Ella Suni

EXPLORING THE ELEMENTS OF SUCCESSFUL BUSINESS PROCESS MODELING: A CASE STUDY

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ABSTRACT

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This is a master's thesis report in the University of Jyväskylä faculty of information technology. The topic of this thesis is successful business process modeling, which is approached through a case study. This thesis has three main goals: First, to broaden the knowledge of business process modeling by conducting a systematic literature review. Based on the literature review an up-to-date categorization of the benefits associated with process modeling is created. This categorization creates a base for understanding the reasons behind modeling efforts in organizations and interest for the topic in research. Second, through interviews in a case organization create knowledge of the actualization of these benefits and the challenges organizations might face regarding modeling. Furthermore, this report demonstrates the role of previous experience on the notions of process modeling and considers the effect of employee role on perceived benefits and challenges. The results suggest that employees with better experiences and more involved process modeling are able to identify more benefits in comparison to challenges. Third, through the knowledge created in this research demonstrate the need for better understanding of the actualization of business process modeling benefits both in organizations and in research. The results suggest that the benefits associated with modeling mostly disregard implementation of process models and in general the time after modeling. This supports the previous notions of evidence for the usefulness of business process modeling being lacking. With this the need for better understanding of the actualization of business process modeling benefits both in organizations and in research is demonstrated.

Keywords: business process modeling, process modeling benefits, business process management, BPM, CSF

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Tämä raportti on Jyväskylän yliopiston Informaatioteknologian laitoksen pro gradu -tutkielma. Tutkielmassa käsiteltiin liiketoimintaprosessien mallintamisen hyötyjä sekä vaatimuksia niiden toteutumiselle. Tutkielmalla oli kolme päätavoitetta: 1. Laajentaa kirjallisuuskatsauksen avulla ymmärrystä liiketoimintaprosessien mallintamisen tarjoamista hyödyistä. 2. Case organisaatiossa toteutettujen haastattelujen avulla tutkia hyötyjen toteutumisesta sekä kohdattuja haasteita organisaatioissa. 3. Kirjallisuuskatsauksen ja haastattelujen perusteella selvittää, onko liiketoimintaprosessien mallintamisen hyötyjen ymmärrys nykyisellään riittävää. Tutkielmassa luotiin ensin kirjallisuuskatsauksen pohjalta kategorisointi mallinnukseen aikaisemmin liitetyistä hyödyistä. Kategorisointi tarjoaa tietoa siitä, miksi mallintamista tehdään ja tutkitaan kasvavissa määrin. Kirjallisuuskatsauksen avulla käsiteltiin myös mallinnuksen haasteita sekä vaatimuksia onnistuneelle mallinnukselle. Tapaustutkimuksena toteutettujen haastattelujen avulla perehdyttiin entisestään mallinnuksen hyötyihin, vaatimuksiin ja haasteisiin. Tulosten perusteella esitettiin, että haastateltavien aiemmat kokemukset sekä rooli työyhteisössä vaikuttavat käsityksiin mallinnuksesta. Positiiviset kokemukset ja tiiviimpi työskentely mallinnuksen parissa näytti helpottavan siihen liittyvien hyötyjen tunnistamista. Tutkielman tulokset osoittivat myös, että prosessimallien jalkauttaminen sekä mallinnuksen jälkeinen aika jäävät aiheen tutkimuksessa usein vaille huomioita. Tämä tukee aikaisempia käsityksiä prosessimallien oletetusta hyödyllisyydestä todisteiden vähäisyydestä huolimatta. Lopputulemana tutkielmassa osoitettiin, että liiketoimintaprosessien mallinnuksen hyötyjen toteutumisen paremmalle ymmärrykselle on yhä tarvetta.

Asiasanat: liiketoimintaprosessien mallinnus, prosessimallinnuksen hyödyt, prosessijohtaminen, BPM, CSF

FIGURES

TABLES

LISTS OF ABBREVIATIONS

BP	Business process
BPM	Business process management
BPM	Business process modeling
BPML	Business process modeling language
BPMN	Business process modeling notation
BPR	Business process re-engineering
CSF	Critical success factor
EPC	Event-driven process chain
KM	Knowledge management
KPI	Key performance indicator
PPI	Process performance indicator
UML	Unified modeling language

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1 INTRODUCTION

Presenting and analysing business processes is a fundamental problem for all organizations. Using information technology as a tool for managing this problem has been discussed in the management and computer science research community since the 1990s. Different ways to present business processes and analyse them have been utilised to improve the understanding of organisations and their processes, to facilitate process design and analysis, and to support process management. (Koubarakis & Plexousakis, 2002, p. 299)

In addition to the interest of presenting and analysing business processes in the research, it also is of practical importance providing industries with support on designing organisational structures, processes and IT infrastructure (Koubarakis & Plexousakis, 2002, p. 299). In practice, descriptions, designs and formal models of organizations, also known as enterprise models (EM) (Aguilar-Savén & Olhager, 2002, p. 378) are used to represent the knowledge of an organization and what it wants to become (Koubarakis & Plexousakis, 2002, p. 299). With this presentation an organization and its operations can be understood, planned, renewed, evaluated, optimized and controlled (Vernadat, 2002).

Business process modeling (BPM*) is an enterprise modeling method which has been created to describe and re-design businesses (Nadarajan & Chen-Burger, 2007, p. 2). Enterprise modeling methods aim to find ways to improve organizations effectiveness, efficiency and profitability (Nadarajan & Chen-Burger, 2007, p. 1) and in the last decades BPM has become an essential

* BPM has previously been used as an abbreviation for Business Process Modeling (see e.g. Aitken, Coombs & Doherty, 2015; Calabrò, Lonetti & Marchetti, 2015; Scholtz, Calitz & Snyman, 2013; Aldin & de Cesare, 2011; Nadarajan & Chen-Burger, 2007; Aguilar-Savén, 2003), Business Process Management (see e.g. Kožíšek & Vrana, 2017; de Albuquerque & Christ, 2015; Baumgrass, Herzberg, Meyer & Weske, 2014; Indulska, Green, Recker & Rosemann, 2009) and even Business Process Mining (see Leida, Chu, Colombo & Majeed, 2012). In this thesis, BPM will be used solely as a synonym for business process modeling.

part of enterprise design (Aguilar-Savén, 2003, p. 129). BPM has been widely accepted as a design and management technique for multiple purposes (Sedera, Gable, Rosemann & Smyth, 2004) and has since become an important activity for a growing number of organizations (Ertugrul & Demirors, 2015, p. 1).

Despite the interest BPM has cultivated, understanding of its benefits is still limited (Indulska et al., 2009, p. 3). Multiple research articles are based on the importance of BPM, but only few of them give a reasoning for this importance. It seems to be common knowledge, that BPM can benefit organizations, but in practice the evidence to support this claim is considerably hard to find. This was also noted by Kesari, Chang and Seddon (2003) who conducted a study on the claimed benefits of BPM after noticing "it just seems to be assumed that process models are useful" (p.1). In their study prior literature of claimed benefits of process modeling were discussed, however multiple new research articles discussing the benefits of BPM have since been published.

Already as the research by Kesari et al. was published, it was noted by other that the amount of business process-oriented methodologies, modeling techniques and tools has grown rapidly (Aguilar-Savén, 2003, p. 129). Since then the growth has only continued and the amount of research addressing BPM has also grown equally. In their study Kesari et al. interviewed twelve practicing consultants using BPM in their daily work life and identified four main categories of benefits and problems of BPM. These categories were 1. Documentation benefits, 2. Design benefits, 3. Use benefits and 4. Potential Disadvantages.

This master's thesis report aims to continue the work of categorizing BPM benefits by conducting a systematic literature review broadening the once up to date but now dated viewpoint from Kesari et al (2003). It also aims to turn the focus from the claimed benefits of BPM to the actualization of the benefits of BPM in organizations by conducting a qualitative case study, interviewing stakeholders involved in BPM projects with varying intensity.

Prior literature has tackled the topic of BPM with different focus areas, but a report presenting a broader understanding of the topic seems to be lacking. This thesis first introduces the topics of business process and BPM to the reader. It will then dive deeper into the benefits that have been associated with BPM by conducting a literature review to explore prior research on the topic. The main contribution of the literature review will be a categorization of the found benefits. A categorization as such can help with understanding if these benefits are being actualized in organizations in practice.

In the following, a qualitative case study will be conducted in order to broaden the topic to the actualization of the benefits found in the literature review to the benefits found in organizations. This research aims to create an understanding on the benefits of BPM, requirements behind successful BPM and the actualization of the potential benefits in organizations. This thesis aims to further demonstrate the need for better understanding of the actualization of business process modeling benefits both in organizations and in research. The research questions for this thesis are:

1. What kind of benefits are associated with business process modeling?
2. What is required for successful business process modeling?
3. How can business process modeling benefits be actualized in organisations?

The hypothesis behind this study is that the benefits of business process modeling seem to be commonly assumed but the evidence for their actualization and the requirements for successful BPM have not been sufficiently examined.

The rest of this thesis is structured as follows. Section 2 first introduces the key concepts of business processes and business process modeling. It then presents prior research discussing the benefits associated with BPM and goes on to create categorization of the found benefits. In this section the requirements for receiving BPM benefits and the shift from BPM to the continuous improvement of processes are also discussed, providing initial answers to the research questions. Section 3 introduces the case organization and presents the research methods of the empirical part of this research. Section 4 presents the findings of the case study, which are then discussed in section 5. The discussion aims to further explicate the results of the research questions and the presented hypothesis. Finally, section 6 presents the conclusions of this thesis.

2 LITERATURE REVIEW

In this section the thesis will go deeper into the benefits associated with BPM by conducting a literature review. First a base for understanding the different concepts regarding BPM is created through the concepts of business processes and business process modeling. Then the research methods for the literature review will be explained and the findings presented. The main goal of this section is to answer the first research question: 1. What kind of benefits are associated with BPM? This section will also go on to discuss the second and third research question through prior literature.

Based on the benefits found in the literature review keywords describing the findings are created. These keywords create the base for a categorization of the benefits associated with BPM. The categorization provides a more thorough understanding of the benefits associated with BPM and creates a base for understanding the reasons behind BPM projects in organizations. Then the factors behind BPM benefits and the use of BPM as a tool for the continuous improvement of processes are discussed. Finally, the conclusions of the literature review will be presented.

2.1 Business Processes and Business Process Modeling

A process is a somewhat ordered set of tasks or steps that are taken to meet a specific goal (Humphrey & Feiler, 1992, see Curtis, Kellner & Over, 1992, p. 76). A business process (BP) describes a similar set of tasks and steps but in a certain context and adds the dimension of creating value to the customer (Hammer and Champy, 1993). To achieve a business goal an organization must undertake certain activities (Kožíšek & Vrana, 2017, p. 39). A business process is comprised of activities executed in a certain order in order to fulfil the business goal (Snoeck, Poelmans & Dedene, 2000, p. 1). In other words, a business process can be said to be "a set of related activities that create value for customers" (Smart, Maddern & Maull, 2009, p. 502).

According to Aguilar-Savén (2003, p. 129) the importance of business processes was already brought up in the 1960s (see Levitt, 1960) and in 1985 Porter described processes as being the basic unit for competitive advantage. Later Kaplan and Norton (1996) stated that financial results are generated by happy customers which in turn generate from processes that are enabled by people. Today business processes are considered as a key factor in integrating an enterprise (Aguilar-Savén & Olhager, 2002) and experts in the field of both information technology and business engineering consider understanding them a baseline for successful systems (Aguilar-Savén, 2003, p. 129). Because of increasing globalization and regulatory pressures, organizations are often forced to remodel existing BPs to stay competitive (Mykityshyn & Rouse, 2006, see Lewis, Young, Mathiassen, Rai & Welke, 2007, p. 7).

