic knowledge about the present used processes. However, the management may want to have employees who think in processes. In that case, new people have to be hired, who are willing to think more about what to do, and not simply input data into the system.

SAP is, in most cases, the largest and most central IT business tool within the ERP environment. If SAP can offer functionality, then a company should use them. In many cases, SAP is used only for the classic supply chain process, financial management or material management. However, there are many other areas, such as quality management, which could also use an SAP system. E6 supports the idea that in the ideal scenario, a single IT tool can be used for all central business processes, and SAP can be that standardized process tool which offers quite a lot of different business processes. Therefore the usage of a central ERP system could result in a better maturity level than zero. Often, SAP has a reputation for being too complex, and this is supported by the expert’s experience: it is very difficult to lose this negative reputation. Even ARIS, as the first BPM modelling tool of SAP, had this reputation, and that is why, in the expert’s opinion, it has been replaced in the market in the last few

years. In practice, E6 has accumulated the experience that a company should have initiated their own departments with the sole purpose of modelling with the ARIS tool. But creating ARIS departments cannot be done by many companies for budgetary reasons.

The processes which provide SAP are already quite high, and an impressive maturity level can already be reached through the use of standard SAP processes. If in general the eden model is used in a SAP environment, it is quite possible to attain the highest maturity level. The premise is that sufficient time and budget is available to adapt the standard SAP processes to the special company characteristics.

E6 estimates that a maturity model can also be used to migrate different SAP releases. On the one hand, employees must be trained and the company must be adjusted. On the other hand, the management wants to know the status quo and wants to control the migration and get a report. Both requests can be supported by a maturity model.

In general, the integration of changes within an ERP system will result in an ERP-System with more know-how about an organisation. The system is then also a knowledge management system. A standard SAP system does not exhibit this behaviour, but the aim of implementing BPM and reaching higher maturity levels in an organisation changes the pure SAP standard functionality. Each programming effort invested in the SAP system helps to create a system that is more fitted to the processes of the company and adjusts media breaks. The maturity model is then supported as a process model to push these changes in small steps and to move towards the target of achieving the optimum process at the end.

E6 also has some suggestions for maturity models which have previously given this the wrong, or no, consideration. He reports that the use of standard processes is not given enough attention in practice. Many maturity models, and even eden, do not value it, but it might be a good criterion that ERP software use as many standard processes as possible, which are not changed by any customizing. Furthermore, every important issue should already be found in the low maturity levels of a model. In this regard, the CMMI model conducting the

measuring processes with process indicators only at higher maturity levels is the wrong approach. Processes should already be measured at the low maturity levels.

9.2.6.8 Summary for expert No. 6

A maturity model should be applied in an organisation in order to be more successful and determine the current maturity level of a company through self-assessment, like the eden maturity model. This procedure supports the management in understanding the current situation of an organisation and highlights the strengths and weaknesses which are already established. Furthermore, a model should support a company, push for further development and demonstrate a proven path towards better maturity. But, if it requires too much effort, then it is not always the goal to achieve the highest maturity level. Consequently, a special BPM maturity model is the implementation vehicle for the strategic topic BPM.

A model should also make some further development and be up-to-date to cover new technologies or business areas. Therefore, a model should have the goal of being a driver and moving a topic forward.

E6 was involved in the development of eden and has included some criteria from another model into the eden model. The old model included a lack of communication and a weak role for management, and these gaps were closed by the eden model. However, eden has, up to now, involved only a small investigation into the field of IT. The analyst still misses the analysis of new topics, such as digitalisation through the internet and the use of mobile devices. These aspects are not in place, as the model was developed in 2006. Furthermore, any form of analysis of IT interfaces between systems or about a used ERP system, are still missing. Therefore, E6 concludes that the IT behaviours of the eden model are not comprehensive enough because since only a few criteria are analysed.

E6 explains that many people do not have the time to deal with a complex maturity model, and that the eden model with 157 criteria is a good compromise to examine as many areas as possible without going into much detail. A model must be manageable and this is difficult if it uses too many criteria and need too

many resources. But he also recommend not to leave out any of these criteria, and therefore not to analyse all the subjects of the model.

In E6's view, it makes sense to use an ERP system to first obtain IT functionalities and then to support the topic BPM by any form of IT applications. He also suggests that it makes sense to use basic ERP processes to reach a higher maturity level.

Many maturity models have the disadvantage of being developed from a theoretical consideration, but the eden model is designed by practitioners. Furthermore, the eden model operates independent of industry and does not need any special requirements. But eden does not provide basic training for how BPM works. If a user employs eden as an analysis model, they should understand the basic terminology of BPM.

It could be helpful to measure the central value-added processes in a company in more detail or to consider it at first, but to achieve the highest possible maturity level all processes need measuring by the maturity model.

For E6, BPM is not an IT issue. BPM is more of a new way for an organisation to run their business. Many organisations have already completed some BPM activities, perhaps also with the help of IT, by setting up some workflows or using SOA. Most people only mention the drawing of process maps if they think about BPM, but BPM means a lot more, such as the handling and analysing of processes, and should be focused as a top-down approach from the management.

E6 explains that the use of IT is not necessary to conduct a successful BPM, but it could be much easier to use IT for the BPM approach and to support BPM maturity models. Any kind of IT, such as workflows, SOA or CRM systems, could be used to support an organisation and their BPM efforts. IT could also help to execute a maturity model, simulate business processes or receive process indicators. In addition, E6 mentions that the highest possible maturity level for eden can be achieved only if the employees assume they receive the best possible IT support for their process management. Furthermore, a BPM team should also have basic knowledge about how IT tools can be handled to produce the best BPM results.

The topics of SAP and BPM can also create great potential for conflict, if old SAP guidelines meets new BPM requirements. This can result in two different worlds with their own resources, modelling experts and process maps. This can result from the fact that the process is already in existence are not analysed, even if a new SAP release is introduced as well a new process flow being designed by the BPM team. An ERP system like SAP usually has its own world and offers many business processes. A maturity model should be able to get to the bottom of these existing processes. Unfortunately, no automatic process flows can be drawn automatically from an SAP system. This is why it is even more important to analyse the pre designed process sequences of an SAP system. Additionally, each media break and any interface should be analysed to examine the real life end-to-end processes in a system. A maturity model should force a company to consider certain areas further, and not to accept processes as a given, even if they are pre-designed by an SAP system.

An SAP system can be used as a standard tool to make use of the advantages and establish the pre designed standard processes, and contains a good foundation for the initial process behaviours. But the highest maturity levels always require a deeper process analysis and should lead to a discussion of what is important for the organisation, and what make the processes really different. E6 believes that only an adapted and customized SAP system creates the best conditions. On the other hand, it is also important to analyse why a standard SAP process cannot be used for the company. Even if not many maturity models value it, it might be a good criterion to use as many ERP standard processes as possible.

9.2.7 Expert No. 7 (E7)

This section provides a detailed summary for expert No. 7 (E7) using the six defined categories.

9.2.7.1 Criteria for definition as expert

E7 has several years of experience in the field of business process management and business process modelling. Since 2006 he has worked in various companies as a Business Process Manager and Business Consultant. His practical focus is the application of SAP solutions. E7 is co-author of the German guide ‘Leitfaden Business Process Management’ which was issued by

the working group ‘Business Process Management (BPM)’ of the German-speaking SAP User Group (DSAG). In practice, he has many years of practical experience in the application of maturity models, and has mostly worked with the maturity models of eden and CMMI.

9.2.7.2 Maturity model

In E7’s opinion, a maturity model is not only a model for a quality assessment. The main aim of a maturity model is to monitor and develop special behaviours and bring special entities to the next level to improve the organisation. Maturity models therefore contain specific instruments to recognize or identify the impact of special behaviours and present a summary or suggestions to improve the organisation at the end.

There are several models that describe themselves as maturity models, but actually derive from the area of controlling. E7 describes these models as a tool to measure performance indicators and carry out pure controlling for certain areas, but not as a maturity model. These measurement systems have less of an intention to push forward development, because their main focus is to measure corporate data.

9.2.7.3 BPM maturity model

E7 explains that the general purpose of BPM maturity models is to monitor and develop processes. That means the process management measures an organisation and demonstrates what effect the BPM currently has.

As described before, there are models on the market which are referred to as maturity models, but rather come from other fields. An example of such a model in the BPM field is what E7 calls the COBIT model, because this model is mainly focused on operating figures. It measures less the process management per se, but rather indicates individual processes or business functions. The model monitors individual processes and controls certain legal conditions. It is focused more on functional behaviours. The model does not measure the maturity of process management or the maturity of concrete processes and deals instead with the transit times of processes. E7 believes that the ultimate purpose of such a model is to carry out, or verify, that something is being done. The key figures are given to improve a specific goal, such as the process cycle time. This form of measurement is, in the expert’s opinion, not wrong and key

figures could be integrated in a maturity model, but this should not be main purpose of a BPM maturity model. The CMMI Model is one example of a maturity model which also measure indicators but also has other ranges within the model.

E7 recommends the eden model as a good tool for beginners. This model is ideal to determine the current position of a company and define medium or long-term milestones. But E7 does not recommend the eden model as a controlling tool for daily process management, because this model is missing some additional control layers to carry out some frequent checks, such as the analysis of the throughput times of processes. One result of this could be the weekly measurement of turnaround times for a specific process. If these times are considered by the customer to be too long, then the process needs to be further analysed. This happens regardless of the used maturity model. E7 recommends the eden model as an instrument for positioning medium or longer-term goals within a BPM environment. The model can be carried out from time to time in order to analyse whether the long-term goals and milestones have been achieved in the process management of an organisation. In the opinion of E7, eden is very striking, catchy and easy to use. It is industry-independent and can therefore be used anywhere. E7 himself has applied the model already in the service sector and the manufacturing industry.

E7 especially recommends eden to create an entry into the world of maturity models for the first time and challenge the process critically. It provides an introduction to the various areas of business goals, business success and process management. Essentially, it comes down to the questions of ‘How all this is related?’ and ‘What benefits can I expect?’ The application of the eden model can create the awareness for process management with very little effort. The eden short- or initial analysis is made with little effort and can quickly determine a first position for the corporate management. The model can also explain initial questions of BPM culture within the company. For example: ‘Where does the company stand today? ‘What will be the effect? Where will the journey take us? What could it potentially cost if it goes further?’

If a company is already deeply involved in the BPM topic, then it should use another maturity model other than eden - maybe even develop an in-house

model themselves. But on the other hand, E7 asks why an already used model should be replaced because ‘no matter how good or how bad, is it what you have then, but why should they want to switch?’ That could be in practice a difficult and comprehensive process. But E7 would not use eden for everyday use. For him, eden is a tool for making a judgment every six months, or annually. For more frequent use, E7 recommends other tools; eden developed partly from the CMMI model and CMMI could be, for E7, a tool which provides more insights for everyday usage, since CMMI is a bit wider and has a bit more of an expanded focus. However, eden focuses more strictly on the topic process management.

A major advantage of eden is the broad community behind it. Furthermore, tools exist to execute the eden model, and these kind of tools do not exist within the CMMI environment. If organisations use CMMI, they have to develop and manufacture much more themselves. For example, a questionnaire must be created, which already exists at eden. In general, the eden model simplifies the use of the topic BPM maturity models at the beginning. Eden leads a user in a very strong sense, but so far, E7 has not been missing any things for his purposes which are available at CMMI, but not within the eden model, though CMMI explore more details.

If CMMI is used, the theory behind it must be recognized. The user must be aware of its complexity, and that it is a very fast forward tool. It could, in fact, be too complex for users who are not so familiar with the subject. If the CMMI model is used, then the users must ensure that the opinion that it is too complex is not too widespread. The users involved must not be discouraged by the complexity of the tools. When an organisation uses CMMI, a complex system of indicators is defined. These indicators can be used for daily needs. CMMI has a greater potential for insights and metrics that can be gained by the wider and larger definition of the model itself. Therefore, a company faces complex work with many indicators. From these figures, it must then decide for itself which are used for daily use. Even the company must define itself how these figures could be measured.

Whether a company really wants to build a complete CMMI as a controlling instrument is another matter. E7 claims that each user of a process

management has its own method of how they gain knowledge. These can be indicators on balance score cards or the use of an CMMI model, which provide a larger variant of indicators.

Within CMMI, an own performance measurement system is defined, and can be used for daily needs. In contrast, a predefined survey is made in eden. As a result of this survey, it can be easily determined how the company is currently situated. The complexity of the indicators at the CMMI can scare a user. There is a high administrative workload necessary to go through the ‘two thousand figures’ of CMMI at the beginning and to define all initial and measurable values. It is much easier to work with a list of questions which is already set in eden.

The expert does not know any general requirements to use a maturity model of eden or CMMI. Theoretically, even a ‘two man company where no IT’ is used, could ‘determining [sic] a level of maturity’. Whether this application of a maturity model ‘is useful is another question’, but in that case, a maturity model could be applied. There are no minimum requirements; it is more concerned with the question of ‘how useful it is.’ As already described, the scope of a CMMI application can be adjusted independently. Theoretically, it is also possible to define only two key figures for a CMMI model and apply only these two figures in the model. But if, on the other hand, a pure positional determination on the current use of BPM in the company is desired, then E7 recommends using the prescribed questionnaire at the eden model.

E7 does not know about further reading literature for the eden model. The eden questionnaire, for example, is only handed out if the eden model is to be applied. There is a homepage of the eden association with some available information; it explains, for instance, that the eden model is based on CMMI. However, this is quite different in the case of CMMI. There are several books on the market that are available and describe the model.

9.2.7.4 BPM

Talking about BPM is talking about the company's management as a whole. E7 explains that to define business processes and monitor those processes is an aim of BPM. The final goal is the optimisation of the company’s business procedures. Processes should not be written only for quality or documentation

reasons. The processes should, rather, be structured according to the company's processes. Finally, the company's performance should be optimized, and that takes place by the different development and direction of the company's business processes in a BPM behaviour.

A single process is the 'flow of something', completely detached from general process management. BPM is a structured approach and tries to improve processes. It is seen within the process management through a 'process spectacle' on the processes in the company. A single process runs through the company from range A to B and exists with or without the use of BPM applications. Within the BPM environment, E7 asks the question: 'What do I do with it' and 'how do I deal with processes?' The BPM approach examines an organisation from the process point of view and considers the whole process, and how that can be optimized and improved, but even individual parts of the process only could be analysed.

9.2.7.5 IT

If processes are optimized, then the associated IT systems must be optimized or adjusted as appropriate. If some processes need to be monitored or controlled, then this information must arise from the IT system.

E7 reveals that, essentially, the process management is very often located within the IT department, which often leads to difficulties. It often results in a lack of awareness in the upper management levels of a company. In that case, the subject of BPM is viewed from the IT perspective and 'limited to the aspect of automation.' Under such an approach, the participants often look only at which processes can be automated, or can assist with IT, instead of investigating generally what can be improved in the process.

From the expert's practical experience, it is important to establish the process management within the top management. In practice, the process management is often not set up at higher management levels and is only practiced in the IT department of a company. A maturity model can then be used entirely to persuade the management about the topic of BPM and the importance of process thinking within an organisation. The maturity model can be used to show what IT does with the process management in general, how well

established the BPM idea already is, and how other areas can benefit from the use of BPM.

When using a BPM model from the IT point of view, it is necessary to obtain a distinction between a more technical approach and the involvement of the corporate culture within the analysis. E7 recommends distinguishing between the BPM models used and to examine in more detail if the corporate culture is considered within the maturity model. Specifically, E7 recommends using always a BPM maturity model which considers the corporate culture. Otherwise, a company is ‘trapped in a technical cycle,’ and will not realize the full potential of BPM. If only the IT provides the request to the BPM and would like to know how the processes are managed or how good their own processes are in the company, then maybe they can use a smaller BPM approach. However, if the management wants to analyse the penetration of BPM in business, then the corporate culture plays a big role, and use of IT can only play a smaller role within the BPM maturity model. Before using a maturity model, who actually introduces or implements the model must be known. It must be understood that E7 specifies that not just the smaller IT parts in a BPM analysis should be considered. That would result in a great difficulty in getting a full consideration of the company’s BPM approach

E7 indicates that eden wants to create a comprehensive view of the BPM approach within the company. But the eden model is also often used when a company previously used only an IT based BPM approach, and would like to show that BPM contains more and that the company's management should be included in the BPM environment.

The applications of the model CMMI that E7 knows personally are often restricted to a technical aspect. They do not reflect a complete enterprise approach in the BPM context.