BPM is the transformation of knowledge of BPs into models that describe these processes. (Scholz-Reiter & Stickel, 1996) A business process model is an abstract level (Di Francescomarino, Rospocher, Ghidini & Valerio, 2014, p. 181) description of the set of activities executed in order to fulfil a business goal (Hammer and Champy, 1993). BPM describes these activities and events usually by graphical representation (see e.g. Indulska et al., 2009, p. 3; Lodhi, Kassem & Rautenstrauch, 2009, p. 1). BPM controls the flow and logic of a process (Recker, Rosemann, Indulska & Green, 2009, p. 335) and can include additional information, such as goals, risks and performance metrics for the process being modelled (Indulska et al., 2009, p. 3).

Business process models help people specify, describe, understand and document processes in a more coherent way than with plain text (Kesari et al., 2003, p. 1). They are used to communicate organizational procedures and workflows to users (van der Aalst, ter Hofstede, Kiepuszewski & Barros, 2003). BPM is often used to increase knowledge of business processes within organizations and to break down organizational complexity (Bandara, Gable & Rosemann, 2005, p. 347; Sedera et al., 2004, p. 485). BPM is considered a key tool for analysing and designing process-aware information systems (Dumas, van der Aalst & ter Hofstede, 2005), organizational documentation and re-engineering (Davenport & Short, 1990), and the design of service-oriented architectures (Rabhi, Yu, Dabous & Wu, 2007).

For successful BPM choosing a suitable modeling approach is important (Bandara et al., 2005, p. 3). For example, Becker, Rosemann and Uthmann (2000) introduce five ways to approach BPM when pursuing a selected purpose: the function view, data view, organizational view, control view and simulation. The targeted audience to use the model designate what kind of information will be conveyed in the model (Scholtz, Calitz & Snyman, 2013). It is also important to realize, that BPM is not a particular modeling language (Schoknecht, Thaler, Fettke, Oberweis & Laue, 2017, p. 3), but multiple business process modeling languages (BPML) such as the unified modeling language (UML) and the business process modeling notation (BPMN) exist (for more on BPML see e.g. Mili et al., 2010). Different BPMLs can be generally divided to rule-based and graph-based modeling languages (see e.g. Rajabi & Lee, 2009).

The model repository of an organization might contain thousands of models (Schoknecht et al., 2017, p. 1). This number of models has been described by Weiss and Winkelmann (2011, p. 1) as "literally hundreds of meters of 'wallpaper' with process models", and they are said to be an important part of decision making and organizations operations (Scholtz et al., 2013, p. 347).

Stakeholders or so-called domain experts (Poppe, Brown, Johnson & Recker, 2012) should be involved in the BPM project. Previously BPM has been performed as a top-down and centralized way, which could take large organizations months or years to perform (Ertugrul & Demirors, 2015, p. 1). Now the importance of collaboration in BPM has been understood, and modeling in a decentralized way has significantly reduced the time for BPM projects (Turetken & Demirors, 2011).

BPM is a collaborative activity (Jain, Creasey, Himmelspach, White & Fu, 2011) which requires the presence of all the required stakeholders to be successful (Scholtz et al., 2013, p. 347). For an appropriate, complete and clear representation of a process the involvement of domain experts is needed (Poppe et al., 2012, p. 77). A successful business process model includes various angels of a business process (Lerchner & Stary, 2016, p. 3) and should work as a tool for communication between everyone involved, instead of them being just for modeling specialists to understand (Becker, Rosemann, Uthmann, 2000, p. 31).

Designing business process models is said to always be an economical risk instead of just a modeling project (Becker, Rosemann, Uthmann, 2000, p. 31). Because BPM is often a time and resource consuming process, convincing top-level management to use resources and employees to take time for the work can turn out to be challenging. Considering the need to continuously re-design and align process models with corresponding enterprise information systems (Aldin & de Cesare, 2011, p. 359) internal buy-in can be a crucial factor in the success and benefits received from BPM.

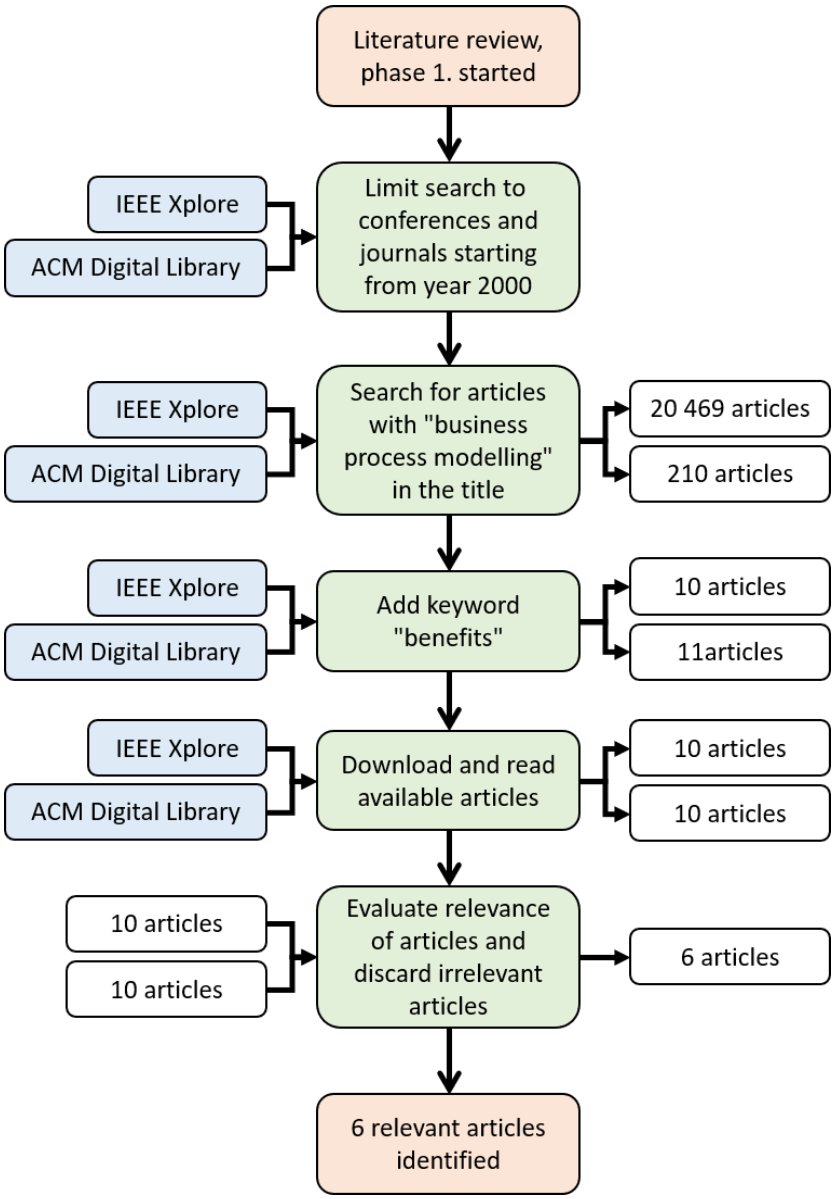
2.2 Literature Review Methods

In this section the methods for the literature review will be presented. The aim of a literature review is to examine and combine past knowledge of BPM to create new information. The goal of this literature review is to go through prior research in order to identify benefits previously associated with BPM and create a broader understanding of the topic.

For this literature review prior research was searched from IEEE Xplore and ACM Digital Library databases. To find relevant articles the search was limited to conferences and journals starting from year 2000. The literature review was done in two phases. In phase 1 the keyword "business process modelling" was used in the title, which resulted in 20 469 articles in IEEE Xplore and 210 articles in ACM Digital Library.

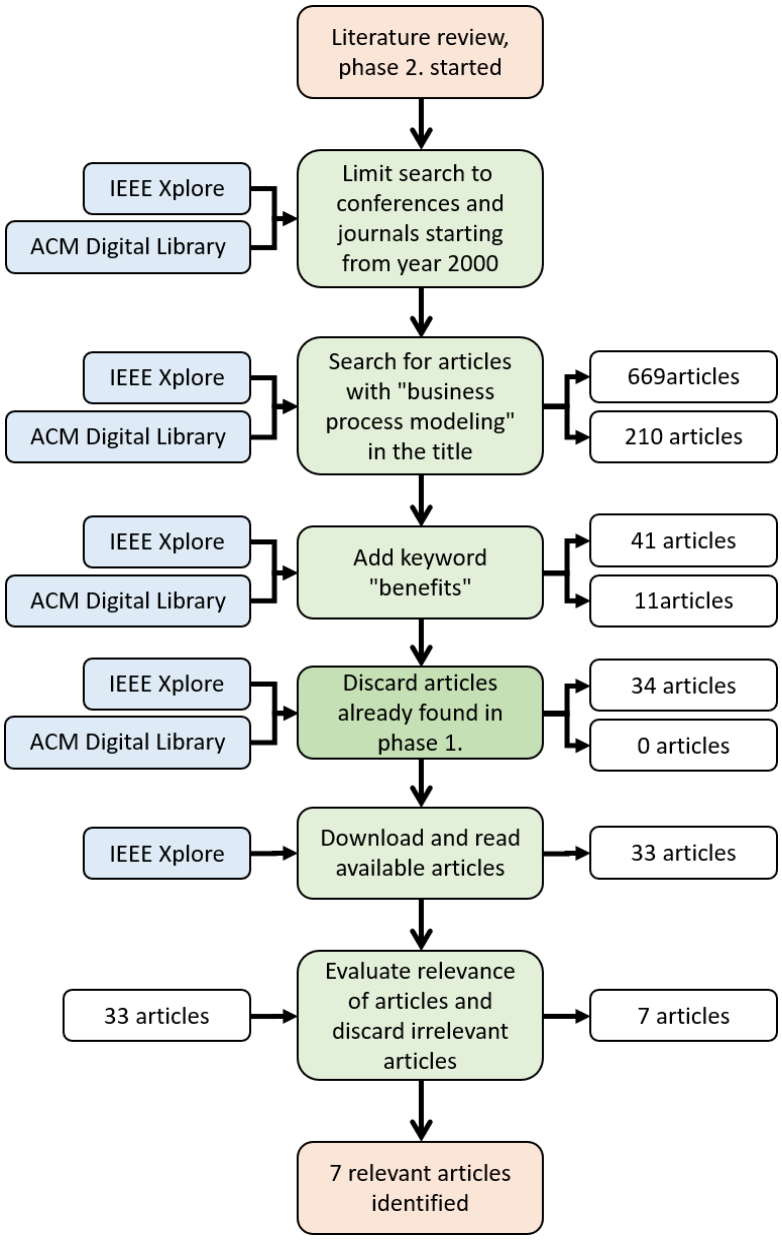
To narrow down the search the keyword “benefits” was search within the previously found results, which lead to 10 results in IEEE Xplore and 11 results in ACM Digital Library. From these results one article from ACM Digital Library was not available, hence left out of this research, leading to a total of 20 conference and journal articles. After identifying these 20 research articles, the articles were read in order to evaluate the relevance of the article for the topic. In total 14 articles were left out due to no mentions of benefits of BPM. This phase one of the literature search is presented in figure 1. Literature search - Phase 1.

FIGURE 1 Literature search - Phase 1



Because of variation in the spelling of the word modeling, the same search was repeated in phase 2 with the word "modeling" instead of modelling. This search gave 34 new results in IEEE Xplore, but no new results in ACM Digital Library. From these articles one was not available, adding 33 new conference and journal articles, which were then read and evaluated in order to evaluate the relevance. In phase 2, 26 articles were left out due to no mentions of BPM benefits, resulting in 7 new conference and journal articles. When combining the relevant results from phase one and phase two, they result in a total of 13 articles from the initial search accounted to this literature review. With the remaining 13 research articles, backward reference searching was used in order to further investigate the topic. The phase two of the literature search is presented in figure 2. Literature search - Phase 2.

FIGURE 2 Literature search - Phase 2



2.3 Business Process Modeling Benefits

In this section the prior literature of BPM benefits is discussed. The aim is to create an understanding of what benefits have been previously associated with BPM. Found literature will be discussed and keywords for found BPM benefits will be created and explained. In the following section the found benefits will then be listed and categorized in order to further broaden the knowledge of BPM.

One of the most thorough listings of BPM benefits is by Indulska, Green, Recker and Rosemann (2009) who focus on the perceived BPM benefits by different stakeholders. In this research three groups of experts on the field of BPM (academies, practitioners and vendors) were interviewed to create a listing of the top 10 perceived benefits of BPM (p. 11). These are:

1. process improvement
2. improved and consistent understanding of business processes
3. improved communication
4. improved ability for process automation, execution or enactment
5. defining, identifying and modeling adequate levels of abstraction
6. greater ability to analyse processes for problems, time or cost reductions
7. support identifying, capturing and managing organizational knowledge
8. re-using previously designed and validated processes
9. improved ability to see how a process might operate, and its implications
10. support for business change management practices, results or impacts

Many of the other articles found in this research are in line with these findings. Rosemann (2000, p. 22) says BPM helps analyse current business and helps all project members develop the same understanding. Similarly, Aguilar-Savén (2003, p. 129) remarks BPM to provide a comprehensive, common understanding of processes and to enable their analysis. Lodhi et al. (2009, p. 1) credit the improved understanding of BPs on the graphical presentation of modeling. Groznik and Trkman (2006, p. 531) and Curtis et al. (1992, p. 76) mention BPM as a great tool in getting to understand business processes and Melão and Pidd (2000, p. 105) as a tool to analyse BPs. To describe these benefits the keywords *understanding,* and *analysis* were created.

In addition to BPM offering increased understanding amongst both team members and managers it can also be used for automation of BPs (Scholtz et al., 2013, p. 347, 349). BPM is said to support (semi)automated execution of processes (Paul, Giaglis & Hlupic, 1999, see Stemberger et al., 2004, p. 110) and even to be a prerequisite for automation (Ertugrul & Demiros, 2015, p. 1). According to Curtis et al. (1992, p. 76) BPM can help automate both process guidance and execution support. Combining the previous benefits BPM can be used for understanding BPs in order to automate them (Sadiq & Orlowska, 1997, p. 2). Previously described are represented with the keyword *automate processes.*

Using BPM to improve processes is mentioned in multiple of the included research articles (Scholtz et al., 2013, p. 347, 349; Groznik and Trkman, 2006, p. 531; Ertugrul and Demiros, 2015, p. 1; Hall & Harmon, 2005; Melão & Pidd, 2000, p. 105). BPM supports process improvement (Curtis et al., 1992, p. 76) by revealing anomalies, inconsistencies, inefficiencies or weaknesses in processes as well as spotting opportunities for improvement (Koubarakis & Plexousakis, 2002; Rosemann, 2000, p. 22; Havey, 2005, p. 7-8). These are described by the keyword *improve processes.*

Similarly, the claim of BPM providing support for the management of organizational knowledge gets support. BPM is said to be an important tool for knowledge management (Kalpic & Bernus, 2006, p. 40, Kalpic & Bernus, 2002) and a precondition for strategically utilizing information (Groznik & Trkman, 2006, p. 531). It is also said to be a valuable means of sharing knowledge supporting its externalization and internalization (Koubarakis & Plexousakis, 2002; Kalpic & Bernus, 2006, p. 41), hence business process models can also be used for training and informing employees (Gulla & Brasethvik, 2000, p. 17). BPM presents informal knowledge by formal expression (Lerchner & Stary, 2016, p. 3; Nadarajan & Chen-Burger, 2007, p. 2; Kalpic & Bernus, 2006, p. 41; Kalpic & Bernus, 2002), or in other words captures implicit process knowledge and document it in a semi-formal way (Weiss & Winkelmann, 2011, p. 34). For these mentions the keywords *formalize knowledge, manage knowledge* and *utilize information* were used.

Additionally, the steps of improved communication and change management on the list by Indulska et al. (2009) seem to be agreed on. This can be said based on the mentions of BPM providing support for improved communication (Scholtz et al., 2013, p. 347; Lodhi et al., 2009, p. 1; Scholtz et al., 2013, p. 347), facilitating communication (Curtis et al., 1992, p. 76) and serving as a communication channel (Gulla & Brasethvik, 2000, p. 17). BPM can also support the development of a terminology shared amongst all project members (Rosemann, 2000, p. 22) which in turn works as a prerequisite for successful communication. BPM is also said to shorten the communication gap between domain experts and IT specialists (Corradini, Fornari, Polini, Re, Tiezzi & Vandin, 2017, p. 217) or in other cases between software developers and users (Becker, Algermissen, Pfeiffer & Räckers, 2014, p. 34). These benefits are described with keywords *communication* and *shared terminology*.

BPM enables the explicit definition of BPs (Ertugrul & Demirors, 2015, p. 1), which again supports the listing by Indulska, Green, Recker and Rosemann (2009). BPM has also been said to "provide high-level specification independent from the implementation of such specification" (Lu & Sadiq, 2007, p. 83) and provide the specifications necessary to automate or improve business processes (Scholtz et al., 2013, p. 347). BPM is also important for business process design and re-design (Desel & Erwin, 2000; see Stemberger et al., 2004, p. 110). *Define BPs, specify processes, design processes* and *re-design processes* are used to describe these benefits.

BPM can also be used for managing (Curtis et al., 1992, p. 76; Weiss & Winkelmann, 2011, p. 1) and renovating existing processes (Paul et al., 1999, see Stemberger et al., 2004, p. 110). BPM provides a foundation for workflow-management (Becker, Rosemann & Schütte, 1997, p. 823) and can be used for benchmarking and completeness check of processes (Rosemann, 2000, p. 22). Havey (2005, p. 7-8) in turn lists formalizing of existing processes and facilitating automated and efficient process flow as benefits of BPM. The keywords *manage processes* and *formalize processes* represent these benefits.

In their listing Indulska et al. (2009, p. 11) mention BPM as enabling the re-use of previously designed and validated processes, but BPM can also support process reorganization (Becker, Rosemann and Uthmann, 2000, p. 30) and has even been described as a necessity for it (Weiss & Winkell, 2011, p. 1). Similarly, BPM is said to be an important tool for process engineering (Kalpic & Bernus, 2002) and re-engineering (Tam, Chu and Sculli, 2001; Becker et al., 1997, p. 823). These benefits are described with keywords *re-use processes, reorganize processes, engineer processes* and *re-engineer processes*.

Becker, Rosemann and Uthmann (2000, p. 30) go on to name a field yet to be mentioned: software development. They state BPM to be important for software engineering and developing software. This is supported by BPM being used as a tool for supporting the development of business applications (Lübke, Lüecke, Schneider & Gómez, 2008) and being the base for model-driven software development (Kühne, Thränert & Speck, 2005; Stein, Kühne, Drawehn, Feja & Rotzoll, 2008, see Jensen & Feja, 2009, p. 341). Tam et al. (2001) also agree and state business process models help with software development and in identifying appropriate strategies for software packages implementation (Tam et al., 2001).

Business process models are also said to be used for understanding business processes in order to develop and implement information systems (Sadiq & Orlowska, 1997, p. 2) and create greater efficiency in the production of the software that supports business processes (Phalp, 1998). BPM has also been stated to "guide the realization of the automatic and manual parts of information systems" (Gulla & Brasethvik, 2000, p. 17) and support information system development projects planning and introducing workflow management systems (Stemberger, Jaklic & Popovic, 2004, p. 118). These benefits are described with the keywords *develop software* and *implement software*.

Other software related benefits were also mentioned. BPM is being used for describing the goals and requirements or discovering shortcomings in previously defined requirement specifications for systems (Li, Jeffery, Fung, Zhu, Wang, Zhang & Xu, 2012, p. 5). It is also used for aiding the management of enterprise systems (Rosemann, Sedera & Gable, 2001, p. 1128) and helping with system selection (Rosemann, 2000, p. 23). By exploring the environment were the software will be used and what is expected of it through modeling, understanding software requirements both for new acquisitions (Alfaraj & Qin, 2008, p. 1) and increasing software quality (Becker et al., 2008, p. 34) can be achieved. BPM being an effective way for software requirement specification, is also

agreed with in many of the other research articles (Corradini et al., 2017, p. 217; Stemberger et al., 2004, p. 118; Paul et al., 1999, see Stemberger et al., 2004, p. 110), hence the benefits discussed here are described with the keywords *specify software requirements and select software*.

The study by Kesari et al. (2003) discussed shortly in section 1 divides the claimed benefits of BPM into documentation benefits, design benefits and use benefits. They include having a means of documentation, which can help with implementing change in an organization and having a common language with clients to documentational benefits, which in this research are described with keywords *documentation, manage change* and *communication.* Understanding current BPs, generating new possibilities for them and providing a means for planning for projects and implementation are included in the design benefits, here described with keywords *understanding, innovate processes, improve processes* and *manage processes.* The final benefits of having a visual representation which helps both the client and user interpret the process easier and more sufficiently and BPM providing time efficiency, are described with keywords *understanding* and *efficiency.*

The keywords *select software, manage processes, improve processes, innovate processes* and *understanding* are used yet again to describe other benefits listed by Kesari et al. (2003). According to them BPM can assist with package selection from software vendors, help users select and understand the software (Curran & Ladd, 2000) and assist in selecting systems (Murgatroyd, Hodgson & Weston, 1998; Minkowitz, 1993). They also say BPM can be used to understand and identify innovative aspects of existing BPs, act as a source of ideas for new processes (Murgatroyd et al., 1998; Minkowitz, 1993) and help with business process re-engineering (BPR) and benchmarking (Jackman, 1998).

Efficiency, documentation, manage change and *innovate processes* are used for a few other benefits mentioned in the literature discussed. Lerchner and Stary (2016, p. 3) claim business process models empower stakeholders to establish new angles to BPs which is supported by the mention of BPM providing support for process innovation (Lewis et al., 2007, p. 11; Becker et al., p. 823). BPM supports change managements as well (Scholtz et al., 2013, p. 347) and is used to formulate and evaluate changes (Koubarakis & Plexousakis, 2002). BPM is also mentioned to provide documentation or help document current BPs (Gulla & Brasethvik, 2000, p. 17; Rosemann, 2000, p. 22). According to Zhao, Duan and Zhang (2009, p. 483) BPM can provide organizations with higher efficiency. Havey (2005, p. 7-8) supports this by saying BPM provides increase in productivity and decrease in head count and allows employees to focus on solving the hard problems. He also sees BPM as a way to simplify regulations and compliance issues, since work policies are explicitly presented in the business process models, which is described by the keyword *support compliance*.