In principle, E7 believes that the use of IT is not a requirement to achieve the highest maturity level within a maturity model. This applies to both the use of CMMI and the eden maturity model; ‘However, in practice, it will probably not go differently from a certain size’ and an appropriate IT infrastructure should be used. This means, at a certain level of company size, that a company can no

longer handle their business without the use of any IT. Consequently, E7 believes that larger companies cannot reach the highest maturity level without the use of IT.

9.2.7.6 SAP/ERP-System & BPM

E7 asserts that the use of an ERP system is not necessary to reach the highest level of a maturity model. It must be distinguished from theoretical considerations and practical application in the enterprise. ‘Theoretically, could also a huge company with 100,000 employees develop a complete IT system to support its processes and could [they] reach the highest maturity level? In practice, of course, it makes no sense, because there exist standard software, such as an ERP system.’ Mostly, own ERP systems are not developed by the company, and standard ERP software systems are used.

Just because SAP is used, a company does not automatically achieve some basic level of BPM or process maturity. SAP can be considered as a fully functional system without having any process ideas in the system and organisation. Having a functioning SAP system in use does not mean that an organisation has established a process. Just because the SAP system has the ability to create a purchase order from a purchase requisition does not mean that they have established a process step. Even if that document conversion is possible in the standard SAP system, that does not mean that all companies use SAP as a standard tool with the given functionality.

E7 believes that the use of SAP does not interfere with the general use of any process management. The problem is rather the mentality of the employees who have worked for years with an IT system. If an employee, for example, spends five years thinking only in a specific manner to enter data into the system, and then has to rethink a whole process, then the difficulty behind this change has nothing to do with any SAP system; it is more of an issue with the mentality of the staff. SAP provides some best practice processes that can be performed in the company. But if the employee has acted differently for years, and is now asked to change to SAP best practice, then the employee balks at the new practice and expresses the opinion: ‘We have always done so, so why should I think in process now? I have always done my work in that way and it still runs, so that's a good thing.’ The previous processes have been retracted

within the company, and if a process management is carried out, that is a process of change and involves a ‘fight’ with employees. Therefore, E7 emphasises that a change has more to do with the staff and not with the technical changes.

The expert sees SAP in practice not as a tool provider for BPM. From personal experience within the SAP working group of the DSAG, ‘the SAP BPM tools are not necessarily used. The interest is not small’, but in practice, SAP tools are probably less in use than BPM tools. E7 imagines that this is has a historical basis. SAP has focused previously in terms of the keyword ‘processes’ more towards automation. The controlling component was added later. With the topic of ‘automation’ in particular, SAP has provided many different tools that were less related and ‘are not necessarily linked, or have anything to do with each other’. For example, SAP Business Workflow is used to automate key processes. Furthermore, SAP Netweaver provides in the BPM part the service orchestration and in SAP there are present ‘three or four other ways’ which offer process automation.

9.2.7.7 SAP & BPM maturity model

E7 explains that the standard SAP system already offers software to support the processes within the company. In addition, the SAP software contains many standard SAP tools for monitoring processes and identifying key figures.

For a maturity model like eden, E7 believes that it does not matter whether an ERP system is in use or not. The situation is different if a maturity model such as CMMI is in use. For that kind of maturity model, Key Performance Indicators (KPIs) can be calculated directly from the ERP system. For example, the duration of a sales process is mapped within the ERP system. The ERP system is not a prerequisite to carry out CMMI successfully, but an efficient ERP system facilitates the determination of specific KPI for processes.

The interviewee supports the contention that IT is a nice tool to support BPM maturity models. For the purpose of just identifying key figures, SAP provides a good platform to determine and compare some KPIs from the ERP system. This is not so important in the eden models, but at CMMI these indicators may provide an important basis.

From the initial small experience of the expert, SAP now provides an additional tool that supports the identification of process indicators. That tool, called SAP Operational Process Intelligence, ‘supports the usage of business processes’ and ‘observes whether performance is on track.’

The use of an ERP system and a maturity model results, in principle, in no contradiction. In the view of E7, a BPM maturity model is a model which measures how well the process management is established and it indicates where room for improvement exists. SAP, on the other hand, provides a tool which supports the implementation of processes. Some of these processes are partly determined by best practices and the process can then be controlled via the software. This means that SAP is a tool to perform processes. A BPM maturity model, however, is more of a tool used at a higher level, and is used to support the process organisation and process management. SAP delivers an ‘execution component’ to perform the daily work or the business processes. In addition, SAP can be arranged as a controlling tool which measures the actual business steps. This answers the question of whether the processes of the organisation result in any profit. The results which are obtained by the SAP numbers can then support the following questions: ‘How do I manage my processes?’, ‘How do I improve my processes?’ and ‘How do I optimize my processes?’ The following change can concern the IT system towards any automation change or represent an organisational change. But it is also quite possible that the result may be that no changes in the used IT functionality are necessary. For example, consider an existing process that passes five departments and each department uses an extra SAP mask for data acquisition and analysis. A process change may mean, for example, that in future only three departments are involved in the process. These departments are still working with SAP and possibly even on the same five masks. A process change does not necessarily mean that there are fewer masks in use. These example shows that SAP is the ‘execution component’ and the BPM maturity model is the trigger at management level to answer the question ‘How can the process be improved?’ But this question does not necessarily involve any IT change.

The various BPM maturity models can support different requirements or applications. For example, an eden model is not the appropriate tool to measure

the improvements yielded by the use of a new ERP system, because eden measures very general things. A CMMI model provides a better approach to support the planning and implementation in the ERP environment. The user needs to know at the outset that the use of such a maturity model requires a comprehensive analysis on the appropriate maturity model and their measurement criteria.

SAP as a software can be a good controlling tool when using a maturity model to support the introduction of BPM. It can analyse KPIs if the model requires the measurement of indicators. It is important to know what the purpose and the field of application of the maturity model is. If the model is used to support the daily management, then key figures from an ERP system such as SAP can be very important and automate supply. If a model is only considered once or twice a year, then a different consideration is needed regarding the whole complex of BPM handling in the company.

There also exists a version of the eden model which is used to investigate individual processes. But obviously, this analysis form is used less frequently. In this individual process analysis, SAP assists the eden model. For example, the SAP ERP system can determine directly the processing times for individual processes. E7 confirms that SAP is generally a tool which serves to support and manage individual processes. But, because a process has been established by an IT system as best practice or standard process, such processes should also be regarded as part of a maturity model. Meaningful changes can be even identified in such predetermined processes. For example, a standard process needs two steps to execute a process, which could also be executed through one mask and by an employee. Or an approval process is defined in the standard scenario, and that approval process is not allowed in the company due to legal requirements. The execution of a maturity measurement can therefore be the determining factor to change a process. The advantage of a maturity level measurement is that this measure can be applied to all processes, whether standard or proprietary processes. With the result of the measurement, a company can then focus on the processes which offer enough room for improvement and savings.

E7 has seen a maturity model used by companies from very different sectors. He notes that it is impossible to say that different areas like finance or marketing offer more or less improvement results than other areas. The optimisation potential depends heavily on the company. Essentially, E7 observes from his experience that the use of SAP does not generally lead to a better level of maturity. It depends heavily on how intensively and professionally SAP is employed as an IT system. The application of a BPM maturity model is a good basis for a better establishment of the process management behaviours and acceptance in a company; it can be used to show how far the subject is already anchored in the organisation.

9.2.7.8 Summary for expert No. 7

For E7, the main aim of a maturity model is to bring special entities to the next level and present a summary or suggestions to improve an organisation. The maturity models have to be questioned precisely, because many models came from the area of controlling and have less of an intention to push forward any further development of a company.

As a good maturity model for the beginning, E7 recommends the eden maturity model but he also explains that this model has no controlling instruments for daily process management. It is more a positional instrument to determine medium or long-term goals within a BPM approach of an organisation. Eden is very striking, catchy and easy and can be used anywhere because it is industry-independent. It can create the awareness for process management with very little effort. If a company is already deeply involved in the BPM topic, then another maturity model should be used. For E7, CMMI provides more insights for everyday usage but it is much more complex and a very fast forward model. But a company must recognize that CMMI has high administrative workloads and has to decide which figures are used and how these could be measured. In the end, each organisation must decide which maturity model they want, how useful they are and what it is worth to them in terms of time and money.

Overall, the final goal for BPM is the optimisation of a company's entire business procedures. Processes should not be written only for quality or documentation reasons. BPM is a structured approach and tries to analyse and improve processes.

The process management is very often located within the IT department, which often leads to difficulties and a lack of awareness in the upper management. From the IT point of view, BPM is often only an aspect of automation, but BPM could do a lot more. The maturity model can be used to show what IT does with the process management in general, how well established the BPM idea already is, and how other areas can benefit from the use of BPM. E7 recommends using a BPM maturity model to consider the corporate culture of an organisation. Otherwise, it examines more technical details and will not realize the full potential of BPM.

The use of IT is not a requirement to achieve the highest maturity level within a maturity model. But at a certain size of company, they cannot handle their business without the use of any IT. Consequently, E7 believes that larger companies cannot reach the highest maturity level without the use of IT.

A company does not automatically achieve some basic level of BPM or process maturity if they use SAP. SAP can be considered as a fully functional system without having any process ideas or establishing processes, but on the other hand SAP provides pre-defined processes and can support the process idea. SAP is, in practice, not seen as a tool provider to support BPM. The focus of SAP in the thematic area of BPM was more about automation; the controlling component was added later. But SAP already offers software to support the processes idea.

For the eden model, it is not important whether an ERP system is used or not. But for models like CMMI, it is more interesting because a KPI can be calculated directly from the ERP system. The ERP system is not a prerequisite to carry out CMMI successfully, but an efficient ERP system can support the model. In general, E7 recommends that IT can support the BPM approach and the use of BPM maturity models.

Generally, E7 mentions that the problem is more the mentality of the employees. If, over several years, an employee sees a specific mask within an IT system, then they do not think about the whole process. They think instead that they have always done it in that specific way and do not want to change it.

A change must handle the behaviour personally and only secondly must it consider the technical change into a process world.

The use of an ERP system and a maturity model forms, in principle, no contradiction. SAP is an ‘execution component’ and the BPM maturity model is more a management trigger to answer the question ‘How can the process be improved?’ The use of SAP does not generally lead to a better level of maturity. It depends heavily on how intensively and professionally SAP is employed as an IT system.

Finally, CMMI is a more complex maturity model and depends more on an ERP deployment than the eden model. But the following always applies: all processes need to be analysed, even if they are defined as best practice by an IT system.

9.2.8 Expert No. 8 (E8)

This section provides a detailed summary for expert No. 8 (E8) using the six defined categories.

9.2.8.1 Criteria for definition as expert

E8 has lengthy experience in the topic BPM and in 2006 was already the head of a BPM competence centre. He also has a scientific background but worked in practice in various functions within an IT organisation, and also has SAP knowledge. He has used the CMMI model and performed maturity analyses together with a consulting firm. At a five level maturity model, his objective was generally to achieve level four. During the practical application, he has learned that it is not always desirable to achieve the highest level of maturity. E8 has also collected practical experience within the BPM environment with the ARIS Toolset and used it to design and maintain business processes. Even today, he works in the BPM environment and is responsible for process management in a medium-sized German organisation.

9.2.8.2 Maturity model

For E8, a maturity model is a very theoretical construct. He believes that maturity models are very abstract and difficult to apply in practice. In his opinion, there have been very few changes in the last twenty years within the BPM area. Ultimately, there is always one important question at the end: ‘How successful is the project?’ A maturity model alone does not help when an ERP

implementation is carried out, or a change in a company must be taken forward. The overall aim must *not* be to always obtain the highest possible process maturity for all business areas. In practice, it is impossible. The outcome of a maturity model will always have different maturity levels for different business domains. No matter which business a model looks at, ‘what ultimately counts is the turnover.’ If a company has the choice to achieve a higher process maturity or make higher turnovers for the same money, then it will always make the decision in the favour of turnover. Therefore, it is always very difficult to apply maturity models to the ultimate consequence.

Maturity models are helpful to make a self-assessment or location analysis for a company and to answer questions such as: ‘Where am I anyway? Why do I possibly have, at one point or another, some problems?’ Maturity models support the answering of these questions and help to define the aims of the organisation. There may be the goal of achieving a higher maturity or even the highest possible maturity level. The other option is to recognize that the company wants some specific improvements, for example, to optimize some special processes or just to get a better control over some processes.

E8 would use maturity models when large change actions are carried out at the company. For example, if a new ERP system is introduced or major changes in the company are carried out or business units are bought or sold. In these cases, a location analysis could be a good starting point to carry out a maturity model. Furthermore, a maturity model could be useful for business cooperation with different companies, in order to find a language that all the different employees can understand.

9.2.8.3 BPM maturity model

E8 indicates that the topic BPM and maturity models occurs more on a personal communicative level rather than on a theoretical level.

The experience of the expert is that there are areas which have a very high level of maturity, for example the finance area. The financial sector is an area which does not create value, because it does not generate income, but it costs money. But a company wants to keep costs very low, so it will always try to reduce this. But if something goes wrong in this sector, then it costs the company money. To minimize this cost-intensive area of finance, from the very

beginning companies aim for a much stronger process optimisation than in other areas. Furthermore, different maturity levels are determined at different sectors in the same organisation. Therefore, it may not be the target of a company to achieve the highest possible level of maturity for all sectors of an organisation. Every company has goals and these corporate goals would affect the company. The levels of a BPM maturity model can help to achieve these goals at one point or another. For example, E8 indicates the production area. If a process optimisation approach helps to improve a process and reduces waste, this could be a big advantage for a company. Therefore, production areas can work for years with continuous improvement processes. In the automotive industry, for example, companies are working very hard with Lean or Kanban to achieve continuous improvements. For E8, this continuous improvement indicates the highest possible level of maturity. The aim of continuous improvement is to get better and leaner processes.

The expert has become acquainted with the CMMI as a model which helps a company to develop a positioning. The CMMI model is, for E8, a standard method to be able to compare his own with other organisations. The model answers two main questions for any organisation: ‘What is our goal?’, and ‘Where do we stand in comparison to others?’ E8 reports that the CMMI model is adapted in practice by his organisation by two additional stages. They created, for example, the level -2. This step describes the state when an employee begins a process and this process is dependent on the employee. This process step has been described as ‘The Local Hero makes it happen.’ This employee made sure that certain things worked, but that had nothing to do with whether this process was described or not.

CMMI can be quite complex in performance. E8 knows from practice that the use of CMMI can lead to external consultants who make a survey for an organisation with hundreds of questions, which are then aggregated. On the other hand, E8 knows that CMMI could also applied on a very small scale by only two factors or parameters which are calculated to control a company. He cited the determination of the changeover time and the delivery time in the production.

In general, E8 argues that a company should not handle with so much detail as possible at the used maturity models and get results, which were perhaps known in advance. It can be quite interesting for management to confirm that something is not working properly. More important is the question of how the management responds; it is not important which methodology or model measures problems: ‘The response to this data is the actual key.’

A BPM maturity model can help to measure a process organisation after the BPM was introduced at the company. A maturity model can then determine where the company is related to process management, and demonstrate to the management the added value of BPM. The model therefore supports the obtaining of funds by the management and the initiation of a further process improvement. Thus, a maturity model can constitute a road map, and define the objectives to be achieved in the near future and the next steps to achieve this aim.

E8 notes that a maturity model should be introduced with an expert, who has industry expertise, knows the company and understands the processes within the company. Not any BPM maturity model can be used. A BPM maturity model must fit the philosophy of the company and it is very important that the introduction is supported by the company's management. From his practical experience, E8 explains that the introduction of a maturity model must always come from above management level. The introduction of a maturity analysis from lower business levels results, in his opinion, in only small changes being successfully implemented.

9.2.8.4 BPM

In E8’s opinion, the topic BPM is the responsibility of a Chief Executive Officer ‘CEO’. Processes have nothing, or only marginally, to do with IT. E8 considers the idea of establishing a Chief Process Officer ‘CPO’ to be a good one, because the main task of a CPO should be to push forward the process management. Maybe a CEO could establish the issue with more priority in the company, like a CPO. If a company wants to have a good process maturity in a BPM environment, it needs full-time employees to pursue this objective. The experts believes that the strong establishment of BPM in companies has regressed in recent years. At many companies, the topic of BPM is financially

driven and strongly associated with the financial sector. The IT organisation often depends again on the financial sector. E8 indicates that BPM and IT shouldn't be associated with the financial sector because these issues are then exclusively oriented in a cost-reflective way. Consequently, many operations and business topics are ignored if BPM is based in the finance sector. More precisely, topic operations can achieve a lot with a BPM based approach. As examples, E8 cites the Kanban method, Continuous Improvement or Business Process Excellence Projects. If these methods are attached to the financial sector, then they are only an appendage. Then, for the manager of the finance department, the individual SD processes or financial issues are far more interesting than the holistic process view of the company.