Other benefits mentioned in the literature are BPM providing organizations with greater *business value* (Zhao et al., 2009, p. 483), BPM helping to describe activities of complex organizations (*manage complexity*), coordinate cooperation with other organizations (*manage coordination*) (Corradini et al., 2017, p.

217) and drive *organizational analysis* (Paul et al., 1999, see Stemberger et al., 2004, p. 110). BPM is also said to be important for *certification*, *activity-based costing* and *human resource planning* (Becker, Rosemann & Von Uthmann, 2000, p. 31; Becker et al., 1997, p. 823) and work as a tool through which an enterprise can be integrated (*enterprise integration*) (Aguilar-Savén, 2003, p. 129). Modeling business processes can also be used for supporting *organizational management* (Hall & Harmon), helping to gain *competitive advantage* over other organizations (Scholtz et al., 2013, p. 347) and creating *transparency* about a process, the resulting products and services, the required data and organisational units (Becker et al., 2014, p. 34). The wording here was used as the keyword for each benefit, if not separately mentioned.

In addition, some of the prior literature mention benefits affecting future BPM projects, which are described with the keyword *support modeling*. These benefits were process model templates being reusable and having an iterative development process of models that allows both the user and the client to consult and modify the model when needed (see Kesari et al., 2003, p. 5-7). Using collaborative modeling in turn reduces the workload for modellers and improves model quality, reliability and accuracy (Scholtz et al., 2013, p. 347). Modeling also enables to quickly teach employees how to develop and validate these models (Chen, 1999) and they are easy to understand for all members of a project group (Stemberger et al., 2004, p. 110).

Table 1 Business process modeling benefits presents the literature discussed and presents the keywords described, which work as a tool for the creation of the categorization of these BPM benefits in the following section.

TABLE 1 Business process modeling benefits

Reference	**Mentioned benefits**	**Keywords**
Corradini et al. (2017)	- shortens the communication gap between domain experts and IT specialists - describe activities of complex organizations - describe the coordination of different organizations that cooperate to achieve a shared goal - effective way to specify software characteristics and program software systems providing automatic support for processes	communication manage complexity manage cooperation specify software requirements develop software
Lerchner & Stary (2016)	- transforming informal to formal knowledge - empowers stakeholders to develop different perspectives on behaviour sequences or BPs	formalize knowledge innovate processes
Ertugrul & Demirors (2015)	- enable BPs to be explicitly defined - constitute a baseline for execution, automation and process improvement	define BPs improve processes automate processes
Scholtz et al. (2013)	- improved communication - increased understanding of processes - support for change management - gaining competitive advantage - help management to understand a process - provide the specifications necessary to automate or improve business processes	communication understanding manage change competitive advantage specify processes improve processes automate processes

(continues)

Reference	Mentioned benefits	Keywords
	- reduces workload for modellers and improves model quality, reliability and accuracy	support modeling
Li et al. (2012)	- used to define system goals and requirements - discover missing and ambiguous requirements	specify software requirements
Weiss & Winkelmann (2011)	- important prerequisite to process reorganization and management - way of capturing implicit process knowledge and document it in a (semi)formal way	reorganize processes manage processes formalize knowledge
Indulska et al. (2009)	- process improvement - improved and consistent understanding of BPs - improved communication - ability to facilitate or support process automation, execution or enactment based on models - issues related to the definition, identification or modeling of adequate levels of process abstraction - greater ability to model processes to analyse them for possible problems, and/or time/cost reductions - support for identification, capture and management of organizational knowledge - greater ability to re-use previously designed and validated processes - greater ability to see how a process might operate, and its implications - support for business change management practices, results or impacts	improve processes understanding communication automate processes define BPs analyse processes manage knowledge re-use processes manage change
According to Jensen & Feja (2009)	- process models are a starting point for model-driven software development (Kühne, Thränert & Speck, 2005; Stein, Kühne, Drawehn, Feja & Rotzoll, 2008,)	develop software
Lodhi et al. (2009)	- used for better understanding and communication	understanding communication
Zhao et al. (2009)	- benefit enterprises with higher efficiencies and greater business values	efficiency business value
Alfaraj & Qin (2008)	- effective tool to understand requirements of software acquisition	specify software requirements
Lübke et al. (2008)	- support development of business applications	develop software
Nadarajan & Chen-Burger (2007)	- formally express informally practiced procedures	formalize knowledge
Lewis et al. (2007)	- Provide support for process innovation	innovate processes
Becker et al. (2007)	- create transparency about a process, resulting products and services, required data and involved organisational units - support communication between software developers and users - foster an equal understanding of the require-	transparency communication specify software requirements

(continues)

Reference	Mentioned benefits	Keywords
	ments, thus increase software quality	
Lu & Sadiq (2007)	- provide high-level specification independent from the implementation of such specification	specify processes
Groznik & Trkman (2006)	- prerequisite for the strategic utilisation of information - great help in becoming fully acquainted with the processes in question and to improve them	utilize information understanding improve processes
Kalpic & Bernus (2006)	- important tool for knowledge management - allows the transformation of informal knowledge into formal knowledge and facilitates its externalization, sharing and subsequent internalization	manage knowledge formalize knowledge
Hall & Harmon (2005)	- support organizational management - support improvement practices	organizational management improve processes
Havey (2005)	- Formalize existing process and spot needed improvements - Facilitate automated, efficient process flow - Increase productivity and decrease head count - Allow people to solve the hard problems - Simplify regulations and compliance issues	formalize processes improve processes efficiency support compliance
Stemberger et al. (2004)	- easily understandable to all members of a project group - base for identifying requirements, planning information system development projects and introducing workflow management systems	support modeling specify software requirements develop software implement software
According to Stemberger et al. (2004)	- play an important role in business process (re)design (Desel & Erwin, 2000) - drive organizational analysis, renovate existing processes, derive requirements and specifications for information systems, support (semi)automated execution of processes (Paul et al., 1999)	design processes re-design processes organizational analysis manage processes specify software requirements automate processes
Aguilar-Savén (2003)	- enables common understanding and analysis of BP - provides understanding of a process - works as a tool through which an enterprise can be analysed and integrated	understanding analyse processes enterprise integration
Kesari et al. (2003)	- Documentation benefits: common language with clients, means of documentation, flexible template - Design benefits: understanding the current BPs, generation of new possibilities, means of planning for the project/implementation - Use benefits: visual representation of processes, iterative development process, time efficiency	communication documentation manage change understanding innovate processes improve processes manage processes efficiency support modeling
According to Kesari et al. (2003)	- assist with package selection from software vendors, help users select and understand software (Curran & Ladd, 2000) - helpful for BPR and benchmarking (Jackman,	re-engineer processes management understanding (2) improve processes (2)

(continues)

Reference	Mentioned benefits	Keywords
	1998) - understanding and identify innovative aspects of existing BPs, act as a source of ideas for new processes and assist in selecting systems (Murgatroyd et al., 1998; Minkowitz, 1993)	innovate processes (2) select software (3)
Koubarakis & Plexousakis (2002)	- reveals anomalies, inconsistencies, inefficiencies and opportunities for improvement - valuable means for sharing knowledge - used to formulate and evaluate changes	improve processes manage knowledge manage change
Kalpic & Bernus (2002)	- important tool for process engineering - allows transformation of informal knowledge to pragmatic, formalised and structured knowledge, hence an important tool for KM	engineer processes manage knowledge
Tam et al. (2001)	- form a tool for BPR - help to identify appropriate strategies for software packages implementation - help with the software development	re-engineer processes implement software develop software
Rosemann et al. (2001)	- aid in managing enterprise systems	managing enterprise systems
Rosemann (2000)	- helps document and analyse current business - helps all project members to develop the same understanding and terminology - tool for benchmark and completeness check - highlight weaknesses and potential for improvements - helps with system selection	documentation analyse processes understanding shared terminology manage processes improve processes select software
Becker et al. (2000)	- important for software engineering and developing software (p.30), process reorganization, certification, activity-based costing and human resource planning (p. 31)	develop software reorganize processes certificate processes activity-based costing human resource planning
Melão & Pidd (2000)	- help analyse and improve BPs	analyse processes improve processes
Gulla & Brasethvik (2000)	- models serve as communication channels - guide realization of the automatic and manual parts of information systems - used to train and inform employees - provide documentation	communication implement software manage knowledge documentation
Chen (1999)	- teach employees how to develop and validate models	support modeling
Phalp (1998)	- greater efficiency in the production of the software that supports business processes	develop software
Sadiq & Orlowska (1997)	- helps understand BPs in order to automate them - helps develop and implement information systems	Understanding automate processes develop software implement software
Becker et al. (1997)	- foundation for operationalisation of process-oriented approaches (process re-engineering, process innovation, workflow-management,	re-engineer processes innovate processes manage processes

(continues)

	activity-based costing)	activity-based costing
Curtis et al. (1992)	- facilitate understanding and communication - support process improvement - support process management - automate process guidance - automate execution support	understanding communication improve processes manage processes automate processes

2.4 Creation of a Categorization of Benefits

In the previous section prior research describing benefits of BPM was presented and keywords for those benefits were defined. In this section a categorization to broaden the understanding of these benefits is created. A categorization as such can help with understanding if these benefits are being actualized in organizations in practice and if the benefits of BPM have been communicated properly to relevant stakeholders.

To create a categorization the keywords were first categorized in two separate groups divided based on the literature search phase they were found in. Once the benefits from both literature search one and two were categorized, the created categorizations were compared and analysed in order to create one final categorization. The categorization of the found benefits, including the keywords behind each category and the number of mentions, is summarized in table 2 Categorization of business process modeling benefits.

The categorization of the benefits draws upon the listing by Indulska et al. (2009) discussed in the previous section. From all benefits mentioned in two or more articles included in the literature review, a category has been created. When categorizing the found benefits, many of the categories were created based on the keywords mentioned in the literature studied, which made their categorization self-evident. These categories were **process understanding, improve processes, process innovation, process automation, process analysis**, **manage change** and **modeling support**.

The remaining categories were created as follows: Keywords *develop software, specify software requirements, select software*, *implement software* and *managing enterprise systems* were grouped to one category called **software improvement**. This category describes the development and management of existing software, requirement analysis for existing or new software and the selection and implementation of new software.

Keywords describing the management and documentation of knowledge or utilization of information were grouped in a category named **knowledge management**. These keywords were *formalize knowledge, manage knowledge, documentation* and *utilize information*.

Keywords *activity-based costing* and *human resource planning* were grouped in with ***efficiency***. These benefits were seen to be related to organizational func-

tions targeting increase in productivity and effectiveness in costing, human resources and time.

Keywords describing defining and designing BPs (*define BPs, specify processes, certification, design* and *engineering*) were grouped under **process definition.** *Manage processes, reorganization, re-engineering, re-design, re-use processes* and *formalize processes,* on the other hand were grouped under **process management** since they consider processes that have already been defined. *Shared terminology* was placed in the same category as *communication* since it works as a prerequisite for successful **communication**.