E8 expects that the introduction of BPM initiates a general discussion of processes in an organisation. This means that a company should be able to bring people together and to promote a discussion about processes. It could help an organisation a lot more when people from IT and business discuss why processes are faulty in certain ways, than to simply draw a documented process overview with pictures. In order to encourage employees to discuss BPM, a modelling tool like ARIS could help to initiate a discussion. The introduction of a modelling tool could support the employees to create a special business language which can be understood by both IT and business. E8 notes that it is much easier if IT and business can talk on the same level. Using the same language is the best basis for discussion about the processes of an organisation. It would be a hindrance if only one part of the BPM team could discuss any specific transactions or interfaces and the other part does not know what transactions or interfaces mean.

On the other hand, the recording or drawing of processes could be a great help to ensure that employees understand and discuss BPM. E8 notes from practical experience that if a group of different employees highlight their different processes, they always try to find common characteristics or the same process steps in the various processes. Recorded processes can also be readily used to find a general and common path based on the individual processes which were recorded.

9.2.8.5 IT

When a company leaves it to the IT department alone to introduce an SAP system, it will quickly amaze how badly these processes are launched. From the IT viewpoint, an ERP system is such a pure IT system which should be introduced. The fact that a system could have poor or incorrect master data will not be noticed by an IT department. A business department will soon discover when false material information or billing addresses have been maintained in a system and therefore documents have to be recreated. Therefore, it is always helpful to include the business departments within IT projects.

The requirements for an IT system have changed rapidly in the last few years, because employees now have a lot of smartphone experience. Many employees have almost the same IT knowledge now as an IT expert, because they also deal with IT issues during their spare time and possess extensive IT know-how. An IT specialist is always focused on one topic and geared towards a specific area, but the IT world has changed a lot in recent years. Previously there were often ‘generalists’ who knew every corner in every system and oversaw the entirety of the IT system relationships. Today, IT employees who have these general views are very rare. IT systems have become very complex, because the systems are strongly driven by the requirements of the departments. Today's IT expert deals more with very specific interfaces between systems, or with the question ‘how can I manage to look after my system with a minimum of resources’, since IT is very financially driven. The question of whether the system supports a process in a proper way, or if there exist possible improvements to the process or the system, is nowadays hardly found anywhere. The IT department is strongly driven by the business one and there is no time for it to provide a general overview. Therefore, the introduction of a process organisation provides a better and global overview. The expert's experience is that joining employees from the IT and the business department in a BPM team is a very good decision. If both departments explain to each other how an interface at the IT system could work, and which requirements behind the interface exist, then a better optimisation potential could be identified. E8 indicates that a company gets better process optimisation if IT experts work closer together with the business experts. Therefore, E8 worked in the BPM environment with teams made up of 50% IT people and 50% business

people. There is not only the question of what an IT system could do, it is also important to follow the compliance rules of an organisation which are often better known by the business departments. There is not only the requirement to observe the technical components; but also the very strong requirements to respond to market changes very flexible and efficiently. The aim must be to quickly find a rapid and common solution for IT problems. An IT system must be able to react quickly and flexibly. Furthermore, SAP provides functions and procedures for overnight changes. But it is entirely legitimate to create first of all a workaround in order to solve a problem and to implement an extensive system solution later.

9.2.8.6 SAP/ERP-System & BPM

SAP supports, as a tool, the initial set up of company processes. Even such a configurable system like SAP often provides standard processes, like a standard sales process for example. It may be the case that different organisations have different sequences, but all steps of a sales process essentially run the same at all companies. ‘A sales process is actually designed always similar[sic]’ and this is also the case in various industries. These standard processes could be used as a first business process, but an out of the box standard process is not an optimized process. The diversity of an organisation could not be solved with a standard business process. SAP provides a basic level of maturity, but every company should individually analyse its processes to uncover improvement potential and to design their processes optimally.

If SAP is introduced ‘out of the box’, a company achieves a successful process implementation relative quickly. With the ERP system, SAP delivers a lot of industry know-how and already provides a configured system which runs with relative standard functionality. That means that in the first few steps, the company does not have to concern themselves too much with possible processes. In most cases, an SAP system is not newly introduced without a previous system having been in place. Then there is already an existing process or an old ERP system and it is then switched to SAP. In this case, there are two approaches. Either the new SAP system should be in a ratio of 1:1 to the old ERP system behaviours, or the ERP system change should also include the analysis and conversion of the involved processes. In the first case, E8

expects that these projects will, in most cases, fail. When a system is simply replaced by another, then process changes will not be considered or existing errors from the old system are taken without hesitation.

E8 strongly recommends a process analysis if a system change or a system update is carried out. A company should gain the best of the new system and combine the new features with the best from the old system. Processes should be scrutinized and analysed, for example by asking why this process remained in place for years in the present way. Only then should an implementation on the new system be carried out. An SAP system should be used as a utility to use processes on an IT platform, even if it provides some limitations. Ultimately, SAP is relatively flexible, and there are many ways in which an SAP system could be customized. Therefore, E8 believes that it is nearly impossible to map processes that are already perfect, clean and correct at the first introduction of a SAP system. There are many uncertainties and many local rules which can be implemented only by the continuous improvement of a SAP system.

9.2.8.7 SAP & BPM maturity model

E8 claims that SAP and maturity models do not have much to do with each other. by In his opinion, SAP delivers only a certain level of maturity. The maturity model considers only the highest common denominator and the success of a BPM project within an organisation. BPM maturity models analyse whether methods and procedures are available to ensure that the SAP system and the organisation runs in a process oriented manner and a continuous improvement is realised. A maturity level can then show how close a company comes to the optimum of business process management and reach the goal of a continuous process improvement.

If new experts are involved in the process improvement team, and they already have years of experience in the SAP environment, then they often make the following three statements about a desired change:

- It has always been like this.
- We have never done it like that.
- Who are *you,* anyway?

This thinking affects the team members to find the optimal process. An old SAP veteran will always lead the team to a specific SAP solution, ‘because he gathered over the years the experience that it will work at its best.’ For these team members, the thought horizon has to be extended; they must be ready to consider new ways. If, for example, a SAP veteran has mapped some processes in Germany, the result will not be the optimum for the Brazilian market, because these are different jurisdictions. The employee must learn to think in a more global way. For example, they must define more standardized global processes, which have more local forms or adaptations and have certain additional behaviours for different countries.

The process change is often driven by human and organisational adjustments. The BPM management has to learn that employees need to be collected and directed into a different way of thinking. For example, the BPM team members need to realize that processes can have different functionality for different countries. The development can be started with generic processes which have the same functionality in all countries. An example would be a classic SD process which has the same requirements in all countries. The subsequent accounting must then take place by individual and country-specific regulations to accommodate different accounting systems or tax rates. In this example, the greatest challenge for the employees is to define a flexible, possible process template that is scalable to different countries. For the expert, it is not only the analysis of the current maturity level that is important, but there must be a model which can be adapted as flexibly as possible to the current circumstances. The agility, and how quickly a model can react to market changes, must necessarily be considered in a maturity model.

SAP could assist the measurement of process indicators: not only the throughput times of processes the system can obtain, but also the quantitative evaluation of good returns from different measurement criteria with a SAP system. SAP can produce, with little effort, the key figures for a process analysis. E8 indicates, as examples for key figures, the costs incurred at the financial sector or the necessary change-over time at production. A company must reconsider in the analysis the frequency of the process indicators. A process which runs perhaps four or five times a year should receive less

intense attention as a process which runs several times a day. Furthermore, a company does not necessarily need the highest maturity level for a rare process. In those circumstances, it may be sufficient if the process is fully described and documented. This means that an achieved maturity level should depend on how often the process is run. E8 himself would apply an eighty twenty rule. This means an organisation should focus on process instances that make up eighty percent of the company. For the remaining twenty percent which are run less frequently, whether these processes are needed should be scrutinized and how far they should be considered. If areas generate no income, then a company should thoroughly consider withdrawing from these business areas.

9.2.8.8 Summary for expert No. 8

For E8, a maturity model is a very abstract and theoretical construct, which is difficult to apply in practice. If a company has the choice to achieve a higher process maturity or make a higher turnover for the same money, then it will always make the decision in favour of the turnover. But a maturity model could be helpful to make a self-assessment to define or analyse the aims of an organisation. The overall aim is not to always reach the highest possible maturity level; this is, for practical reasons, impossible.

A process change is often driven by human and organisational adjustments. For example, a maturity model can support an organisation if large change actions are carried out or to find a language that is understandable for all the different employees. Many things within a maturity model have to do with communication and to measure a process organisation. The use of maturity models brings people together and promotes a discussion about processes, but it is useful to design a special language which can be understood by both IT and business departments.

E8 indicate that there are areas which have, from the beginning, a much higher maturity level than others. One example is the finance sector, because finance cost companies money and generates no income. For that reason, a company wants to minimize cost intensive areas with no income.

E8 knows of an CMMI which could be quite complex. He suggests that an organisation should not lose itself in too many details when it applies a maturity

model and should reach solutions which are still known without using the model. More important is the management acceptance and response; a maturity model must fit the philosophy of the company.

The introduction of BPM can establish a general discussion of processes in an organisation and needs full-time employees to support the objectives. Maybe the introduction of a Chief Process Officer or ‘CPO’ could give BPM issues a higher priority. But the implementation of BPM is cost-intensive and that must be clear to a company. Therefore, it is not a good idea to link BPM and IT with the financial sector which will pay most attention to the costs.

The IT requirements have rapidly changed in the last years. The users have more IT experience from the use of smartphones, the IT systems have become very complex and the market expects quick, flexible and efficient IT changes. These are also all arguments for combining the IT and business departments for the implementation of BPM and the application of BPM models, and to place them in a joint department.

If an SAP system is to be introduced, it is always helpful when IT and business develop the instructions together. The IT department know what is technically possible and the business department knows much more about the content of the processes. The introduction of an SAP system does not make a company better and lead to better processes, but SAP can help as a tool to make things more efficient. First, the introduction of SAP leads to an enormous amount of work and increases the operating costs. A company does not achieve better sales through the use of SAP. Ultimately, a company needs to succeed in the long term, manage more flexible business processes and optimize the business processes. SAP is only a supportive tool that provides a basic level of functionality and maturity. With the ERP system, SAP delivers an out-of-the-box solution with a lot of industry know-how. This know-how can be used to combine it with the necessary requirements of the organisation. It is nearly impossible to map processes perfectly, cleanly and correctly at the first introduction of a SAP system, but a BPM maturity model could be a good foundation to make continuous improvements from the SAP system and its processes.

A SAP system is always a good system for the measurement of process indicators. SAP can produce, with little effort, many possible key figures for a process analysis.

E8 mentions that SAP and maturity models do not have that much to do with each other. SAP delivers, in his opinion, only a certain level of maturity. A maturity model could show by a maturity level how close a company comes to the optimum of business process management and reaching the goal of continuous process improvement. The problem with the use of SAP is often the employee who uses it. An old SAP veteran will always lead the team to a specific SAP solution because he gathered years of experience and has the best experience with it. These employees must learn to think differently and consider new ways, and realise that different processes can have different functionalities for different countries.

To conclude, E8 explained his personal 80:20 rule. This means that an organisation should focus on process instances that make up eighty percent of the company activities. A process that is carried out several times a day should be considered more frequently and more intensively than a process which is carried out only four times a year.

9.2.9 Expert No. 9 (E9)

This section provides a detailed summary for expert No. 9 (E9) using the six defined categories.

9.2.9.1 Criteria for definition as expert

E9 gained his experience 20 years ago as a project manager for SAP implementation projects and as a plant manager to build an entire assembly plant. His focus in the SAP environment was the HR module. Since 2012, E9 has been the director for an international project for the harmonisation of business processes and the integration of a single SAP platform.

The focus of this interview was the consideration of this company's BPM project. The aim of the project is the development of uniform process solutions for the enterprise. The project specified that as many processes as possible close to the SAP standard should be implemented. 'The standard is the norm' is the order of the management. The use of SAP was an active business decision,

because in the future the company intends to consistently rely on it. Indeed, the company management is convinced they are using SAP ‘also in ten years.’

This large project is currently being carried out within the company over a period that extends over several years. The project is concerned with the harmonisation and optimisation of all business processes worldwide and their integration on a single SAP platform. The aim of this project is the introduction of BPM at the organisation. First, the project started with the documentation of business processes. This is done by the ARIS tool. Additionally, there is an upstream input tool with the name Symbio. This tool provides an ‘Excel-based front end’ and makes ‘the conditions of ARIS a bit easier.’ ARIS is, in the eyes of the expert, a scarily powerful and complex tool which users do not cope well with. Nonetheless, the organisation uses ARIS due to historical reasons because there are already licenses for this tool and some areas already use it. In E9’s view, ARIS is a ‘very complex solution’ which, in his opinion, is however a de facto standard. A further reason to use ARIS is the existing know-how within the organisation. However, the combination of ARIS and Symbio create a front-end tool which allows for a much better operation of ARIS. Unlike the assumption that the organisation will still be using SAP in ten years, E9 is not convinced that the organisation will still be using the ARIS tool in that timeframe; he believes that its use will certainly change in the coming years.

9.2.9.2 Maturity model

For E9, a maturity model is a general tool which examines the stability of solutions in practice, but up to now there have been no considerations in E9’s BPM project regarding how to use a maturity model. The capacities of the BPM project team are being used to the fullest by the previous process analysis and the redesign. Therefore, no additional tasks can be processed by the team. The sole main task is currently the successfully roll-out of the BPM project. In a second step, the business should receive a good support phase by the BPM project team, and only after that can process audits be established. Whether then are some spaces to use maturity models must be clarified later. Of course, the BPM project team would determine later whether the newly developed process functions are working as planned, but not under the aspect of maturity models. E9 combines maturity models with painted sheets from their own central organisation with any theoretical content on it, but the staff do not care

about their level of maturity. They want to know: ‘Does it work or does [it] not work and makes it the daily work easier or not [sic]?’ The BPM team is discovering some improvement potential from the practical experience of the staff. For example, in small parts of the company, the BPM templates were already implemented, and a first process audit already carried out. This audit discovered that ‘certain processes are not [used] or not fully used or only partially correct.’ There are diverse reasons for this. Among other things, the audit revealed a lack of training, insufficient SAP functionality or master data errors. But the audit members also highlighted the conscious ignoring of the process instructions from headquarters. The use of a maturity model was not contemplated in this first process analysis phase. With the findings of the audit process, the BPM team was already operating at full capacity and had discovered much room for improvements.

Later on, subsequent process analysis process controls should necessarily be placed on the SAP system used. According to E9, it is not likely that those analyses will take place under the headline of maturity models. The company uses SAP as the central ERP based tool and ‘without SAP, nothing works.’ As a prototype for a SAP-based process evaluation, E9 has already examined the SAP solution ‘Run SAP Like a Factory.’ With this tool, indicators for process evaluation can be determined, and E9 would expect such figures for any kind of processes evaluation within a SAP ERP system. Furthermore, these tools also allow triggers to start SAP workflows if some kinds of figures are achieved. At present, there is no alternative to a basic SAP use within the organisation and therefore an analysis tool should interact with the SAP system.

9.2.9.3 BPM maturity model

E9 defines a BPM maturity model as a tool which examines the stability of the template solutions and is developed as part of the BPM project. Furthermore, it should analyse the maturity of the existing process solutions.

In principle, E9 recommends beginning the analysis of processes promptly after the introduction of process management. Ultimately, the BPM project must also explain to the management what they actually do, and how successful the implementation is. E9 mentions that it is not important how a process analysis is performed, it is more important that any kind of process analysis is made.

Within the company, the expert has at first already rolled out BPM in small areas, and a small enterprise process management team are engaged in the analysis of the new processes through an Excel-based solution. The team determines by expert discussion the problems that arise with the introduction of the BPM concept and collects open items with an Excel spreadsheet. The Enterprise Process Management team then begins to manually catalogue the problems and to determine what kinds of errors are occurring. For example, problems can arise through a lack of understanding, or due to a lack of, or incorrect, process functionality. The team's goal should be to conduct a systematic approach for process analysis. First, however, it is crucial for the BPM project to roll out the new processes through the whole company.

The focus of the BPM project is currently not to measure process indicators or an implementation of benchmarking: ‘The organisation is still reluctant according to the principle what is really comparable?’ There is still the question of which numbers are needed to determine a process analysis. In practice, the business is already making the initial requests, such as how high are the ‘total costs’ of some areas. The supervisors of the project would like to see how different the costs for some standard processes are. They want to make a cost comparison to other external companies or internally to other departments, because they believe that a purchasing process is nearly the same anywhere. If the booking costs of a supplier invoice are more or less expensive somewhere else, then the supervisors would like to know that. Ultimately, the goal is: ‘Everything, no matter what we do, we must do it better than all the others’, and this includes the process costs for the BPM processes.

9.2.9.4 BPM

E9 believes that it is a mistake ‘to look at BPM as if it would be only ERP.’ Business Process Management has initially nothing to do with ERP, but shows how a company can achieve certain successes. BPM describes how the complexity in this process matter can be made manageable and controllable. In these analyses, ‘manual process steps are just as important as electrical process steps.’ There are things within a BPM environment that should be better implemented electronically with an ERP system, and there are things that are not made for an integrated solution and are done better manually. For example, if the material posting at the IT system needs longer then a material

production, then the question of whether that still makes sense should be considered. E9 specifies that from the benefit viewpoint, the digitisation of the process is finite at this point. A company should consider what the customer is paying money for, because they pay only for decent quality and delivery at the right time. It even has to be questioned whether the BPM implementation brings an entrepreneurial or procedural value.

E9 explains that the implementation of their own BPM project began with the description of the company processes. In several workshops, the business processes were always defined granularly and relevant characteristics where determined. The consideration was not immediately related to an ERP or SAP system. The investigation was more general, for example regarding how the business sales process should be handled. The result of this process description was then compared to the SAP standard solution. The next step was to merge the two solutions, or delimited, but only as far as the business was able to accept the new process flow. An important question at the workshop was always: ‘Did you need it differently because you are accustomed to it or did you need it differently, because there is a need for it?’ Finally, only very special things where deviated from the standard and an own solution was developed. In a next step, the new solutions where developed and put into operational functionality on a specific date and the new processes where applied and used. From that point, the business is responsible for the utilisation of the new processes. The next steps are that the company will deal with the analysis of the new processes and how the new processes have been established within the company. Only after the implementation does the BPM project team starts the reflection and ask the question of how processes should be analysed. E9 points out, that an ‘enterprise process management team’ is established after the introduction of BPM in the enterprise. The task of that team is to make process management and perform regularly process analyses. It is intended that the team establish a process mining tool for their analyses. Another idea is that regular process audits are carried out to analyse how the processes run in reality. So far, there have been no thoughts on using maturity models.

The realisation of the topic and the need for business process management comes from the business. ‘The enormous demand for processes, structures, visualisations and a management ability to make this complexity controllable’ was triggered by the business. The business would have primarily satisfied its needs and not been interested about what the possible solutions could be. The nationwide BPM project was finally an IT outcome. Ultimately, it was a management decision from those who believe in a cross-border harmonisation by a BPM solution. The previously missing documentation process was seen as a starting point and good chance to implement BPM within the organisation. E9 believes that BPM is experiencing a huge upswing in the company, and is needed to reduce the complexity within the process environment.

E9 indicates that the company management make considerations not from one quarter to the next but instead make long-term considerations. This long term viewpoint is a great advantage for the long-term scheduled BPM project. A company needs a lot of money and time to carry out such a project, and there must be the force of will to conduct such a project for the long-term. E9 believes that in this kind of project, no one can calculate how much money a company really saves through the use of BPM. As part of this BPM project, other IT solutions such as shared services have been established; therefore all cost changes cannot be explicitly assigned to the BPM project.

There are two main areas in which the BPM team has gained experience through the BPM project. First, there is the development area. The BPM project has learned to develop complex themes more flexibly, and no longer by the waterfall model. For issues where team members cannot hundred percent state if the idea finally works, the flexible approaches are ideal. On the other hand, if the team members know exactly what should be done and how it works, then the flexible approach takes too long and is too expensive and the waterfall model is a better approach. But the problem with the waterfall model is that staff members only know at the end whether a solution works or not. In highly dynamic and highly complex special solutions, the BPM project has achieved excellent progress with the agile approach. The second learning factor within the BPM project was the improvement of the documentation approach.

Previously, varieties of different documents were created, but now the whole of the documentation solutions are collected in a large document.

E9 doubts whether SAP is a BPM tool vendor. All companies which are known by E9 and discuss BPM still use additional tools. SAP has, in the visualisation and modelling, serious weaknesses which they need to revised. ‘SAP is not a BPM tool.’ This assessment has also been recognized by SAP itself. According to the expert, SAP has promised at one of the upcoming releases that the SAP Solution Manager will demonstrate significant improvements towards BPM. This BPM project uses the solution documentation in the business process hierarchy of the SAP Solution Manager, but the documentation is created by ARIS and Symbio and therefore not a pure SAP solution, even if the principle is to implement all requirements close to standard SAP solutions.

9.2.9.5 IT

E9 describes the internal BPM project not as an IT project, but more as a ‘transformation process with some parts implementation in the ERP system.’ Nevertheless, the BPM issue is driven mostly centrally from the company’s IT department. In principle, E9 indicates two ways to push the subjects IT and BPM. Either the topic BPM is managed somewhere centrally within the company, for example, at a business operations department, or the IT department adopts the subject BPM. The proximity to IT is often very helpful because BPM is often linked with the use of software tools. However, this has the great disadvantage that ‘process management is always seen as an IT issue and that's general mischief.’ BPM being linked to IT is a great disadvantage, because it is very difficult to eliminate this connection in the employees’ minds. However, E9 sees a trend that a CIO is not only responsible for IT behaviours, but rather for a triad of IT, processes and projects. However, ‘it take about ten years’ until there is a total understanding that business process management is not a pure IT issue, and this is true not only within the expert’s company. The main focus of a BPM project is the harmonisation of all business processes, and that means it is ‘primarily a transformation project with an attached IT’ portion.

The teams for the BPM project in the enterprise are interdisciplinary and about two-third comes from the business environment. The project has also an IT

aspect, but the relevant input must come from the business. Therefore, it is important to integrate the business well within the BPM project. The team includes not only specialists from the various company areas, it also includes a former production manager or team leader from logistics. This means that some BPM team members also come from the management level. The project is additionally supported by a consulting firm, which assists with manpower, methodology and programming services in the implementation. Furthermore, the team has been put together in a very international way. An attempt was made to include not only German but also Chinese, American and other European team members. The international make-up of the project team was a sensitive topic and in practice an expensive and difficult task. It had a large impact, costs a lot of money and leads to difficult performance. For example, the project had to agree on a common project language, which in this case was English. This makes the participation of non-English speakers difficult. Compared with the turnover of the organisation, the team would still have to be placed much more internationally than it was.

9.2.9.6 SAP/ERP-System & BPM

Through the use of SAP within the BPM project, the company expects better maintainability and a reduction in complexity. The management believes that the organisation does not need special treatments and must learn ‘that there are also non-individualized solutions [which] are good.’ SAP already offers a broad standard of products, and other and much larger organisations use these standard solutions without having a large number of special adjustments or additional transactions. Therefore, the company should learn to standardize and not be wholly individually designed.

The current BPM project is ‘at least the third attempt’ to establish a process management in the enterprise, and this time it should be a successful implementation, hopes E9. The first requirement for the project was to use BPM as an approach to describe robust processes, including user requirements, risks and litigations. Afterwards, it should be considered within the BPM project ‘what can business process management still afford in terms of a real process management.’ E9 points out that the first step, the documentation, is not really process management. This step is more the basis and preparation for the major BPM project. The following real process management should be focused

essentially on two important issues: What can process management do? Which efforts are the organisation willing to perform? In this first phase of documentation, it turns out that the company has a strong need to visualize, sort and structure processes. With the combination of the documentation tools ARIS and Symbio, the BPM project now provides a suitable platform to support these requirements exactly.

Based on a management decision, the management gave up the goal of reducing the complexity and increasing efficiency. A management requirement was to harmonize processes and integrate everything in an ERP system. SAP was predefined as the ERP system to be used, because the company has used SAP for twenty years. The aim of the project is also to replace many local non-SAP solutions and uniformly change these systems for a SAP solution. In the practical implementation, it means that the process descriptions involve a very large ERP role. That means the process descriptions describe steps that essentially run in the SAP environment. The project therefore faces the criticism that it only does what's in the ERP, and ‘the real world outside’ look different. E9 confirms this assumption through an example of the description of the process step ‘execute manufacturing order.’ For the production, this description is too short, because behind this description there could be about two hundred additional process steps. These steps could include, for example, to load the material from a pallet or to clamp it in a machine. This delegation level currently does not exist, but the project has learned that a certain benefit can only be generated when the processes are described in much more detail. But when the processes are described in more detail, it is no longer a template, it is more a localisation. Then this process may take place in Singapore in a much different manner than in the United States or Germany. The process is then indeed more mature, but even more diverse. The ‘step in the localisation’ is a big challenge, because this localisation of the processes can only be developed together with the business. ‘The business must then maintain the processes, because only they know how it really works.’ The IT department does not know how concretely a process runs in West China, for example, But the business only supports the BPM project if they generate an additional benefit. For example, they hope that through the BPM project there is less infrastructure costs, thanks to a harmonized system.

E9 highlights that there are areas which are more appropriate for harmonisation than others. Economically oriented areas such as finance and controlling, which are closely related to the business management, are very similar in different organisations. In these areas, it is obligatory to harmonize these. When there is a change in these areas, for example, a change in the VAT regime, then SAP will provide a new solution in a timely manner. It would be quite different in areas which are used by only a few companies and have developed individually through customer-specific programs. Each enhancement package or each release change then makes it necessary to test their own solutions and adjust the customer-specific programming to the new SAP system.

To unify the areas of logistics and production and harmonize quality management and purchasing is already much more difficult. However, the company wants to harmonize these areas, because it believes that a lot of money can be saved if possible efficiency reserves are utilized, and complexity is reduced. But such a large project requires a period of several years until all processes are rolled out at the national and international sites. In the meantime, the process template is still growing. Ultimately, the project aim is to introduce at all locations the standardized process templates, no matter if it is a five person site that has previously only used Microsoft Excel, or a production site with 800 employees that still runs on SAP. There should be no exceptions, in order to create at a later date the best possible consolidations in the enterprise. E9 indicates that the master data management is an area with a lot of potential for optimisation, but a major effort is required to improve this. Personally, E9 believes that proper processes should always have its master data management under control.

The benefit which provides the BPM approach is to harmonize the process world and the introduction of process templates. The ultimate aim is therefore to standardize the SAP processes. In the recent practical use, the company has recognized that processes were extremely complex and difficult to operate. It took a far greater effort to optimize, exploit synergies and reduce the complexity of the processes. The aim of the BPM project is now to provide a standardized template. This default template must then be defended against further splitting and any diversification within the organisation. According to the project, the

fragmentation of this template with a thousand variations must be avoided, because that would be a step backwards, since this fragmentation currently exists in the organisation. The strategy to achieve this goal is to provide proper documentation and transparent access for all employees for this visualized documentation. The template should be a leader for all processes; this means that business can no longer decide about process changes, and all functional processes are implemented on the basis of the template. BPM provides the basis documentation for the defined processes and only by using this base and the template can it be decided together with a process owner whether an approach may differ. Essentially, the motto is ‘defend the template’ and to use as many standard processes as possible in the organisation. The new processes should be placed as close as possible to the provided SAP standard, and the SAP standard is used as a benchmark for developing the new processes for the project. E9 explained that ‘80% of all the processes are very similar in an industrial company.’ These processes have no major differences and link all companies to nearly the same use of processes. The complexity is more about the process details, but to send or sell offers, pay supplier invoices, post invoices, recruit staff and pay for staff are all processes which are done by every company, and for such processes a SAP standard should be used.

If, however, only ‘five or eight or ten companies in the world’ have a need for a range of solutions, then there is no corresponding standard solution. In these cases, the company needs to build its own solution with front-end and business logic, because SAP does not offer any solutions. When an extremely complex issue must be addressed that is ‘technically difficult, process technically complicated and system side a real challenge’ then many team members are needed to develop a new process and its solution. An example from the current project is the topic ‘Production Material Tracking’, which had placed great importance on the exact localisation of materials. This was, for example, aggravated by the fact that the reservation was made by a two-man rule. In contrast to that difficulty process is a sales process. A sales process has relatively few members and is rapidly implemented because this is already defined in the standard SAP system. In practice, the implementations of sales processes have tuning potential, because previously each division and each sales manager has performed its sales process in another variant. The

responsible employees must be convinced that they should use the new developed process flow.

Through practical experience of the BPM documentation, the company hopes to achieve an additional benefit, for example, in the area of QM. So far, there exist QM ranges from older QM systems which are not uniform and very fragmented. This old but expensive IT environment needs to manage all documents and procedures. Among other aspects, the BPM team can imagine that for the area of document management, many requests can be supported by the process world. There could be some practical approaches through the combination of the document management and QM. The use of the BPM documentation can lead, for example, to a harmonized solution that also uses the tools ARIS and Symbio for the QM documentation. The BPM team hopes that through the reusability of the BPM tools, there is an enormous saving potential for the future design and use of the QM area.

Ultimately, BPM and ERP systems do not depend on each other. Business management can be conducted even without ERP, but an ERP system speeds up the implementation. It does not matter whether an ERP system is SAP or Navision. First, the processes should be developed. Therefore, a BPM project is not any kind of IT project, it is a process project, or more precisely a process transformation project. However, a BPM project is followed by an IT one which realises the process considerations. At this BPM project, the design team has always considered how SAP has implemented the requirements within the standard processes. Ultimately, the standard SAP process was an important argument for the final design of the process. After all, the main project goal was to implement the processes as close as possible to the SAP standard. As a result, the management promises reduced complexity, lower maintenance costs and rarer occurrences of problems in the area of maintenance and handling. Additional benefits are also that there are fewer problems with release changes, and SAP enhancement packages can be loaded more quickly because less special programming must be investigated. Ultimately, all staff can join any standard SAP training and do not require any company-specific training which is tailored to the company operations.

E9 does not support the thesis that the market may change too quickly, and a SAP system is too slow for practical use because the company is always reluctant to engage in any system changes. In general, each SAP transport and each release change is associated with a high risk and the use of money and time. The company wants to save time and money through the use of standard SAP and standard updates. That is one reason not to perform frequent updates, and then only those that have already been tested by SAP.

In principle, there are, in the BPM project, only a few individual cases that prefer a non-SAP solution, and use other add-ons. E9 specifies that not everything in the SAP portfolio is ideal and can be used for the organisation. Even SAP could do some things better, but overall, the experience with the use of SAP is a good one and different solutions or self-developed programs are only used in some individual cases. If E9 had another chance to start the project from scratch, he would still pay more attention to establishing all the new processes in much more detail to the standard SAP. The project has established the harmonisation through great passion and sacrifice; the business has finally accepted that the standard is not a bad thing. But as soon as something is tuned, someone comes and explains that he cannot live with the process in this way. To say ‘no’ is always a big challenge, and the statement: ‘defend the template’ is still valid at this point. There is already enough momentum through legal requirements to alter the first introduction of the process and that must not be increased by special requirements.

9.2.9.7 SAP & BPM maturity model

E9 reported that after the introduction of new processes, the determination of process indicators should play a distinctive role for the company. Then the SAP system will play an important role, because it is used in the BPM project as the leading system. For E9, an interesting approach is the SAP solution ‘Run SAP like a factory.’ With that toolkit, SAP offers a service which is based on the SAP system and automatically determines process indicators. Not only can key figures be determined systematically with the toolkit, it can also trigger alarms or workflows within the SAP system. For example, purchase requisitions which have not been edited for more than two business days can be sent to supervisors and the supervisor can take appropriate actions. But, first, such tools and measurements have not yet been provided in the project. The

obligation is initially to establish a SAP system and set up the new BPM processes. After that, follows the decision about how processes should be later analysed and evaluated. So far, some BPM team members have seen only a prototype from the SAP solution ‘Run SAP like a factory.’ The question of which tools are used to analyse a KPI has not yet been answered. E9 firmly expects that process audits are carried out later.