The remaining keywords were only mentioned in one of the articles included in the literature review. For them a category of **organizational management and support** was created. These benefits were not directly concerned with organization's processes, but rather support and manage other important organizational activities or characteristics. This category consists of *organizational management, manage complexity, manage cooperation, organizational analysis, enterprise integration, support compliance*, *transparency, business value* and *competitive advantage.*

While this list of categories may be incomplete it still provides an overview of the benefits of BPM and shows what themes are being commonly discussed by practitioners. One could easily argue that any of these topics could be repositioned to a different category or described by a different keyword. This categorization presents the view of one researcher and future research is encouraged to continue this work of BPM benefit categorization.

TABLE 2 Categorization of business process modeling benefits

Category	**Key words**
Software improvement	develop software (8), specify software requirements (6), select software (4), implement software (4)
Process management	manage processes (6), reorganize processes (2), re-engineer processes (3), re-design processes, re-use processes
Knowledge management	manage knowledge (5), formalize knowledge (4), documentation (3), utilize information
Process improvement	improve processes (13)
Process understanding	understanding (11)
Communication	communication (8), shared terminology
Process definition	define BPs (2), specify processes (2), formalize processes, engineer processes, design processes, certificate processes
Process innovation	innovate processes (6)
Process automation	automate processes (6)
Efficiency	efficiency (3), activity-based costing (2), human resource planning
Process analysis	analyse processes (4)
Change management	manage change (4)
Modeling support	support modeling (4)
Organizational management and support	organizational management, manage complexity, manage cooperation, organizational analysis, enterprise integration, transparency, support compliance, business value, competitive advantage

2.5 Requirements for successful BPM

In the literature the benefits associated with BPM were discussed and categorized. In this section the requirements for the actualization of these benefits are discussed. These include the critical success factors for BPM, measuring the success of a process model and considering the potential challenges of BPM.

2.5.1 Process Modeling Frameworks

BPM has become fundamental for organizations in today's world of increasing organizational change (Aldin & de Cesare, 2011, p. 359). BPM can be used a basis for decisions to implement new processes, organizational structures and IT systems, and as a result the success of a process modeling projects has become a critical part of change initiatives (Sedera et al., 2004, p. 485).

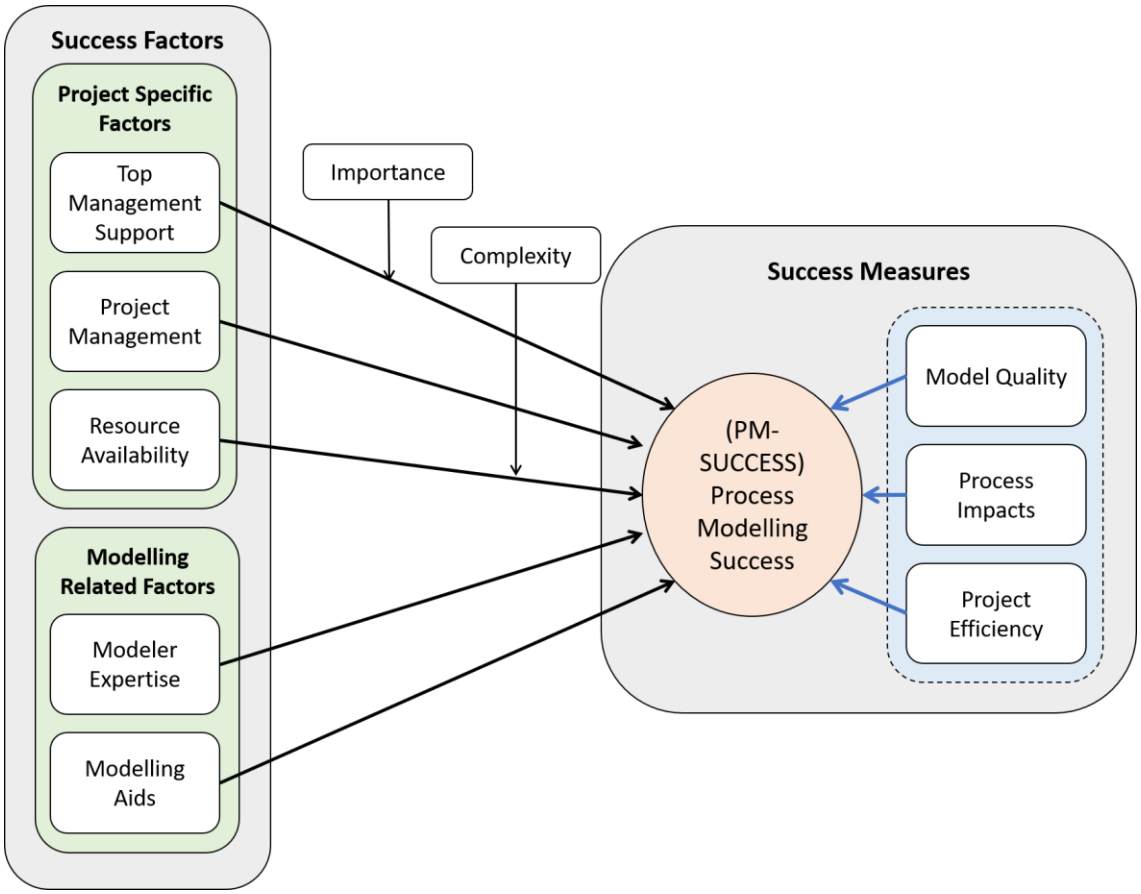
To receive the wanted benefits from BPM some critical success factors (CSF) for BPM should be considered. A critical success factor refers to the most critical functions of an organization for its success and survival (Johnson & Friesen, 1995, p. 57), or in this case the most critical dimensions of BPM for the success of the modeling project.

A framework for the CSFs and success measures of BPM called the *process modeling success model* has been created by Sedera et al. (2004) in order to help with the identification of crucial elements for successful BPM and the evaluation of the success of these projects. This framework divides the CSFs into project specific factors and modeling related factors. The project specific factors include stakeholder participation, management support, information resources, project management and modeler expertise. The modeling related factors in turn include the modeling methodology, modeling language and modeling tool.

The success of a modeling project can be measured based on how efficient and effective it has been. Efficiency refers to the execution of the project within time and budget assigned, and effectivity to the fulfilment objectives set to the project. (Sedera et al., 2004, p. 486) The previously described process modeling success model by Sedera et al. also adds a dimension of success measures. They name such measures as model quality, user satisfaction, individual impacts, process impacts and project efficiency.

Bandara (2007) has taken the *process modeling success model* even further by validating the constructs and testing the model, which led to some changes to the previously mentioned. The final process modeling success model is described in figure 3 Process modeling success model (Bandara, 2007). In this model top management support, project management and resource availability are the project specific factors and modeler expertise and modeling aids modeling related factors.

FIGURE 3 Process modeling success model (Bandara, 2007)



Top management support includes the commitment for funding and providing of other resources from top management, and their active participation and involvement in decision making. Project management in turn includes the defining of objectives, scope and the level of modeling in for BPM. It also includes the management of time, people, communication, quality and costs.

Resource availability consists of stakeholder participation, which means the input from stakeholders to the design, review and approval of the models, and information resource items. Information resource items refers to the availability of stakeholders for information gathering and their knowledge of the process being modelled as well as the information available through documentation. The modeling related factor modeler expertise in this model refers to the skills and experience of the modeller in BPM, their business knowledge and methodological knowledge. Modeling aids consists of the used modeling tools, techniques and methodologies.

The moderating variables in this model are importance and complexity. Importance refers to the importance and relevance of the project, and how needed it was. Complexity describes the volume of transactions in the process being modelled, and the number of stakeholders, process variants and functions as well as the amount of inputs, outputs and dependencies involved in it.

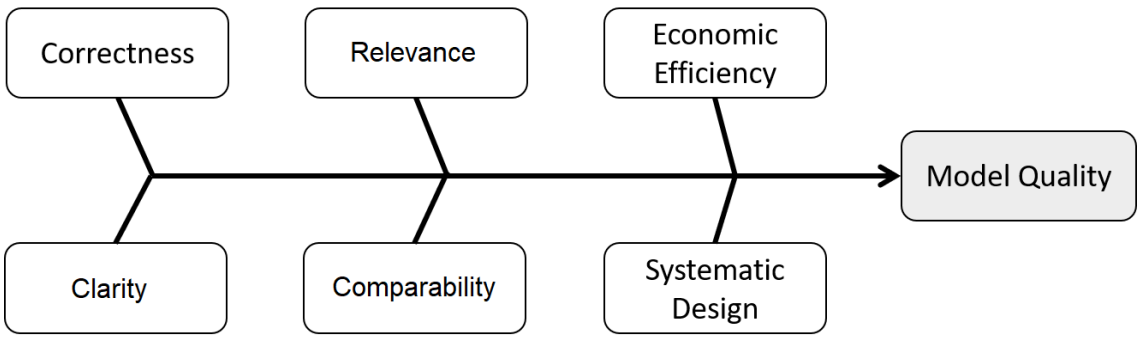
The success measures of the model are model quality, project efficiency and process impacts. Model quality consists of the accuracy and relevance of the information in the model, the ease of use and flexibility of the model, its conciseness and understandability and the realisation of user requirements in the model. Efficiency describes the duration of the project and the efficiency of invested person days and overall resources to the project.

Process impacts include both the individual impacts and process impacts of BPM. The individual impacts are such as learning about the processes being modelled and identifying problems related to it, and increased awareness of the importance of BPs. Process efficiency includes cost effectiveness of processes, reduced processing time, improvements to the process, increased quality of products and services and improved understanding of personnel requirements.

The success of a model can in turn be measured based on the framework of the six dimensions of quality by Becker, Rosemann and Uthmann (2000) presented in figure 4. These dimensions of quality are correctness, relevance, economic efficiency, clarity, comparability and systematic design. Becker, Rosemann and Uthmann call the first three guidelines the *Basic Guidelines,* that describe the syntactic and semantic correctness of process models, the selection of a relevant modeling technique and object system and the economic efficiency of the modeling, including as an example the re-use of models.

The remaining three guidelines are called the *Optional Guidelines*, because unlike the basic guidelines they are not a necessary precondition for the quality of models. These describe the readability and consistency of the models and the relationships between information models, such as the correspondence of inputs and outputs in related models.

FIGURE 4 The Framework of the Guidelines of Modeling (GoM) (Becker, Rosemann & Uthmann, 2000)



2.5.2 Process Modeling Challenges

The factors behind successful BPM can also be approached through understanding and managing BPM related challenges. A literature review by Aloitaibi (2014) categorized challenges facing BPM into 1. Challenges between business and IT, 2. Security issues and 3. Managing customer power.

The first category requires alignment of business and IT needs. Challenges requiring this alignment are the misalignment of business and IT strategies and the different view of people from different backgrounds. According to Aloitaibi, IS manager often view BPM from a technical perspective, when senior executives in turn view it from a business perspective. People with different backgrounds might also face communication challenges due to differences in experiences, culture and skills. In an ideal situation someone with the knowledge from both IT and business area with as Aloitaibi calls it "complete understanding" should be included in BPM work. (Aloitaibi, 2014, p. 708)

Security issues emerge often from insufficient understanding of integrating security to business process models. According to Aloitaibi adding security manually can also prove to be complicated and error-prone, and lack of experienced IS developers might result in security leaks. The challenge of growing customer power is related to the rapid change of business processes with increased competition, expanded markets and raised customer expectations. Organizations and their process models need to be improvingly flexible and responsive to changing customer requirements. (Aloitaibi, 2014, pp. 708-709)

In two newer studies regarding collaborative modeling the challenge of selecting a suitable process modeller for successful BPM is addressed. If selecting an outside resource as a consult, they will only be able to listen and try to understand descriptions of processes or observe the work (Lerchner & Stary, 2016), or in other words might have insufficient knowledge of the actual work. In addition, a top-down centralized manner taking months or possibly even years to do. On the other hand, an outside resource can relive the other stakeholders from having a dual role and have the necessary experience of process modeling, hence an understanding and skills to use formalized and even diagrammatic notation. (Ertugrul & Demirors, 2015)

An internal modeller from the modelled area in turn might not have this knowledge and struggle with the use of terms and notation, as well as provide poor performance on seamless execution. (Ertugrul & Demirors, 2015) They would also need to act in dual roles, or as described by Ertugrul and Demirors act in two different worlds simultaneously. A modeller from the area however would be closer to the operations (Lerchner & Stary, 2016) and provide needed area expertise, as well as reduce the time needed significantly (Ertugrul & Demirors, 2015).