The company has not yet applied any maturity model. The initial aim is to fulfil the obligation. E9 explains that this means introducing the topic BPM within the organisation based on the SAP ERP system and producing a full record of documentation. Only then can additional value for the business be generated or a process analysis introduced. E9 supports the assumption that with the use of standard SAP, a certain level of efficiency could be achieved. But this happens only if SAP is used in an extremely professional manner. This means that bills are booked and workflows are used as the functionality is offered at the SAP standard. When a workflow-based purchase requisition process is used consistently, and all of its assets and documents are properly used by the business lines, and at the end some key figures demonstrate how long the converting of the purchase requisition has taken, then a company has already achieved some of the efficiency opportunities. E9 cannot say how much increased potential such a process may offer, but he suspects that the process already has great effectiveness. E9 also notes that a standard SAP process may not always show the best process route; there are existing SAP solutions which have to be questioned carefully. That is a main task of a BPM team: to ask critical questions and to analyse where the SAP standard does makes sense, and where it does not. E9 mentions that there are some SAP standard processes which already reflect an industry standard, because SAP has a completely dominant position and many companies use the process flow in the manner that SAP has specified. Therefore, this basic definition of processes is, for many companies, already close to the optimum process. But such predefined processes are ‘not all suitable for all companies and not to any size.’ There are also company areas which are not yet large enough ‘or certain types of business’ where a SAP standard solution does not make sense. On the other hand, there are business areas where it can make much more sense to use the standard SAP. This means that every BPM team has the duty to assess the

SAP processes. ‘Just because something is SAP standard, it is not by definition effective’, and this must be clear to each BPM team member. Each company must assess for themselves whether the standard SAP solutions should be used or not. There are many people who suggest that the SAP standard might be a good idea for routine processes, but that does not excuse the process team from the obligation to check it. E9 also claims that within the company the business operates quite independently of the SAP and is not driven by the SAP standard software. Of course, the employees always look to the SAP solution, but through participation in numerous committees and working groups that exist outside of the company, E9 believes that his company certainly knows how other companies operate SAP, and is aware of many areas where the standard SAP process does not give the perfect definition. The company's fundamental decision to use SAP is a fixed and undisputed approach. Of course, there are always people or areas that have a certain dissatisfaction regarding the use of SAP, and through a BPM project this may be even lower. By setting the new processes as close as possible to the SAP standard, it may be that a process is, in the eyes of some people, ‘ugly’, but that does not matter to the BPM team if they meet the internal requirements to implement the process. The BPM project assumes that a SAP solution that is designed for a majority of the industry can be well applied to their own company. This means a radical change in business strategy because, so far, there have been many self-programmed solutions and these are now being replaced by the SAP standard. Of course, it is possible to program many individual SAP solutions and define own process flows by individual coding, but this needs a lot of time and money to realize these solutions, and the company wants to avoid these individual solutions in the future to reduce the time, costs and maintainability.

9.2.9.8 Summary for expert No. 9

For E9, a maturity model is a general tool which examines the stability of solutions and includes many theoretical considerations. Practitioners are only interested if something is working or not and are not interested in the theoretical maturity model approach which can cost a lot of time and money.

The entire BPM project is based on two point management decisions. First, the organisation uses SAP as the central IT system and secondly it uses standard SAP processes and tools wherever possible. Based on the SAP standard and

the approach that no process runs in the company without SAP, the BPM project considers how the company can combine the real processes of the business with the standard processes of SAP. The management decision was therefore the harmonisation of processes by a BPM project based on the SAP ERP system. The aim is to minimize the user program data, because the cost and complexity of the company is rising and the maintainability of the system is poor. Each SAP enhancement package or each SAP release change makes it necessary to test its own individual solutions and adjust the customer-specific programming to the new SAP system. From past experience, the company has learned that the individualisation of software generates high costs, and therefore greater benefits should be achieved by the use of standard software and processes. The organisation must also learn that non-individual solutions are a good fit for the organisation and not a poor solution. E9 does not support the thesis that the market may change too quickly and a SAP system is too slow for practical use.

E9 specifies that SAP areas exist which are better suited for a harmonisation like finance and sales processes. Processes at these areas are easier to standardize. The payment of bills is nearly the same everywhere and therefore, these areas should be necessarily viewed in a BPM project and can be defined as a basic part of any BPM project. These areas have a good standard SAP solution which is nearly an industry standard, because SAP has a dominant market position and a lot of companies use the process flow in the same manner SAP has specified. E9 believes that the use of standard SAP raise an organisation to a better maturity level if the standard processes are used in an extremely professional way. But all processes must be always be considered and analysed by the BPM team even if they are SAP standard processes. Not all predefined processes are suitable for all companies and the BPM team must decide whether the process is working at its best for their own organisation.

There is also some criticism towards implementing everything in the SAP ERP system. Some employees note that the world consists of more than ERP covers. There are areas where additional systems have to be included in order to fully map the processes. Furthermore, there are process descriptions which are too inaccurate and need to be described in more detail. But if processes are

described too precisely, these process descriptions are more of a localisation and no longer a template which can be used country-wide. The main motto of the project is: ‘defend the template’ and use as many standard process templates as possible at all locations, rather than individually programmed solutions.

The most important innovation of the BPM project is the creation of harmonized and optimized processes within the whole organisation at all sites. The general problem is that the process must be manageable for a long time and little effort, and the BPM project tries to realize these requirements by a solution that is placed close to the SAP standard. An important question is therefore always: Do you need a process deviating from the standard because you are used to it, or because you have genuinely different requirements which have to be implemented?

There is no alternative tool at the organisation for the SAP ERP system and therefore any BPM and analysis tool must interact with the SAP system. E9 explains that it is not important for him how to perform a process analysis, it is more important that some kind of process analysis is made to explain to the management what they actually do, and how successful the implementation is. At the moment, the BPM team is creating a manual list that addresses the problems in the BPM environment. Furthermore, it is now recognized at the BPM team that the evaluation of key figures or indicators is needed to analyse the first process costs. The management want to make a cost comparison of the total costs for different areas. For this analysis, SAP is an important data source because the most key figures are stored there. SAP also offers a ‘run SAP like a factory’ toolkit which is based on the SAP system and automatically determines process indicators or trigger alarms or workflows within the SAP system.

BPM and ERP systems do not depend on each other, but an ERP system could speed up an BPM implementation. E9 explains that BPM does not only consist of ERP but it can make up a large part of it. BPM describes how a complex process can be made structured, manageable and controllable, and that things within a BPM environment exist which should be better implemented

electronically like an SAP ERP system. But SAP is not a BPM tool and for the visualisation and the modelling of processes, additional tools needed.

The organisation is aware that the BPM implementation is a long-term project that requires a lot of time and also a lot of money. As part of this BPM project, other IT solutions are also implemented and introduced.

The team has had lengthy experience in two areas: Firstly, complex topics which do not know exactly what they should finally do and how their work can be implemented better with a flexible approach. However, the classic waterfall approach is the better approach for topics that can be precisely defined. The second experience was regarding the handling of documentation. A good solution has been established to manage the documentation by bundling it all into one large document rather than a variety of different documents. But E9 indicates that the documentation is not really BPM and is more the basis and preparation for the major BPM project.

The topic of BPM is often driven by IT, but IT is only a supporter. That BPM is linked with IT is a great disadvantage and it takes years to reject this idea. A BPM project is not any kind of IT project. For E9, BPM is more of a transformation project with an attached IT portion, because processes are often supported by IT tools or followed by an IT part which realises the process considerations. All relevant input at a BPM project must come from the business. Therefore, a BPM team should not consist of IT but rather business employees. Furthermore, management decision-makers should also be part of the team, as well as international employees at an international project.

9.2.10 Expert No. 10 (E10)

This section provides a detailed summary for expert No. 10 (E10) using the six defined categories.

9.2.10.1 Criteria for definition as expert

E10 has worked over many years in various companies as a project manager, trainer and consultant. In total, he has over 20 years' experience as a project manager and nearly 10 years' experience in the BPM environment, as well as 6 years as a leader of a process management team.

The task of E10 and his team is to improve processes and to measure the success of processes. They use no BPM maturity models, but E10 specifies that the demands on his team have, unknowingly, a high coverage rate with maturity models.

From the first process analysis, across the modelling of new standard processes to the determination of key performance factors, has been a long lasting journey that began over 10 years ago at the company. The process management emerged from a re-engineering project, which was transferred to a continuous organisation. Based on the process map that has emerged in the re-engineering projects, two process management departments were formed. One team focuses on major projects of new constructions for customers. The second department is engaged in the execution of services and supports more collaborative processes for overhauling or processes at replacement part deliveries and minor modifications for customers. E10 is employed with his team in the second process area. This team has several and various processes and reports directly to the head of the business unit.

In addition to the process management theme, the company has also applied SAP ERP as a central ERP tool for several years. E10 has only limited practical experience with the use of maturity models, but his company also applies process evaluations which are possibly used in the same manner for maturity models. Personally, E10 does not recall any maturity model, because the company has so far not been able to use a BPM maturity model and the topic has been forgotten.

9.2.10.2 Maturity model

The company has no maturity models in use. For E10, a maturity model is a step or level model which determines how far the company has made progress with the operation of a certain topic, for example, process management. Thereby a minimum and a maximum expression are specified in the model, and the model determines where the company wants to develop itself in the next steps to get better results and identify the organisation’s own requirements. Furthermore, the current state of the company is developed within a model.

E10 has, for his own company, a kind of a subtle and hidden process maturity model in his mind. He would like to achieve the following maturity levels:

- The core processes, key management and support processes provide a clear process description in the process map.
- There exists a clear assignment of responsibility assumptions for each process to a management representative who will take care of the process.
- A process manager would be established to convert ideas and support the company management at the process design.
- A continuous process status is determined and a process measurement is performed. The objective should not be that manual Excel lists are maintained at the reviews. The aim should be to identify Key Performance Indicators (KPI) and determine them automatically by a system. The leading system of the organisation is the SAP system, therefore, SAP fields must be retrieved and reports run regularly.

Based on this self-provided classification, the expert beliefs that it should be recognized where the company stands and what the target values are. Furthermore, measures should be derived, which can be implemented consistently and lead to an improvement of the process management. It would be desirable that the company recognizes that all changes have an impact and that the changes result in an improvement.

E10 expect that the relevant stakeholders should recognize themselves within the maturity model. For example, the IT department should find some aspects about IT as well as the management or process manager at a process maturity model finding aspects about management or process tasks. Furthermore, when using a maturity model, a company needs to consider whether and how it fits the company. Is a maturity model with three levels enough for the organisation or is it better to apply a finer model with seven steps?

E10 believes that a maturity model should be introduced by a top-down approach in a company. The top management should actively express the desire that it wants to know where the company stands and could therefore suggest the use of a maturity model. E10 recommends for these steps that a process management team accompany the questions. The impetus for the use of a model should come from the top management, otherwise, E10 sees the risk

that the use of a maturity model could result in no changes and a team which introduces the maturity model might apply the model only for themselves.

9.2.10.3 BPM maturity model

A BPM maturity model is, for E10, a guideline for the questions: 'Where am I with my process management or with my processes and where am I going?' E10's company has no maturity model in use. However, each sub-process at the company has a strategy and a master plan. Therefore, even without the use of a special maturity model, a kind of strategy or leadership exists at the company. E10 identifies this strategy as a kind of a self-developed maturity model for the company. This basic strategy has, in his opinion, no fundamental differences to a normal maturity model with different levels. However, this basic strategy is designed for single processes and does not apply to the whole company. This strategy considers, similar to a maturity model, the current challenges in the company and tries to align the process owner to the challenges. As an example, E10 identified the spare part process. A spare part process has two major objectives. When the customer calls, the replacement part must be identified and delivered quickly and this is regardless of whether they call a branch or the head office. A high degree of automation can minimize the complexity of the spare part process and the process can be accelerated. Quite different is a remodelling or reconstruction process for a customer. In such a process, speed plays a lesser role. The goal there is to develop a good solution together with the customer. The technical complexity, the counselling and finally the quality of the solution are important goals in this process. The main strategy is therefore to have a satisfied customer at the end of the process. E10 explains that in these examples, the starting points are different. The spare part process mainly measures KPIs regarding the speed of the process. In contrast to a spare part process, the cooperation of the parties and the quality of the outcome are particularly important in a reconstruction process. A maturity model therefore must be able to examine different things. In a spare part process, interface problems should be investigated, while in a reconstruction process a lack of competence or lack of coordination can be a crucial factor and should be investigated.

E10 believes that, in reality, the current process management in the company is especially inadequately treated, leaving it to the responsibility of the process

team. E10 states that only his own process team show very good process management. The individual processes are split across multiple locations within the process team. Each process manager can identify personally with his process across the whole organisation. The process managers know their own processes and these processes are well modelled. Furthermore, the process manager establishes, through reports, an intelligent measurement for the processes. However, the process department cannot implement anything or decide anything for themselves. In addition, the process management is not given high priority by the management. Therefore, the process management is not developed in the intense way imagined by E10. The management representatives do not adopt process management ‘necessarily as part of its mission.’ The expert mentions the lack of promotion from the management and that support is lacking to invest money in IT and to train employees.

E10 expects that a maturity model should analyse how much a company's management respects process management as a management task, and how management supports the implementation of BPM in companies. In addition to that, a maturity model should make the topic BPM more present in a company.

For E10, a maturity model needs some main tasks in the BPM environment to check whether the following three roles are present and have the expected functionality:

- Is there a process manager which supports, either part time or ideally full time, the process management of the enterprise?
- Are there part process owners which act as an owner and are responsible for sub-processes?
- Is there a role that guarantees the organisational link in the departments? This means the model should identify if there exist SAP Key User or Process Experts which are associated with the processes in the department and know the processes in great detail.

For the experts, the best time to introduce a maturity model would be if there exists in top management a person who wants to understand the topic BPM, or if there is a desire in the company to improve or modify something. If there is the insight in the company that something ‘has to change’ or a company has to

do something else ‘otherwise it cannot go on [any] further’ then that would be a good chance to introduce a maturity model and to consider changes. But the necessary condition is that a company wants to have a change and is willing to deal with it. However, this change will have to be supported or be requested by the top management. If executives are never told that business processes are important, it is certainly not successfully implemented in the company. The corporate management must practice process management. BPM must be measurable in the annual objectives of a company and at management level and then a maturity model can be a measuring instrument to evaluate the topic.

E10 expects from a BPM maturity model various aspects which should investigated by a model at the enterprise level. It should assume the corporate structures and identify key figures from the SAP system. Over the longer term, a maturity model should identify how BPM has developed within the company and how the thinking of employees have changed. However, it should also consider whether there exist in the company ‘organisational adjustments within the meaning of the process efficiency’ or if the company ‘respects relocation planning on process efficiency.’ For example, the question could be: Are departments which are linked in a process by numerous interfaces located close to each other or does the number of interfaces play no role in the selection of the department locations? From such attitudes, can the corporate culture then determine how the subject processes are established among the employees.

9.2.10.4 BPM

The company began with BPM in 2006, and has used the terminology process management since the beginning. The first project was a reengineering project and drew at the beginning a process map with individual sub-processes for a low level overview. The results of the re-engineering project were transferred to a continuous process management organisation. This means individual processes were modelled, they were trained, partly measured, and process reviews and process audits are carried out from time to time. In parts of the company, where this organisational structure arose, a process team was formed and established in three different areas: Process owners, process managers who act as full-time support for process questions and the process or

SAP key users who work as ‘bridgeheads’ for the departments in the business operations.

Essentially, BPM should be supported and driven by the management. E10 believes that if processes play an important role in the company, ‘then the rest will automatically give.’ Then, a company will develop automatically in a manner in which the processes support the organisation in the company. If the management do not assist the topic of BPM, and only individual areas achieve smaller steps, then these areas only achieve things which bring the best possible success from their view. However, BPM is an investment for the company. When BPM is not applied correctly, because the management does not support the topic, then the management should be asking the question: Is it really the company's wish to use BPM? Or would it be better to close the BPM department and save a lot of money?

When the topic BPM is only driven from the lower or middle management, then it is, perhaps, understood and accepted, but there are no supporters who can strongly demand and pursue the subject within the organisation. In this case, its resonance within the organisation is much more subdued. E10 believes that such a topic will only be better promoted if managers from the top management are chosen to take care of it. The same applies to the issue of maturity models.

Ultimately, the goal of a company is to make sales and profits. Therefore, issues such as process management and maturity models are often neglected because that subject results in no higher sales for a company. Often, there are no additional staffs for internal improvements or optimisations available and other projects are considered more important. In addition, this can lead to the opinion that any process upgrades are regarded as an annoyance or the employees try to prevent the process changes, or want these changes in a less frequent manner. The management of a process map is then perceived as a large inconvenience and the change of processes is perceived as annoying for the ongoing operation. However, E10 reports that provocative approaches can then shake up the thinking in this area; he can than demand a sense of process management within the company and persuade people to think more about the topic. A process management which is not consistently applied, is bypassed, has a poor data quality or represents a deficient process discipline which is

unhelpful. These problems need to be recognized by a maturity model. In that case, a rethinking in the minds of employees must be encouraged and that can be best influenced by the top management.

E10 explains that the management processes are the worst process-oriented ones in the company, and that workable management processes ‘are mostly not [recorded] in the process map.’ E10 would like to examine this area. However, it is very difficult to convince the management, and therefore this area is currently not willing to engage in process management. Much simpler and more important for the company are the value-adding processes and the service processes. For example, the spare parts process or processes by which the company earns money and the customer pays directly for that process.

9.2.10.5 IT

A good IT support is required to assist the processes. IT systems like SAP are required and included for the maintenance of processes. A lack of IT support or the use of technically unqualified IT staff can result in unsuccessful projects and may cause negative effects for the process management. E10 clarifies that IT has a significant impact on the technical support of process management and, in addition, also has a strategic influence.

From the strategic approach, the process management is located in some companies in the field of quality management, and others in the field of IT. From the expert’s point of view, an interconnection between the two areas of quality management and IT would be the best solution. In an ideal world, process management involve both quality management and IT in a combined organisation. To push the topic in an optimal way, even employees who serve the subject of process management should come from the areas of both business and IT.

E10 reports that in the area of operational process management, it is difficult to integrate IT. IT sees itself as a service provider to solve problems and not as a process efficiency-enhancing area. It requires a high use of the process management team to motivate and engage IT for process needs. E10 highlights one example from the SAP environment. The IT department provide SAP basic training, but is unwilling to provide continuous training for SAP users to improve their skills up to a level of a SAP key user. In this case, IT believe that it is the

task of the business department and not their responsibility. However, E10 believes that an IT which wants to have SAP key users and process centres must also invest in their education. In these cases, IT should deal more with the people to ensure successful IT implementation. This is an example in which there still exists some improvement potential for the IT organisation within the topic of SAP and process management.

At the company of E10 there still exists a mix of IT and business personnel for the process management team and the operational business are assigned to the business unit manager. This mapping to the business unit is a useful construct for the experts. The second process management team in the company is associated with the quality management, and that may well have the disadvantage that the team is too far away from the business.

The output of a maturity model should be less interested in the company's IT department. The people who work in the process should instead be more interested in the outcome. If a maturity model exists, then it would be important for E10 ‘that the part process owner sets a goal: Where we are today [sic] and where [do] we want to go?’ A maturity model does not necessarily have the objective of always reaching the highest maturity level, but it is important to find themselves and to set a goal. The process owner and the management must decide how much effort goes into the process management, and what would be sufficient. The process manager and the process owner have the task of achieving the defined objectives, and promoting the implementation. When implementing BPM in practice, then a balance between the business and IT should be struck. This means that IT offers first a standard solution. Then the business or process management team analyse whether this standard solutions fits or which areas are different. Next, the IT and the business departments should make a sensible decision of which area should now be adapted to combine the process with the standard IT and useful additional implementations.

For the expert, a high maturity level would be the following scenario: IT offers a technical advisory group, which automatically analyses the output of an IT system and finds technical potential for further development of the process. Finally, this process management team offers the development for the

processes without any kind of customer order and automatically offers these improvements.

E10 considers that with IT process reports and measurements, the processes of a company can be analysed in an IT manner by figures which are based on an IT system, but the issue of ‘culture’ is also extremely important for a company and should definitely be analysed in more detail.

9.2.10.6 SAP/ERP-System & BPM

In the expert’s company, a process would not be possible without the use of SAP. SAP is the leading ERP system in the company. E10 suggests that a company should examine whether the standard SAP process could be a solution for them. Not everything that IT provides may be optimal for a company and the principle ‘process follows IT’ should not simply be assumed, but also the phrase ‘IT follows process, follows strategy’ is not necessarily correct either. E10 believes that the ideal solution likely lies between both strategies. IT should show what they can already provide with standard processes, and the business should analyse which IT changes are needed to use the process in an optimum manner.

SAP has two unbeatable arguments: First, it is the leading ERP system. All financial transactions have something to do with the SAP system and are displayed there. On the other hand, SAP can clearly define which values must be maintained. Through the application of mandatory and optional fields, it becomes relatively clear which system fields are required. That means that a user can be very well guided through a process by the system. The more processes and fields predefined by IT, the less outbreak options a user has in the process. SAP provides a solid foundation for validating data, and provides a ‘high chance of automation and analysis capabilities.’ SAP also provides a good data base for evaluation functions as the analysis of processing times.

E10 believes that conscious SAP use can contribute to a certain process maturity at the company. He further explains the thesis that process management use must be connected to an ERP system. Furthermore, processes will not work without an ERP system because the ERP system contains the required data for the measurement of the processes, and comprehensive processes ultimately influence the ERP system. If process

management is to be performed in the company, then a process manager should be established, which has ERP knowledge and meets the demands of IT. These employees must speak the IT language, to formulate requirements and to be able to influence the ERP system. This process manager must be the link between IT and the people, and must be associated with IT understanding the needs of employees, or must be able to combine the IT expertise with the requirements of the process development at the implementation. The IT implementation is not just concerned with the understanding; it also concerns the decision of how an ERP system can be used.

E10's company analyses KPIs which are based on the existing SAP system. That means the SAP system measures, by indicators, processing times, determined rejection rates or counting errors, but the measuring process is different in various processes. In a spare part process, the measuring of KPIs could be useful but in a conversion process, the measurement of throughput times would not make sense. If different ideas and coordination between the vendor and customer takes place, the success depends on the satisfaction of the customer with the final product and not from the throughput time of the process.

In practice, the company uses SAP BI to measure process indicators. This means the process team consists of BI experts with the necessary IT expertise to create the reports.

E10 believes that it is possible to avoid many Excel and Access reports by the thoughtful use of SAP. Generally, it is also possible to reduce the system diversity through an elaboration of an ERP system, but there will never be only one ERP or one SAP system which can provide all the functionality of a company. In addition to an ERP system, other systems are needed. However, a company should attempt, through changes, to reduce the variety of different systems.

In many cases, IT was in the past built around the processes. E10 emphasises that this is not the correct method. Rather, a balance between the IT or the ERP system and the processes must be established. The process should not dominate the development; the aim instead should first be to achieve the

company's goal. In which direction does the company want to change through the use of process management? Originally, the expert's company wanted to use the standard SAP system, but now it is more oriented to the current process flow and therefore many in-house developments have been programmed. The ERP system has therefore been adapted to the processes already in use and could still be continued, but that is not a successful process management in the opinion of the expert. An IT should *not* make developments, rather it should make it possible that the process can go on as before. At this point, a decision from the top management is needed, which raises the question of whether the IT should adapt to the process or not. E10 states that in the long term, such a development will have its revenge and will generate higher costs. Within the topic process management, the process management team should also deal with the IT systems and develop a long-term IT strategy, and not merely satisfy short-term needs. It is important for E10 to find a balance and draw attention to the question: 'How much do standards helps us and where do standards not help us in the long term?' The question of how long-term efficiency can be developed from the standard and customizing changes of a system should be reconsidered.

E10 explains that the introduction of an intelligent SAP system can lead to process optimisation. As an example, he uses a remodelling process with new SAP document types which contributed to an overall acceleration of the process. However, it is important to deal consciously with SAP and be willing to reconsider the SAP functionality, otherwise a SAP system can cause disturbances.

The definition of the processes within the company has been especially defined by long-time SAP experts. The interviewee doubted, however, whether that represents successful process management. The experts adapted the standard SAP process for the processes in the company, but no one understands the changes as the experts have left the company. The interviewee believes that this would not happen if the processes were more closely defined to standard processes, because the processes can be better understood by other employees who have less special knowledge about the company. However, the existing process would then need to be adjusted and that was not desired by

the management because their target was that IT adapts the processes. The SAP experts have taken this decision and been faithful to the slogan ‘IT follows process’, adapting the ERP system by programming and customizing the processes.

To analyse the key figures in the SAP system, no new fields in the SAP system were defined. However, the problem lay in the following question: Which of the already existing SAP fields is the correct one? Due to the different locations, the operation was different in the different plants and therefore partly different fields have also been filled in the SAP system. The company currently measures only end times and there are no time measurements of certain milestones. A company has to be aware at that point how much effort it put into the care of such data in order to measure milestones times and which additional value then delivers these measurement indicators. E10 explains that there is a motto in the company: ‘What is not in SAP, does not exist.’ Therefore, the company has the strategy of managing all financial figures within the SAP system and performing key figure indicators only within the SAP system.

9.2.10.7 SAP & BPM maturity model

For the experts, the topics ERP and maturity models relate to each other. When using maturity models it should be considered how often, and in what form, they are carried out. Furthermore, the maturity model should match the company and their objectives. It does not necessarily apply to a standard model, that the highest achievable maturity level should also be the target for the company. It is not the maximum that is desirable, ‘but the active answer to the question, what's good for me?’ and what is good for the company. E10 says in addition: ‘A good maturity model can occur only with the cooperation of the company.’

A SAP system behaves similarly, it provides opportunities, but a company must make the effort to think about how SAP is best suited for the company. A SAP application, explains E10, which runs only to the standard does not optimally represent the company. But too many self-developments are also not good for a company, because it may be, for example, too difficult to maintain or train. Here, a balance has to be found. If the ‘IT is always moved around about the actual processes, then the processes do not improve.’ With SAP, there is a chance to apply standard processes, but it must always be actively questioned what the

company wants to use. What standard should be used, or is there a need to change the delivered SAP standard processes? A suitable maturity model for the company should be generic and respond to individual sub-processes, and have a certain degree of flexibility to analyse sub-processes.

The successful use of maturity models and process management in the SAP environment must be implemented together by IT and business. IT must play an advisory role, which means, that the IT department is not only concerned with the requirements. IT also needs to think strategically and consider the business requirements. Then, an appropriate balance between the SAP customizing and SAP standard must be developed and implemented by both IT and practical business use. The management should urge IT and business to work together, otherwise IT will have to find answers to technical problems that are, perhaps, regarded differently from the business viewpoint. In addition, the situation in which IT is not involved on process changes, and only works to solve problems by service tickets and maintenance, must be avoided. Ideally, the IT department can offer the business some consulting services and introduce a standard SAP solution scenario. E10 hopes that, in addition, IT supports the departments to qualify and train some users to become key users. A process team should also integrate IT competence within the team and formulate IT demands correctly. This IT competence should arise through the integration of team members who have an IT education. E10 explains that departments which are composed only of technical staff could be unhelpful because this behaviour ‘complicates the dialogue between departments’ and promotes a silo mentality. An optimal organisation would be if IT specialists were sitting in the departments, even if they are associated with IT. ‘The organisation of competence does not have to be the physical arrangement of people at the rooms.’ It is important for E10 that key users of the process are placed in the departments and perhaps SAP IT specialists also integrated within the process management team, in order to promote a more interactive operation.

9.2.10.8 Summary for expert No. 10

For E10, a maturity model is a step or level model which determines how far the company is within the operation of certain things. A maturity model must be applied consistently and the model must be able to determine the current state of a company, whether bad data quality exists or the company has poor process

discipline, and the model should demonstrate possible next steps for a better result. Furthermore, the relevant stakeholders should be recognized within the model itself and whether, and how, the organisational goals fit the company.

E10 recommends that the introduction of a general maturity model, and especially a BPM maturity model, should be driven by the management and a top-down approach. The goal of each company is to make sales and profit. Process management is often seen negatively because it is not directly traceable that sales or profit increases can occur from it. Therefore, this topic needs support from the top-management to clarify its importance.

There are processes that can be analysed better than others in the field of process management. For E10, the management processes are the worst process-oriented processes in the company, but it is very difficult to convince the management to change these processes. Simpler and more important for the company are the value-adding processes and the service processes, like a spare part process for which a customer pays directly.

A maturity model does not necessarily have the objective of always reaching the highest maturity level, but it is important to define which goals or which level of the maturity model should be reached at minimum.

For E10, the use of IT has a significant influence for the strategic and technical support of process management. Unqualified IT can lead to incomplete process management and systems like SAP are required for the maintenance of processes. Often, the IT department sees itself only as a service provider but for E10, IT has more of an interconnective role between the quality management and the IT support. This role needs IT and business people and also the knowledge from both parts to implement a successful BPM. However, it is not only the IT but also the culture of an organisation that should be reviewed in a maturity model and is just as important as IT.

If SAP is the leading ERP system at an organisation, the company should try to use as many standard SAP processes as possible. But not everything which SAP or a general IT provides could be best for the organisation. The principle ‘process follows IT’ should not always be implemented, but the principle ‘IT follows process, follows strategy’ may also not be implemented consistently.

E10 believe that the best route lies between both strategies. IT should demonstrate what can be possible, and the business should always analyse which processes and IT requirements are needed. The main aim should always be to achieve the organisation's goals, rather than aiming for a process that works as before and adapts to the IT system. Therefore, a process manager should always need detailed knowledge about IT functionality and be able to influence the ERP system, as well as knowing the provided processes and how to use them. Furthermore, a long-term IT strategy should be developed and the following question answered: How much does standard SAP help the company to be successful in the long-term?

SAP has two important arguments in its favour. First, it is the leading ERP system on the market and all financial transactions have something to do with SAP. The system provides a good data base and a high chance of automation and capability analysis. E10 explains the importance of the system by the company's motto: 'What is not in SAP does not exist.' Secondly, SAP provides a solid foundation for validating data and provides high automation and analysis capabilities. E10 advises that process management must be connected to ERP systems, because an ERP system contains the most data for the required measurement of process indicators. With a reasonable use of an ERP system, many Excel and Access Databases can be avoided. But in addition to an ERP system, other systems are always necessary and must be analysed.

Furthermore, ERP systems and maturity models fit together. A maturity model and the IT used must play an advisory role and lead to strategic thoughts and finding the balance between poor SAP standard processes, the SAP customizing used and self-developed programming. An SAP system which runs only by SAP standard processes does not optimally represent the company, but too many self-developments are not the best solution. A good maturity model should support the company and their objectives. A model also initiates co-operation in the company between key users of the process, IT experts and the business.

9.2.11 Expert No. 11 (E11)

This section provides a detailed summary for expert No. 11 (E11) using the six defined categories.

9.2.11.1 Criteria for definition as expert

E11 is employed in an SAP consulting house and has over 18 years of SAP experience. As head of Process Governance, he has been actively involved in the BPM environment for several years. E11 is co-author of the German guide 'Leitfaden Business Process Management' which was issued by the working group 'Business Process Management (BPM)' of the German-speaking SAP User Group (DSAG). Furthermore, he is a frequent guest and lecturer at international conferences on Business Process Management topics. E11 uses the SAP maturity model at his company.

9.2.11.2 Maturity model

For E11, a maturity model is a uniform standardized measuring framework, or a benchmark to assess the maturity of processes. In E11's company, a maturity model is used to assess the maturity of the process management. The goal of a maturity model is often to follow a predefined path of measurement. The maturity model then presents a standardized and uniform framework for how the further development can be realised and objectively measured at the next development steps. Then, the measurement is carried out by individually defined criteria which must be reached in order to achieve the next step of a maturity level.

A maturity model should fit into a company and its requirements. The company of E11 wanted, for example, a maturity outcome with clearly defined steps for each maturity level and not a matrix outcome which relates to a degree of maturity. Company requirements like these are important and have to be covered by the maturity model that is used.

9.2.11.3 BPM maturity model

E11 believes that in general, a company tries to optimize the use of BPM in an organisation by using a maturity model. A maturity model then leads to a review and can, for example, determine if a process was not implemented correctly. It could be, for example, that approval levels are not correctly displayed at the process and the organisation uses too many approval steps in practice.