Kesari, Chang and Seddon (2003) also list challenges or as they call them disadvantages of process modeling. These include the possibility of over-analysis, possibility of misinterpretation(s) and possibility of developer bias(es). The possibility of over analysis is described as attempting to model processes

too ambitiously which might result in overly complex and hard to understand process models. The possibility of misinterpretation describes the miscommunication of the actual structure of a process, which can result in its inconsistencies in understanding. The possibility of developer bias in turn includes the challenge of developers lacking in creativity due to previous experiences, industry templates and pre-existing world views. All of these challenges are important to consider when modeling business processes. (Kesari et al., 2003, p. 8-9)

2.6 Business Process Indicators

In addition to considering the requirements for successful BPM and measuring the success of a process model, the success of the process itself needs to be evaluated. The evaluation and improvement of business processes has become more and more important and is now a critical requirement for all organizations. Key performance indicators (KPI) and process performance indicators (PPI) are key instruments for this evaluation. (see e.g. El Hadj Amor & Ghannouchi, 2017; del-Río-Ortega, Manuel Resinas & Antonio Ruiz-Cortés, 2010; Pérez-Álvarez, Gómez-López, Parody & Gasca, 2016) These performance indicators describe the state of organizations processes and offer information on whether an organization is meeting its objectives, by including for example strategic goals, quality requirements and production targets (Pérez-Álvarez, Gómez-López, Parody & Gasca, 2016, p. 238).

A KPI is a state-of-the-art, numeric indicator of the success and performance of a process (Pidun & Felden, 2010, p. 99). KPIs measure strategic objectives and process goals and support the control of process execution (Vom Brocke & Rosemann, 2014, p. 113). KPIs focus on the most critical aspects for the success of an organization, in order words CSFs (Parmenter, 2009). They can present financial, qualitative, quantitative and time-based indicators (Calabrò, Lonetti & Marchetti, 2015, p. 169) which make processes measurable and controllable (Pidun & Felden, 2010, p. 99). By presenting strategic goals with qualitative or quantitative indicators the targeted value and actual value of process performance can be compared (Pérez-Álvarez, Gómez-López, Parody & Gasca, 2016, p. 233).

Another way for understanding certain process performance problems, could be process performance indicators (PPI), which represent the process goals on an operational level instead of the strategic level of KPIs ((Pérez-Álvarez, Gómez-López, Parody & Gasca, 2016, p. 233). PPIs can be measured by observing processes (del-Río-Ortega, Manuel Resinas & Antonio Ruiz-Cortés, 2010) and they are often used for the detection of irregularities in work behaviour (Pérez-Álvarez, Gómez-López, Parody & Gasca, 2016, p. 233). Furthermore, different dimensions of KPIs, such as time, cost and quality can be cultivated to more refined PPI measures (Baumgrass, Herzberg, Meyer & Weske, 2014). Where KPIs describe strategic measures such as revenue growth or customer

acquisition costs, PPIs describe operational measures such as the cycle time for offer building or percentage of rejected offers by applicants (Neudert, 2007).

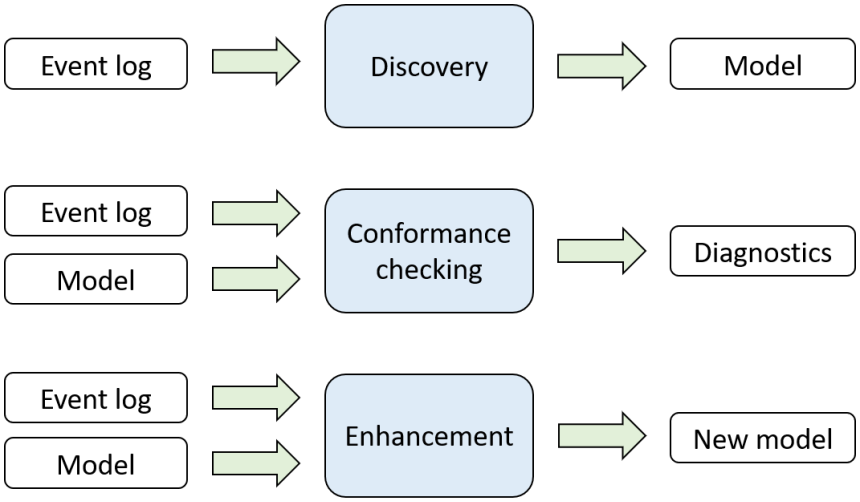
As KPIs, the measure of a PPI reflects the CSFs of a process, which can be used to specify process requirements and to evaluate process performance. This is why the management of PPIs should be integrated to the entire lifecycle of a business process, including simultaneous modeling of PPIs and business processes. PPIs have been noted as an important tool for evaluating the performance of business processes and for defining and measuring the progress towards process goals. (del-Río-Ortega, Manuel Resinas & Antonio Ruiz-Cortés, 2010, pp. 555, 556, 570, 571) In addition, the inclusion of PPIs to decision making can help make business processes easier to adapt to in real life (Pérez-Álvarez, Gómez-López, Parody & Gasca, 2016, p. 233).

2.7 Process Mining

A relatively new research are focusing on improving processes with the help of business process modeling is process mining. Process mining is the discovering, monitoring and improving of real processes by utilizing event logs in information systems to extract knowledge (Van Der Aalst et al., 2011, p. 169). The central benefits received from process mining is the objectivity of the compiled data; the information gathered describes what is actually happening in the organization, not what people think is happening (Van der Aalst, van Dongen, Günther et al., 2009, p. 3).

According to the members and supporters of IEEE Task Force on Process Mining, process mining can be divided into three types: 1. Discovery, 2. Conformance checking and 3. Enhancement. The first type of process mining produces a process model of an existing process from the event logs of example executions. The second type, conformance checking, is used to compare an existing process model to the event log of the process, in order to confirm if the real process and model are aligned. The final process mining type, enhancement, aims to improve an existing process model through the knowledge created from the event logs. (Van Der Aalst et al., 2011, p. 172) These different types of process mining are described in figure 5. Process mining types.

FIGURE 5 Process mining types (Van Der Aalst et al., 2011)



To enhance process models through process mining the relations between the elements in a model and the corresponding events in an event log can be analysed. This can be used to discover bottlenecks, throughput times and other improvement possibilities (Van Der Aalst et al., 2011, p. 172), and is hence the most interesting type of process mining in the light of this research. Through this relationship inconsistencies between the log and a model can be revealed and so called "replays" used to improve process models. These replays refer to the examining of timestamps in when replaying an event log on a process model. (Van Der Aalst et al., 2011, pp. 176–177) For more on process mining see e.g. Van Der Aalst (2011), Van Der Aalst et al. (2011) and Laguna and Marklund (2018).

2.8 Conclusions of the Literature Review

In this section a literature review of the benefits associated with BPM was conducted. Due to variation in the spelling of the word modeling the search for literature was done in two phases. In phase one literature was search with the keyword business process modeling and in phase two with business process modeling. The literature found was discussed and keywords for the found BPM benefits were created. Based on the keywords a categorization of BPM benefits was created. With this categorization the literature review answers the first research question of this thesis: 1. What kind of benefits are associated with BPM? Separate categories from keywords in phase one and two were created and compared. From these a final categorization was comprised. The final categorization of BPM benefits lists the following categories:

1. Process improvement
2. Process understanding
3. Software improvement
4. Communication
5. Process management
6. Process innovation
7. Process automation
8. Knowledge management
9. Process definition
10. Efficiency
11. Process analysis
12. Change management
13. Modeling support
14. Organizational management and support

With this categorization a more thorough understanding of the benefits associated with BPM is created. This listing creates a base for understanding the reasons behind BPM projects in organizations and BPM research. It can be used to improve internal buy-in for BPM projects and to evaluate if the possible benefits of BPM have been properly communicated to relevant stakeholders. A categorization as such can also help evaluate if the possible benefits of BPM have been actualized in an organization after BPM.

In addition, the key factors behind the found benefits were discussed. These included the *process modeling success model* by Bandara (2007) and the framework of the six dimensions of quality presented by Becker, Rosemann and Uthmann (2000). Furthermore, some challenges mentioned in prior literature important to consider when modeling processes where described. These were the challenges between business and IT, security issues and managing customer power, the challenge of selecting a suitable process modeller for successful BPM and the possibilities for over-analysis, misinterpretations and developer biases.

The use of BPM for the continuous improvement of processes was also shortly examined. After successful process modeling the success of a process itself should be measured and evaluated. This can be done by utilizing different measures such as key performance indicators and process performance indicators, which reflect the CFSs of a process. In addition to the KPIs and PPIs of process models, process mining can also be used to improve processes and process models alike.

3 RESEARCH METHODS

From this section onwards, the focus will be on the empirical part of this study. A qualitative case study has been conducted in order to answer the research questions: 1. What kind of benefits are associated with business process modeling? 2. What is required for successful business process modeling? and 3. How can business process modeling benefits be actualized in organisations?

Through the categorization created in the previous section the benefits of BPM mentioned in the interviews held will be examined. This research aims to create an understanding on if the possible benefits of BPM are actualized in organizations after BPM projects and if not, why not. This section describes the case organization and the research methods of the case study. First the case organization will be introduced and the goals of this study for the case organization will be presented. Then the execution of this research and the reasoning behind it will be explained.

3.1 Case Organization

The case organization in this research is a leading globally operating Finnish forest industry group, whose core business consists of tissue and cooking papers, paperboard, pulp, wood products, wood supply and forest services. By managing and growing forests sustainably and producing renewable energy from production side streams, the case organization is also a forerunner in sustainable bioeconomy.

The case organization consist of five main business areas (BA) focusing on different fields of the forest industry. In this thesis the case study will be conducted in cooperation with the BA focusing on paperboard. This subsidiary is a leading European producer of premium fresh fibre paperboards including folding boxboards, food service boards and white kraftliners. In this thesis this BA is referred to as **case company**, and the entire forest industry group is referred to as **case organization**.

In the end of 2018 a project for the unification of processes in different BAs in the case organization was started. This United programme aims to create an efficient, systematic and unified way of working and ensure the development of operations as one efficient unit. The goal of the United programme is to create transparency, share best practices, provide unified data, create an image of one unified high-quality company, more efficiency through unified development resources, time savings, profitability and consistent leadership.

Due to United, a re-modeling of the previously modelled processes has become current, as well as the defining and modeling of yet to be modelled processes. This aims to create an understanding for the different BAs of their own processes, aiding the conversation and comparison of similar processes in different BAs. Currently, most BAs have defined and modelled the core and main processes of the BA, as well as some of the sub and work processes.

The case company uses ARIS Architect & Designer to model event-driven process chains (EPC) and Value-added Chain Diagrams (VCD). For the modeling work two full time employees a Solution Owner and a Solution Expert are facilitating the modeling work. The processes are being modelled in project groups bringing together employees working in different phases of each process. In these groups of process experts and process modeling experts the as-is situation of the key processes has been modelled.

In this research employees in different roles in the case company were interviewed. The aim of this research is to provide an idea of the actualization of potential BPM benefits in the case company. With this knowledge the organization can go on to better communicate the wanted outcomes of BPM and improve both modeling methods and process measures. This research also provides an idea of how these models can be used to support the continuous improvement of processes.

3.2 Execution of the Research

To answer the research questions a qualitative case study was conducted. A case study includes an empirical investigation of a phenomenon in its real-life context (Robson, 2002, p. 178). A case study method is typically used for obtaining descriptions and interpretations from others, discovering and portraying the multiple views of the case (Stake, 1995, p. 64).

A qualitative research method was used because the aim was to understand a certain phenomenon, not necessarily to measure or generalize. The findings of this study will be used to explore a certain case organization; hence results should be valid in the context of the study. In a qualitative study the close relationship between the target organization and the researcher is typical. In this research the researcher is working closely with BPM in the case organization, which also justifies a qualitative research method.

For the case study semi-structured interviews were held. Interviews are the predominant way to achieving understanding of so-called multiple realities,

meaning the multiple views on a case (Stake, 1995, p. 64). Semi-structured interviews were chosen in order to gain more insights of the topic by having some flexibility in the interview. For the interviews a list of themes and questions was created, but the order and composition of questions varied, which is typical for semi-structured interviews (Saunders, Lewis & Thornhill, 2009, p. 320). The interviews were held as individual face-to-face interviews, apart from one Skype-interview, and were voice recorded. In addition to the interviews some triangulation was done by utilizing existing documentation of the benefits of BPM in the case organization.

A research by Coombs (2015) was used as a basis for the structure of the interviews (p. 37-38). This research was chosen due to the similarity in topic and the potential for the questions to be adjusted to fit a semi-structured interview and the theme of this research. The aim of the interviews is to get descriptive answers instead of simple yes and no answers, also described as "description of an episode, a linkage, an explanation" (Stake, 1995, p. 65).

The questions were structured as follows: first, questions of the interviewee's role and experience in modeling projects were discussed, to gain knowledge of their possible impacts on the answers. Second, questions of the benefits and challenges of modeling in order to find out if the categories of the benefits of BPM found in the literature review have been seen at the case company. Third, questions regarding the efficiency of modeling and if something the interviewees had not expected had emerged during modeling. Finally, the interviewees were asked about other concerns they might have regarding modeling. The interview template can be found attached in Appendix 1.

To test out the interview template, a pilot interview was held. This has been suggested to be an important part of a case study research with interviews (see e.g. Stake, 1995, p. 65). Based on this pilot interview some minor changes to the wording on the questions were made, but the content of the questions remained the same.

For the sampling of interviewees, a purposive sampling method was used. Purposive sample selection is often used in case study research, due to the small sample size. Using a purposive sampling method enabled the selection of cases that would most likely provide information able to help answer the research questions. The sampling strategy used was maximum variation sampling, which was chosen to ensure possible variation in answers. This variation in small sample sizes is said to represent the key and patterns of particular interest and value. (Saunders, Lewis & Thornhill, 2009, pp. 237-240)

In total 11 employees were interviewed. The interviews were voice recorded and each interview was about 15 to 45 minutes long. Due to the semi-structed interview method chosen, the interviewees were encouraged to drive the discussion which resulted in responses varying in time and sequence. The interviews spanned employees from different organizational levels and multiple business segments. This dispersion of roles was chosen to find out if the role of the employee in the modeling project might affect the perception of the bene-

fits and challenges of BPM. The interview data can be found attached in Appendix 2.

Within a few hours of each interview, a written facsimile of the interview was prepared as suggested by Stake (1995, p. 66). This was done to ensure the capturing of relevant information, meaning that what the interviewee meant was captured in contrast to the exact words they used. From the facsimile a final transcription was made where the focus was on four key themes relevant for this research:

1. Benefits of BPM brought up during the interview
2. Challenges of BPM brought up during the interview
3. Critical success factors / Requirements for successful BPM and receiving the targeted benefits
4. Interviewees overall notion of BPM

Based on the transcriptions data analysis was conducted to identify themes appearing in multiple interviews. The following section presents the results of the interviews, which are then further discussed in section 5.

4 RESEARCH RESULTS

In this section the results of the case study interviews will be presented. The results are reviewed through three key themes relevant for this research: 1. Benefits of BPM, 2. Requirements for successful BPM and 3. Challenges of BPM. In addition, the general notions of business process modeling in the case company are presented. In section 5 the meaning of these results will be further discussed.

4.1 Business Process Modeling Benefits

The results of the case study suggest that business process modeling is useful for organisations and individuals for multiple reasons. In all eleven interviews at least one benefit of BPM was brought up. These benefits are described in the following subsections.

4.1.1 Benefits for Communication

The most often mentioned benefit received from BPM was support for communication, which was mentioned in ten interviews. The modeling exercises held in the case company had improved communication between business units and forced them to unify used terminology. This had also initiated the work of benchmarking the used terminology with other companies working in the field in order to avoid defining new meanings to commonly used terminology. Once the used terminology had been defined it was understood that the different BAs are in fact not that different from each other, but instead share many common processes that had previously been simply referred to with different names.

The knowledge of a process was also said to be easier to communicate forward with the help of a process model. Process models were also seen as a tool for training and learning by many of the interviewees. On the other hand, communication was seen as a prerequisite for process modeling. The drastically increased communication and benchmarking between BAs had enabled sharing

of best practices, supported getting away from working in silos and identifying synergies between processes.

4.1.2 Benefits for Understanding

Improved process understanding was mentioned in eight of the interviews. Process models were said to make it easier to understand a process one might not be familiar with or involved in and that the visual representation of a process model makes processes easier to understand. BPM was also said to help understand synergies between different business units and business areas and hence improve cooperation. The understanding of "the bigger picture" created through process modeling was seen beneficial for understanding and managing organizational complexity and improving cross functional work.

Transparency created by process modeling was mentioned by three of the interviewees as one of the main enablers for broader understanding. This was seen as a positive way to improve circulation of employees within different roles, which had been commonly encouraged within the organization. One interviewee stated they could not think of any other way to create understanding of what one person needs to do and how it is connected to the process as a whole in an equally understandable and unambiguous way as process models. The same interviewee also stated that even though the process model itself would not be utilized in any way the modeling work itself is useful since the biggest benefit of process modeling is working together and hence creating unified understanding.

4.1.3 Benefits for Improvement

Software related improvements were mentioned by seven of the interviewees. Process models were seen as a base for developing systems and to specify system requirements. System requirement specifications and unification of business processes through BPM in turn were said to help unify the system field of the case organization. One of the interviewees also brought up process models as a tool for deriving test cases for system development.

Somewhat surprisingly improving processes was only mentioned in three of the interviews. Two of these interviewees saw process models as a tool to help measure processes, which in turn supports process improvement. One of the interviewees described that process models can help evaluate if the process is being followed and still encountering issues that would require process improvements, or if the issues are simply due to not following the process. This was also seen as one of the ways BPM can improve efficiency within an organization. Another interviewee in turn saw modeling of to-be processes as a way to support process improvement, since even though the maturity to work as in the to-be process model might not be there yet, improvement ideas have already been identified and documented.

4.1.4 Benefits for Efficiency

The benefit of efficiency was mentioned by five interviewees. According to one of the interviewees with most experience in BPM, even though all the other benefits such as transparency and knowledge sharing are important, in the end the main outcome of BPM is business efficiency through the unification of processes. This business efficiency in practice means that the company is able to produce more goods with less employees and is continuously creating a bigger buffer in preparation for harder times they might face in the future. They also stated BPM helps people learn and do things faster, which creates efficiency through time savings which and leaves time for other important functions.

The other three interviewees brought up similar efficiency benefits. BPM was said to help unify business processes, which enables the unifying of IT systems. Unifying the system field in turn creates efficiency and cost savings both in IT development and the support needed for different IT systems. BPM was also seen as a tool for reducing unnecessary work or so-called waste. Less training time needed was also brought up as a benefit of being able to simplicity explain how work is done through process models.

4.1.5 Benefits of Clearly Defined Processes

Efficiency was also said to be achieved through process models clearly defining what is done, how and by whom. Having clearly defined processes was mentioned as a benefit of BPM by five of the interviewees. This formalization of what is done enables a straightforward, systematic way of working and prevents deviations of the commonly agreed process. One of the interviewees highlighted that it is not necessary to model every possible deviation to the process flow, but the key is to present the rules for deviation. They stated that without these rules being included in the models it becomes easier to deviate from the process without sufficient reasoning. The benefit of having clearly defined processes was described by one of the interviewees as follows "one way of working might not be better then another way of working, but one way of working is better than five different ways of working".

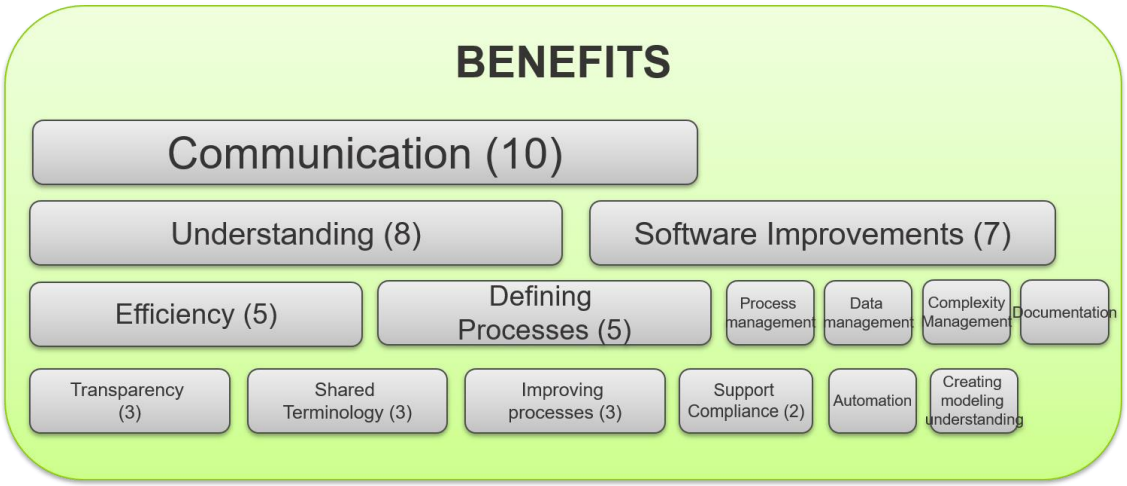
The visual representation of a processes (process model) was seen as a clear representation of what is actually done in the process, making the actions "more concrete" and structured. This was described by one of the interviewees as "mental support". This "mental support" was brought up by other interviewees as well, who described it as follows: "*no longer need to wonder how something should be done this time, since every time it should be done the same way*", "[process models] *clearly state what should be done, so to ensure correct actions you can follow the process model and check everything is done in a correct way*", and "*everyone knows who does what, what is my role in the process and what is required from me*". It was also seen positive that with process models other people can also be demanded to follow the process.