E11 highlights that a maturity model has, in the widest sense, the goal to improve processes. The use of a maturity model can make many things 'visible at all' within a process. E11 suspects that a process with a high maturity level is

better and more efficient than a process with a low maturity level. E11 believes that, in all likelihood, a process with a low level of maturity involves inefficiencies that ‘no one can really see or measure.’ Therefore, the expert suspects that the maturity level does not necessarily mean something about the accurate quality of the measured object. On the other hand, a process with a high degree of maturity is likely to be ‘managed and illuminated‘ so well that inefficiencies would have been much more noticeable.

The company of E11 uses the SAP maturity model. That model is an internal model used by SAP and is of only little importance for SAP customers. This model has nothing to do with the original SAP software and was introduced because the available models on the market did not meet the requirements of the SAP AG. The goal was, for example, to have very precise steps in the model and not to receive comma values for a process graduation. Furthermore, specific SAP aspects should be anchored in the model, for example that an IT-supported process is mapped with SAP standard software. The definition of the model provides that in the highest level of maturity, a process is implemented at an unmodified SAP standard system.

The criteria for using a standardized SAP system led to many debates in the company and there are exceptions. For example, E11 reports that exceptions exist when SAP does not provide functionality for a particular process. But often the employees are accustomed to the fact that a system is modified to their requirements. At some point, however, ‘the maintenance of these many modifications is an economic problem.’ Therefore, the idea behind this standardized software application is not only to take aspects from the process management. The idea is increasing additional support from IT aspects for better maintenance. E11 also reports that SAP is focusing on this standard approach because it wants to send a signal to the external customers and demonstrate that the standard processes are usable for them.

The SAP maturity model is not a secret model and is shared by SAP with companies that are interested in the model and specially request it, but the model is not used at software consulting projects. The basics of the model are partly based on the CMMI model, and the levels of the models are quite similar to CMMI.

E11 describes the internal classification of the SAP maturity model through the following steps:

- At level one, a process is documented and the responsible persons are known.
- At Level two, the main criterions are that KPIs are defined, and these KPIs are also measured regularly. This means overall that the process is managed.
- At level three, the prerequisite is that an unmodified SAP system is used. This level is very close to an excellent process. There should also be a vision for the process within the company. It further includes continuous improvement measures and a real-time monitoring of the performance.

At the SAP maturity model, all specified criteria must be fulfilled before the next higher maturity level can be reached. This means that all ‘7-10 criteria’ of a level must be fulfilled before the level of maturity is fully achieved. For the highest maturity level, the most powerful criteria is always to consider whether this process can be represented in a standard SAP system. But if there is a process in an organisation which is not defined by a SAP standard system, then ‘this criterion is not applied’ by the maturity model. For example, a technical drawing cannot be created in the SAP system. E11 cannot answer to what extent this requirement of the standardized processes is a useful maturity criterion for other companies. He can only presume that the use of standardized best practices is a good criterion for a maturity level.

At the expert's company, the automatic reporting of the maturity model is carried out on a monthly basis. The report analyses where the individual areas of processes are in relation to the process maturity levels. This analysis should not be a subjective assessment, and the company has therefore developed the idea that a maturity model allows for a more objective method. The parties assume that the idea of process management in the company is established in much more detail if a process reaches a higher level of process maturity. Over 250 processes are measured individually in the company. Finally, the target value is determined as the average of all these processes. As a result, each process has a fixed level between ‘1’ and ‘3’, but ultimately the average of all evaluated processes has a value with a decimal point. Only in this way is it possible that

even minor changes to all the processes can be perceived. The degree of maturity is determined by a criteria catalogue, which is assessed by the process managers themselves. But the process team also offers the opportunity to determine the criteria by a shared workshop. In this way it is possible to work out what a process is still missing in order to reach the next stage of maturity. As a rule, the global assessment is carried out once a year by the SAP maturity model.

The intention of the own maturity model was to obtain a standardized measuring framework and to enable a certain comparability. In general, the aim was to ‘communicate the quality of process management in general.’ Ultimately, the practice has been shown to be unrealistic in the sense that ‘the degree of process maturity increases continuously.’ It is more likely to reach a certain level and then the process maturity stagnates. ‘The motivation to increase the degree of maturity’ can be defined to a certain extent by the top management. For example, the management of E11 expected that all processes are at least documented and a process manager has been named. However, an absolute process maturity can only be achieved if the process manager is committed accordingly to his processes. A process manager can also better communicate with the management at higher maturity levels about the process performance, because the process manager could use KPIs which are calculated directly from the SAP system. The SAP model also uses such KPIs within its model to provide the opportunity to perform a monthly analysis.

This maturity model has been applied in the company since 2011 and since then there have been changes in the model. E11 reports that it makes sense to check whether certain criteria are still useful or whether new additional criteria should be included. For example, if the company strategy changes, the model should be checked to see if it still fits the new strategy. A maturity model should not be ‘carved in stone’ and it is very important that it is supported by the users. This can lead to long discussions about the different criteria at the diverse maturity levels, but there some new ideas and approaches could also arise from the discussion.

Internally, the model is documented by SAP, and this documentation is available to all internal SAP employees. But in addition to the DSAG Business

Process Management Guide, the expert is not currently aware of any additional literature about the model.

E11 reports that in practice it is quite possible that a process falls back to a lower maturity level. If a process management is very much dependent on a person and this is then eliminated, then the degree of maturity can also decrease. Other possibilities are, for example, when responsibilities are changed or reorganisations are carried out, or no process manager is found. Usually this condition only exists for a short-term period, and the original stage can be reached again quickly.

In many cases, E11 has learned that many companies do not have a maturity model, or the existing model is perceived as too complicated. In addition to the special feature of the model, that refers to the use of an unmodified SAP system, another unique feature from the expert's point of view is the simplicity of the model and its small amount of criteria.

9.2.11.4 BPM

For E11, BPM can be used in different aspects. Typically, BPM includes a process description in a particular notation and this process efficiency is then used as a basis or as documentation for the persons that execute the processes. Further aspects are, for example the automation of BPM with BPMS. BPMS are a special kind of tool to support the BPM activity and refers to BPM suites or BPM systems.

E11 believes that a pure BPM does not persist only as a modelling tool, but its usage consists of a lot more. E11 would insert BPM in such a way that a company first considers which business processes exist at the company and models these processes by a process model. The next step would be to determine how these business processes could be managed by an SAP system and how the topic BPM and SAP could be combined in this phase before other topics are added.

9.2.11.5 IT

E11 explains that an ERP system can be very helpful to standardize IT processes. Employees today expect, for a standard process flow, some form of IT support. In general, E11 expected an IT-supported process which is ‘mapped

with SAP standard software' because this is also required for the later used SAP maturity model. In contrast, it can be quite reasonable that strategic processes or management processes can be executed without the use of any IT.

The application of the SAP maturity model does not require the use of any specific IT, and it is independent of it. However, the use of the SAP maturity model makes more sense when an SAP ERP system is in use. Overall, SAP is often the leading IT system of a company in the business area and therefore this requirement of a used SAP system applies to many companies.

9.2.11.6 SAP/ERP-System & BPM

E11 recommends the following procedure when using BPM within a SAP environment. First, the company should consider what business processes exist within the company and illustrate these through a process model and by textual descriptions. In a next step, a consulting company should be examined to see how these business processes can be depicted in SAP and whether pre-defined SAP processes or SAP best practices can be adopted. Ideally, the company should consider how the process model and the standard SAP system can be brought together as closely as possible. The use of a maturity model should be considered in a later step.

E11 points out that there are many ways to use an 'ERP software' and distort the pre-defined processes. Just because a process runs in an SAP ERP system, this factor does not necessarily mean that the ideal and 'best practice' case for the company is running. E11 recommends that every process should be analysed carefully for the company, because processes can also be used incorrectly. E11 knows examples of where certain pre-defined SAP process flows are used for entirely different requirements than originally conceived by SAP. This means that this process is then no longer a best practice case. One example of changing best practice is the handling of approval stages in a process. If the standard process requires two approvals by different persons, but the process model still requires two additional approval documents, then the process is displayed and configured by a standard SAP system, but no longer as a standard process.

9.2.11.7 SAP & BPM maturity model

In the case of the SAP maturity model, the criteria determines how the SAP software is used in the processes. A process participant should accept that a process is carried out by a standardized, pre-thought process within the SAP system, and no additional self-developments are carried out. Wherever a process is actually based on IT, the SAP maturity model requires that a standard SAP process should be used, which is referred to by SAP as the 'Best Practice.' Traditional processes such as finance or HR processes can be represented very well by using standard SAP software. In the case of strategic processes or management processes which do not always need any IT support and where an IT application is not provided, this requirement is not applicable.

However, overall E11 does not believe that there are differentiations within the SAP maturity model. He does not think that modules such as SAP FI or SAP CO can be better or worse combined with the maturity model than in other areas.

E11 describes the interplay between an SAP system and a BPM maturity model as a very individual step. Depending on the established maturity model, each company should decide for itself whether the interplay is important, or if the model should not consider it at all. However, the fact is that SAP is a big or the most important IT system at many companies, and therefore a SAP system has many touch points within a company.

The ERP system supports the identification of KPIs to make performance measurements and also provides standard best practices which can be used. KPIs that are used for the SAP maturity model are calculated directly within the SAP system, but the determination depends on the individual processes. In the case of manual processes, nothing comes from an electronic system, but, for example, if throughput times are calculated, 'then it is [a] quite normal method' if these processes run through SAP and determine the values directly from the SAP system.

E11 highlights that, in contrast to standard ERP solutions, the topic of cloud solutions can have a significantly higher standardisation degree. With cloud solutions, a customer can affect the solution much less, because the cloud application is made available to all customers in the same way and a

modification does not makes sense for a single customer. That means the creation of individual possibilities makes less sense if a cloud solution are used.

The use of a maturity model should not be carried out right from the start with the introduction of an SAP system. In this case, the focus of the SAP introduction would be shifted completely. If a company introduces SAP, everything should revolve around the company, and it should be not the case that the guidelines are provided by the maturity model and affect the SAP introduction.

E11 cannot clearly answer the question of the dependency on SAP, BPM and maturity models. In a certain way, these three things have a certain dependence on another when they are viewed from an SAP point of view or within the framework of standardisation. A ‘process manager within SAP would say’, however, that they are rather independent of each other. Each company should consider what is important for their maturity, and if a standardisation of IT processes is an important thing for their organisation. In this case, an ERP system can be very helpful. But E11 is unable to conclude that an ERP system is a general prerequisite for a BPM maturity model.

E11 highlights the following interconnections between the use of SAP or general ERP systems and the SAP maturity model. First, the model requires an SAP system which is mapped very close to the standard, and uses the SAP best practice solutions. The ERP system can also help to determine KPIs for a maturity model directly from an SAP system. This means that SAP provides standardized reports that determine and present KPIs.

9.2.11.8 Summary for expert No. 11

For E11, a maturity model is a uniform and standardized measuring framework for a review which determines the maturity and follows a predefined path of measurement. The result is a maturity level, which does not necessarily mean something about the accurate quality of the measured object. Certainly, a high maturity level should involve better management and more efficiency, and in contrast low levels involve more inefficiency.

As a result of the model, further possible developments can be highlighted. E11 mainly recommends that a maturity model should fit the company and its

requirements and strategy. A BPM maturity model has the main goal to of improving processes and making hidden errors visible. E11 recommends that each process should be analysed in much more detail for the company, because processes can also be used incorrectly.

The company uses the SAP maturity model which is developed by the SAP AG to meet the SAP own requirements of the company. As a specific SAP aspect, this model examines whether a process is implemented with SAP standard software. The use of SAP is an essential aspect for the SAP Maturity Module to achieve the highest possible maturity level. Consequently, this SAP maturity model is linked to a SAP system but only if SAP also offers this process in the SAP standard system. The origin for this link was derived from the fact that the maintenance of many own developed programs is an economic problem which should be avoided by the use of standard software. Furthermore, E11 presumes that the use of standard processes is a good criterion for a maturity level. However, this SAP maturity model is normally not used at consultancy projects which are managed directly by SAP.

E11 clarifies that the goal of a company cannot be that every process reaches the highest possible maturity level. E11 recommends for his own organisation, that each process reaches at least the second of three maturity levels. He indicates that a process at level two can be a good and acceptable process for the company. The model is based on the CMMI model and measures over 250 different processes of the company. It is, for E11, unrealistic to expect that the process maturity increases continuously. Furthermore, the motivation to increase maturity depends on how the top management supports this. The use of BPM maturity models and KPI can provide a good basis to discuss the BPM with the management and this communication is always better if a higher maturity level is reached.

A maturity model should also be checked regularly to see whether criteria are still useful, or additional ones should be included. The model should support the users and this could only happen when it can be changed and is not set in stone.

E11 was very surprised that many companies do not have a BPM maturity model or consider an existing one to be too complicated. For E11, the SAP model is therefore also a good choice because it is very simple and has, with seven to ten criteria, a small amount for each level. The BPM usage consists of a lot more than only the modelling of processes. The processes should also be drawn and they should be analysed to see how these business processes could be managed by a SAP system. Furthermore, the topic of how BPM and SAP could be combined should be investigated. E11 preferred that an external consultancy should demonstrate how defined processes can be adopted through SAP best practices within the SAP ERP system. However, E11 also notes that a process which runs on the SAP system means that this process is the best solution for the company. Every process should be analysed carefully, even if they are predefined by SAP. But a process participant should also accept that a process could be carried out by a standardized, pre-thought process within the SAP system, and no additional self-developments are necessary.

An ERP system in general can be very helpful to standardize IT processes and many employees expect IT support. In fact, the SAP maturity model does not need any special software to be applied, but SAP should be used to reach the highest maturity level. SAP is, for many companies, the leading IT system in the business area and has diverse connections to many areas and applications within the company. The SAP maturity model is, for many organisations suitable because many companies use SAP. E11 does not recommend the introduction of such a maturity model until an SAP system has been introduced and the introduction of an SAP system should not be influenced by the use of maturity models.

E11 describes the interplay between an SAP system and a BPM maturity model as a very individual step and each company should decide for itself whether this interaction is as important as it is defined in the SAP maturity model. It is already enough for some companies to determine only KPI from the ERP system. Other companies prefer to follow the SAP best practice solutions and want to implement their process close to the SAP standard. Therefore, E11 cannot clearly answer the question of the dependency level of SAP, BPM and a

maturity model. This depends on what the company wants and how far a dependency is desired.

9.3 Web survey

The following web survey was publicly available from mid-November 2017 to early January 2018. Within the Google Forms platform, an English and a German version of the survey was created. Both forms contained the same questions and explanations. Anyone who was requested via a XING message or by e-mail received a link to the German and the English version of the google form survey. Each survey was divided into four pages. Only when the 'Submit' button was pressed at the end of page 4, the inputs were counted and the answers were statistically recorded. A total of 152 people participated in the survey and filled in the form. The analysis of the answers contains chapter 6.

9.3.1 Web survey – English Version

The impact of SAP on the utilisation of Business Process Management (BPM) maturity models in ERP projects

A survey evaluating the general applicability of ten developed principles.

Welcome

Thank you for taking part and supporting me and my research! This survey is designed to evaluate ten principles which have been developed as part of a PhD research study. It would be a great help if you would answer the following questions, which should take approximately 15 minutes. Be assured that all answers you provide will be treated as confidential. All data will be anonymized in the thesis and in any subsequent publications.

This research is being conducted under the guidelines of the Handbook of Research Ethics of the University of Gloucestershire, UK. The research plan has been approved by the University, but the contents and opinions expressed in this research instrument are those of the researcher alone.

Please do not hesitate to contact me if you have any further questions via e-mail:

This research deals with the terms 'SAP' and Business Process Management (BPM). In addition, 'BPM maturity models' are considered which analyze the process maturity in companies.

The purpose of this study is to explore the impact of SAP on the utilisation of BPM maturity models in ERP projects.

This research considers the relationships between these three areas in the context of the implementation of SAP ERP in companies.

The objective of the survey is to evaluate the general applicability of ten principles that have been developed from in-depth interviews.

For a general classification of you as a respondent, please answer a few general questions.

How many years of experience do you have with SAP?

How many years of experience do you have with BPM (Business Process Management)?

How many years of experience do you have with BPM maturity models (BPM = Business Process Management)?

Which BPM maturity model do you use or do you know best? (Or do you use a self-developed tool to evaluate and analyze your processes?)

What is the best description of your current position?

- System User
- (Process-) Manager
- Researcher
- Consultant
- Other

What industry sector do you work in (e.g. Manufacturing, Information Services , Management consultancy, University)

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The impact of SAP on the utilisation of Business Process Management (BPM) maturity models in ERP projects

General principles

The research suggests that the following ten principles should be followed if the company wants to use a BPM approach successfully within an SAP environment.

First, there are four general principles that are not specifically related to an SAP system.

Principle 1: Ensure that the concept and operation of process management is understood and owned by the senior management.

Explanation

The successful implementation of a BPM maturity model is only possible if the top management demands this and a top-down approach is carried out in the company for the introduction and application of process management.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 2: Establish a minimum level of maturity for each process in the company.

Explanation

The company should define for itself which maturity level should be reached at a minimum. In practice it is not conceivable that all processes are developed up to the highest possible maturity level.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 3: Ensure that the most appropriate BPM maturity model is selected according to the specific requirements and nature of the company.

Explanation

If the strategies or a central IT component of a company change then there could be the need to also change the BPM maturity model that is used. A company should therefore regularly ask, what are the prerequisites and how often and extensively is the maturity model used.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 4: Establish a BPM team within the company which consists of different specialists who know the IT as well as the business requirements.

Explanation

BPM and maturity models are not a general IT topic and other departments should be involved and also support the topic. The BPM team must be the link between the IT and the people and must understand the IT and the business people. A specialist who understands the SAP system should also belong to a BPM team as well as people who know the detailed company process flows.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

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The impact of SAP on the utilisation of Business Process Management (BPM) maturity models in ERP projects

SAP principles

The following principles are directly related to the use of an SAP system and are thus particularly relevant when an SAP system is used in the company.

Principle 5: Ensure that management fully supports the use of SAP in the enterprise to the full extent.

Explanation

The use of a SAP ERP system within a company as the central IT software system can be a strategic decision. The successful implementation of a SAP system is only possible if the senior management demands this.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 6: Establish as many SAP ERP standard processes as possible at the company in order to minimize the complexity of system upgrades or enhancements.

Explanation

It is important to prioritize when the standard SAP processes should be used, and when it is better to use self-defined solutions. A BPM team should not accept processes as given and must analyse which approach is better suited. The use of standard SAP processes reduces the time, cost, resources and other operational constraints and supports the introduction of new SAP enhancement packages or release changes.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 7: Ensure that all processes have been documented, analysed and understood, even if they are pre-defined by the SAP system.

Explanation

The use of SAP standard processes does not absolve a company from the duty to document, analyse and understand that process. A company should know exactly how its processes are running,. An analysis of the pre-defined process must always be designed to enable a company to examine whether the standard process is usable or whether an individual process should be developed.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 8: Establish a procedure that ensures that all interfaces are analysed for their BPM relevance, regardless of whether they are used between different systems or from and to the SAP system.

Explanation

Interfaces between different systems often offer an increased optimisation potential for process improvement. Especially in the case of system breaks and interface connections, many data are transmitted in a different way than they are requested and needed. It is important to analyse the standard interfaces, because standard process must not be the best and optimal process for the organisation.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 9: Ensure that all teams within a company, especially the BPM team and the SAP team, develop the same processes and process maps and that only one process map exists within the organisation.

Explanation

The situation that different teams working independently on different process models for the company must be avoided for time and budget reasons. It must not happen that different teams do not cooperate and develop different worlds for almost the same requirement.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

Principle 10: Ensure that all necessary key figures are generated directly from the SAP system.

Explanation

The SAP system is often the leading financial system and provides many instruments for the generation and monitoring of KPIs. Many figures are already included in the SAP system. This may have grown historically, but it still offers many advantages for the analysis of KPIs even if the BPM approach was later established within the organisation.

To what extent do you agree with the principle?

- Agree Strongly
- Agree
- Disagree
- Disagree Strongly
- Don't know

Do you have any comments on the above principle? How could it be improved?

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The impact of SAP on the utilisation of Business Process Management (BPM) maturity models in ERP projects

Thank you

Thank you for taking the time to complete this survey. Your response is very important to me, but this survey will only be considered if you press the SUBMIT button at the bottom of this page.

Do you have additional questions or comments about this survey?

Please leave your contact details, if you have any questions or need any further information. (The survey will still be evaluated anonymously!)

Please click SUBMIT to finish the survey!

Thank you very much for your support.

Markus Grube
e-mail:

BACK SUBMIT

9.3.2 Web survey – German Version

Die Auswirkungen von SAP auf die Nutzung von Business Prozess Management (BPM) Reifegradmodellen in ERP-Projekten

Eine Umfrage, zur Bewertung der allgemeinen Anwendbarkeit von zehn entwickelten Prinzipien.

Herzlich willkommen

Danke, dass Sie sich beteiligen und mich und meine Forschung unterstützen! Diese Umfrage soll zehn Prinzipien evaluieren, die im Rahmen eines englischen PhD Promotionsprogramms entwickelt wurden. Es wäre eine große Hilfe, wenn Sie die folgenden Fragen beantworten würden, deren Bearbeitung ca. 10 Minuten ihrer Zeit beansprucht. Hierbei versichere ich, dass alle von Ihnen angegebenen Antworten vertraulich behandelt werden. Alle Daten werden in der Arbeit und in späteren Publikationen anonymisiert.

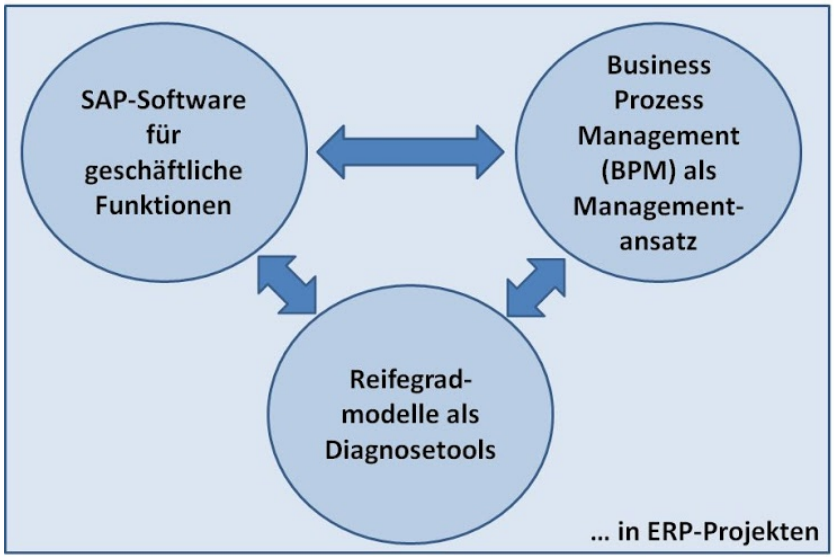
Diese Forschung wird unter den Richtlinien des Handbuchs der Forschungsethik der Universität von Gloucestershire, Großbritannien durchgeführt. Der Forschungsplan wurde von der Universität genehmigt, jedoch sind die Inhalte und Meinungen innerhalb dieser Forschung alleine die des Forschers.

Bitte zögern Sie nicht, mich per E-Mail zu kontaktieren, wenn Sie weitere Fragen:

Diese Forschung beschäftigt sich mit den Begriffen 'SAP' und Business Process Management (BPM). Zusätzlich werden 'BPM Reifegradmodelle' betrachtet, welche die Prozessreife in Unternehmen analysieren.

Der Zweck dieser Studie ist es, die Auswirkungen von SAP auf die Nutzung von BPM Reifegradmodellen in ERP-Projekten zu untersuchen.

Die Forschung beschäftigt sich somit mit der Beziehung zwischen diesen drei Bereichen im Kontext der Implementierung von SAP ERP in Unternehmen.



Das Ziel der Umfrage ist es, die allgemeine Anwendbarkeit von zehn Prinzipien zu evaluieren, welche aus vorausgegangenen Interviews entwickelt wurden.

Für eine allgemeine Einstufung von Ihnen als Befragte/r beantworten Sie bitte einige allgemeine Fragen.

Wie viele Jahre Erfahrung haben Sie mit SAP?

Wie viele Jahre Erfahrung haben Sie mit BPM (Business Process Management)?

Wie viele Jahre Erfahrung haben Sie mit BPM-Reifegradmodellen (BPM = Business Process Management)?

Welches BPM-Reifemodell nutzen Sie oder kennen Sie es am besten? (Oder verwenden Sie ein selbst entwickeltes Tool zur Bewertung und Analyse Ihrer Prozesse?)

Was ist die beste Beschreibung Ihrer aktuellen Position?

- Anwender
- (Prozess-) Manager
- Forscher
- Berater / Consultant
- Anderes

In welcher Branche arbeiten Sie (z. B. Produktion, IT, Unternehmensberatung, Universität?)

WEITER

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Die Auswirkungen von SAP auf die Nutzung von Business Prozess Management (BPM) Reifegradmodellen in ERP-Projekten

Allgemeine Grundsätze

Die Forschung schlägt vor, dass die folgenden zehn Prinzipien befolgt werden sollten, wenn das Unternehmen einen BPM-Ansatz innerhalb einer SAP-Umgebung erfolgreich einsetzen möchte.

Zunächst gibt es vier allgemeine Prinzipien, die nicht speziell mit einem SAP-System zu tun haben.

Prinzip 1: Stellen Sie sicher, dass das Konzept und die Arbeitsweise des Prozessmanagements von der Geschäftsleitung verstanden und gefördert wird.

Erläuterung

Die erfolgreiche Implementierung eines BPM-Reifegradmodells ist nur möglich, wenn das Top-Management dies fordert und im Unternehmen ein Top-Down-Ansatz zur Einführung und Anwendung des Prozessmanagements durchgeführt wird.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 2: Legen Sie für jeden Prozess im Unternehmen einen Mindestreifegrad fest.

Erläuterung

Das Unternehmen sollte für sich definieren, welcher Prozess-Reifegrad mindestens erreicht werden soll. In der Praxis ist es nicht denkbar, dass alle Prozesse bis zum höchstmöglichen Reifegrad entwickelt werden.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 3: Stellen sie sicher, dass das am besten geeignete BPM-Reifegradmodell entsprechend den spezifischen Anforderungen und der Art des Unternehmens ausgewählt wird.

Erläuterung

Wenn sich die Strategien oder eine zentrale IT-Komponente eines Unternehmens ändert, könnte es erforderlich sein, auch das verwendete BPM-Reifegradmodell zu ändern. Ein Unternehmen sollte daher regelmäßig hinterfragen, welche Voraussetzungen gelten und wie oft und umfassend das Reifegradmodell verwendet wird.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 4: Bauen Sie ein BPM-Team innerhalb des Unternehmens auf, dass aus verschiedenen Spezialisten besteht, die sowohl die IT als auch die Geschäftsanforderungen kennen.

Erläuterung

BPM und Reifegradmodelle sind kein allgemeines IT-Thema. Auch andere Abteilungen sollten einbezogen werden und unterstützen. Ein BPM-Team sollte das Bindeglied zwischen der IT und den Menschen sein und die IT und die Anwender verstehen. Ein Spezialist, der das SAP-System versteht, sollte ebenso zu einem BPM-Team gehören wie Personen, welche die detaillierten Prozessabläufe des Unternehmens kennen.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

ZURÜCK WEITER

Die Auswirkungen von SAP auf die Nutzung von Business Prozess Management (BPM) Reifegradmodellen in ERP-Projekten

SAP-Prinzipien

Die folgenden Grundsätze beziehen sich direkt auf die Verwendung eines SAP-Systems und sind daher besonders relevant, wenn ein SAP-System im Unternehmen verwendet wird.

Prinzip 5: Stellen Sie sicher, dass das Management die Nutzung von SAP im Unternehmen vollumfänglich unterstützt.

Erläuterung

Die Verwendung eines SAP-ERP-Systems innerhalb eines Unternehmens als zentrales IT-Softwaresystem kann eine strategische Entscheidung sein. Eine erfolgreiche Implementierung eines SAP-Systems ist nur möglich ist, wenn die Anforderung von der Geschäftsleitung kommt.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 6: Etablieren Sie so viele SAP ERP-Standardprozesse wie möglich im Unternehmen, um die Komplexität bei System-Upgrades oder -Erweiterungen zu minimieren.

Erläuterung

Es ist wichtig zu priorisieren, wann die SAP-Standardprozesse verwendet werden sollten und wann es besser ist, selbstdefinierte Lösungen zu verwenden. Ein BPM-Team sollte

Prozesse nicht als gegeben akzeptieren und muss analysieren, welcher Ansatz besser geeignet ist. Die Verwendung von Standard-SAP-Prozessen kann dazu führen, dass Zeit, Kosten, Ressourcen und andere betriebliche Einschränkungen reduziert werden, und kann die Einführung neuer SAP-Erweiterungspakete oder Release-Änderungen vereinfachen.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 7: Stellen Sie sicher, dass alle Prozesse dokumentiert, analysiert und verstanden wurden, auch wenn sie durch das SAP-System vordefiniert sind.

Erläuterung

Der Einsatz von SAP-Standardprozessen entbindet ein Unternehmen nicht von der Pflicht, diesen Prozess zu dokumentieren, zu analysieren und zu verstehen. Ein Unternehmen sollte genau wissen, wie seine Prozesse ablaufen. Eine Analyse des vordefinierten Prozesses muss immer so gestaltet sein, dass ein Unternehmen prüfen kann, ob der Standardprozess anwendbar ist oder ob ein eigener Prozess entwickelt werden sollte.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 8: Richten Sie ein Verfahren ein, welches sicherstellt, dass alle Schnittstellen auf ihre BPM-Relevanz hin analysiert werden,

unabhängig davon, ob sie zwischen verschiedenen Systemen oder zwischen SAP Systemen verwendet werden.

Erläuterung

Schnittstellen zwischen verschiedenen Systemen bieten oft ein größeres Optimierungspotential für die Prozessverbesserung. Insbesondere bei Systemunterbrechungen und Schnittstellenverbindungen werden viele Daten anders übertragen als sie angefordert und benötigt werden. Es ist auch wichtig, die Standardschnittstellen zu analysieren, da ein Standardprozess nicht der beste und optimale Prozess für die Organisation sein muss.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 9: Stellen Sie sicher, dass alle Teams innerhalb eines Unternehmens, insbesondere das BPM-Team und das SAP-Team, innerhalb derselben Prozesse und Prozesslandkarten entwickeln und dass nur eine Prozesslandkarte innerhalb der Organisation vorhanden ist.

Erläuterung

Die Situation das verschiedenen Teams, unabhängig an verschiedenen Prozessmodellen für das Unternehmen arbeiten, muss aus Zeit- und Budgetgründen vermieden werden. Es darf nicht geschehen, dass verschiedene Teams nicht kooperieren und unterschiedliche Welten für nahezu dieselbe Anforderung entwickeln.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

Prinzip 10: Stellen Sie sicher, dass alle notwendigen Kennzahlen direkt aus dem SAP-System generiert werden.

Erläuterung

Das SAP-System ist oft das führende Finanzsystem und bietet viele Instrumente zur Generierung und Überwachung von KPIs. Viele Zahlen sind bereits im SAP-System enthalten. Dies mag historische Gründe haben, bietet aber viele Vorteile für die Analyse von KPIs auch wenn der BPM-Ansatz erst später im Unternehmen etabliert wird.

Inwieweit stimmen Sie dem Grundsatz zu?

- Uneingeschränkte Zustimmung
- Zustimmung
- Keine Zustimmung
- Ausdrücklicher Widerspruch
- Ich weiß es nicht

Haben Sie Anmerkungen zum obigen Prinzip? Wie könnte es verbessert werden?

ZURÜCK WEITER

Die Auswirkungen von SAP auf die Nutzung von Business Prozess Management (BPM) Reifegradmodellen in ERP-Projekten

Vielen Dank

Vielen Dank, dass Sie sich die Zeit genommen haben, diese Umfrage zu beantworten. Ihre Teilnahme ist sehr wichtig für meine Forschung, jedoch wird diese Umfrage nur berücksichtigt, wenn Sie am Ende dieser Seite auf die Taste SENDEN drücken.

Haben Sie Fragen oder Anmerkungen zu dieser Umfrage?

Hinterlassen Sie gerne Ihre Kontaktdaten, falls Sie Fragen haben oder weitere Informationen benötigen. (Die Umfrage wird trotzdem anonym ausgewertet!)

Bitte klicken Sie auf SENDEN, um die Umfrage abzuschließen.

Vielen Dank für Ihre Unterstützung.

Markus Grube
E-Mail:

ZURÜCK SENDEN