4.1.6 Use Cases of Process Modeling

Additional use cases where process modeling can be useful were mentioned by interviewees. Process modeling supporting data management, documentation and automation were each mentioned by one interviewee. In the case organization the process models had been defined as the place were all related data is documented, stored and managed. This was seen as a way to make the way of working and data more reliable as well as enable automation, since from then on only one set of data would exist.

In addition, one of the interviewees brought up different scenarios where process modeling can be utilized. These were making business processes more linear, deleting unnecessary steps and bottlenecks in processes and in long-term configurating IT systems. These might not head-on describe benefits of BPM but give an idea of the situations in which they might be useful. Having a large program throughout the organization for unifying process models was also seen beneficial for future BPM projects, since it had created understanding to the entire organization of how and why process modeling is done. The mentioned benefits discussed in this section are presented in figure 6 Business process modeling benefits.

FIGURE 6 Business process modeling benefits



4.2 Requirements for Benefit Actualization

To receive the benefits mentioned in the previous section the interviewees saw numerous requirements that should be taken into consideration. In all interviews at least two requirements for receiving benefits from BPM were mentioned. These requirements are presented in the following subsections.

4.2.1 Requirement of Involving Correct People

The one brought up most often was having the correct people involved in the modeling work. This was mention all together in nine interviews, in many of which it was brought up multiple times.

According to the interviewees successful modeling should involve both the people with the substance knowledge of the business area, in other words area experts, as well as people facilitating the discussion and doing the actual documentation of the model. The facilitators and documenters were seen important for the people with substance knowledge to be able to focus only on bringing the knowledge and to make the models easier to update in the future. On the other hand, one interviewee saw that these third parties were not beneficial and should not be involved, but instead the people executing the process should have the knowledge and skills to create and update the process models.

Regardless, many mentioned the facilitators and documenters should in any case have knowledge either of the business area being modelled or best practice knowledge of process modeling itself to provide enough support of industry standards and best practices. This way they are able to understand what people are talking about, pick up the important issues and interpret into process models the knowledge brought by the area experts. Involvement of people who are experts in process thinking as well as people interested in development and improvement in general was also seen beneficial.

According to an interviewee who had previously worked as a program coordinator in a process modeling exercise, the evaluation of how much work and how much resources will be needed should be carefully considered already in the planning face in order to have the right people with the right skills in the right place. Other interviewees also saw having enough resources involved important for process modeling to be beneficial, however it was also seen important that not too many people would be working on the models simultaneously. The importance of the right people being involved from the beginning without needing changes to the working group during the modeling exercise was also brought up in two interviews.

4.2.2 Requirement of Involving Change Drivers

In addition to having the correct people involved, having people driving the change was also seen critical by five of the interviewees. Even before the modeling work someone needs to drive the need for modeling for it to happen in the first place. It was also stated that people need to be willing to change and open for making changes according to the models for the modeling work to be successful. This was described by one interviewee as having a "critical mass" of people on the side of the change. In addition, capability for teamwork was separately mentioned as a critical success factor by one of the interviewees.

During modeling both drivers in the working groups and in management were seen important. The working group drivers are needed not only to drive

the work but also to "keep all the threads in their hands". The drivers were seen important in keeping people focused, asking questions and summarizing conversations.

Process modeling drivers from management were in turn seen crucial for change management. Three of the interviewees even stated that there is no point in starting process modeling work if management support is not available. Both business area and project management should be committed to the modeling work and understand what is done and why. After modeling the support for change and making sure that the organisation does not fall back to old ways were also seen as critical chores for management.

4.2.3 Requirement of Communication

Some other factors mentioned in the interviews for receiving BPM benefits were efficient and sufficient communication, shared terminology and creating understandable models. In many of the interviews it was seen important that communication is coordinated between working groups in order to model shared interfaces, inputs and outputs. Communication between people with different backgrounds was also seen crucial in order to create a shared understanding of processes in general, as well as for benchmarking and sharing best practices. Shared and commonly used terminology in turn was seen as a key factor for successful communication.

Three of the interviewees also brought up the importance of repetition in communication; the "core message" of a modeling project should be clear and constantly repeated, and everyone in the management team should be giving out the same message. This way it can be ensured that everyone involved knows what is being done and for "the message to become reality". Repetition in communication was also seen important within working groups to support shared understanding.

The process models need to be understandable and easy to communicate for the targeted benefits to be achieved. Three interviewees mentioned the models should be simple enough to be understandable even for people not working with the process area both through the simplicity and the used terminology. On the other hand, the simplicity of models was seen important so that the people executing the process can understand it and notice if something is missing, rather than the people modeling the processes being experts on how the model has been defined.

4.2.4 Requirement of Planning

Some of the factors seen important in order to receive the targeted benefits were things to take in to consideration already when planning the modeling work. Evaluating the time needed for the modeling to ensure having enough time and suitable phasing of work and selecting the right tools for the modeling work were seen important by four of the interviewees. According to them the chosen

tools should make modeling easy, be dynamic and agile, as well as support system development, process measurement and the execution of the process.

Defining the targeted goals and level of modeling were also mentioned as important factors to be considered before modeling work. According to three interviewees it is crucial to define what the models will be used for in order to model on a correct level; if a high level is used the processes might be easier to communicate forward, but configurating information systems can in turn only be done through more detailed level of modeling. The understanding of the defined goals should also be shared between management.

4.2.5 Requirement of Exception Handling

Suitable handling of exceptions in processes was a requirement mentioned in four interviews. The interviewees felt it is important to consider what processes actually need to be modelled and what can be left out. Not only should the impact a deviation of the process has, but also the benefits received of modeling it should be considered. One concern was that compromises will be made just for the sake of having unified process models, with no regards to the benefits received from this. On the other hand, other interviewees saw over-simplified process flows more likely to be useful than a process model describing all possible outcomes. The prevailing notion seemed to be that a model does not necessarily need to describe the real process 100%, but that the consequences need to be considered. An example of this as one of the interviewees described would be "for example [deciding] is this business terminated all together because it doesn't fit our process models".

4.2.6 Requirement of Implementing Process Models

According to two of the interviewees only after implementing the created process model the success of the modeling work can be evaluated. One of them stated that the real benefits will be received only after the implementation, and through seeing if people really understood things similarly. The other in turn stated the benefits will only be received if the changes based on them are implemented, not just have models stored somewhere where one person knows about them. In addition, enough time needs to be reserved for the process model implementation so that even the last person at the mill has had enough time to get used to changes derived from modeling before another huge process is started.

Requirements for receiving the targeted benefits that should be taken into consideration after modeling were also mentioned by other interviewees. The one mentioned most often was understanding that process modeling is in itself a process. Four of the interviewees in some words described process modeling as iterative work and a continuous process, rather than once modeling and since having perfect models for ever. Most of them also agreed that at some

point it needs to be decided that the models are ready and move on to implementation, since the models could be worked on and planned forever.

It was also stated that a process model that has been worked on for eighteen months probably would not be that much better than a model that had been worked on for eight months. Despite this it was seen important that people stay open for make changes to the once modelled processes in order to ensure improvement. Hence one of the interviewees suggested it would be important to define if the process model is intended to be a model for one day, one week or one year, so that it could be updated and the made changes communicated and trained accordingly.

4.2.7 Requirement of Measuring Process Models

Another topic that came up as a requirement for receiving the benefits from BPM is the measuring of processes. Three of the interviewees saw that process models should be connected to the execution and measuring of the process so that following that stuff is done according to the process can be controlled and ideally even measured in real time. Efficient measuring of processes and the capability to differentiate business KPIs and process KPIs was seen crucial. One of the interviewees even went as far as stating that a model without measurement is not a process model, it is a process.

4.2.8 Requirements of Process and Project management

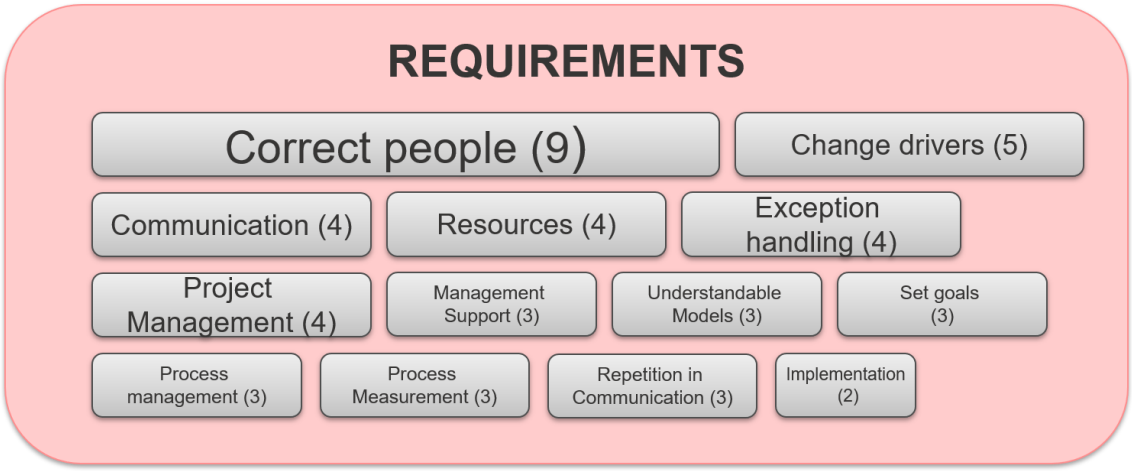
Process management was a critical success factor mentioned in three interviews. Process management was seen important before, during and after modeling. This was seen to include discussions of process in organization, active interference and fixing of issues in processes and clear communication of were process models are stored and maintained to ensure only one version exists and is maintained.

Some requirements were only mentioned by one interviewee, many of which were closely related to project management in general. These were evaluating and minimizing possible challenges before starting modeling efforts and taking into consideration customers processes and the value customer receives from our modeling work. Also, needing to consider the situation of the organization before starting modeling efforts was mentioned; modeling should not be started during time of crisis, and not too much stuff can be included to the same project.

In addition, management should not believe the initial plans, but question them and take on other opinions on them to ensure their reliability. Even if everything has been planned and evaluated before starting the work project management should still be ready to make changes when required and show flexibility depending on how the project is going were also themes mentioned as important for the success of process modeling. Finally, as pointed out by one of the interviewees, it needs to be understood that for a successful process a

process model is not enough. The requirements for successful BPM discussed in this section are presented in figure 7. Requirements for successful business process modeling.

FIGURE 7 Requirements for successful business process modeling



4.3 Business Process Modeling Challenges

Despite the recognition of multiple potential benefits and the requirements for their actualization all interviewees also discussed some challenges regarding BPM. In the following subsections these challenges will be discussed.

4.3.1 Challenges of Human Qualities

The most commonly mentioned challenges were as described by one interviewee "human qualities". These included difficulties with process thinking and understanding, managing different opinions and change resistance. These challenges caused by the human qualities and differences between people were mentioned in eight interviews.

One of the mentioned difficulties was managing loud opinions coming from people and especially authorities not necessarily with the best knowledge of the process. This also brought up the concern of having to compromise too much in the process models. Compromises were said to be done due to two different reasons: 1. having other than the area experts involved in the modeling work, hence not being able to take consider all important aspects of a process, and 2. not interviewing people from multiple different areas to understand why multiple different ways of executing the process exist. In addition, if the process being modelled is not understood well enough in the modeling team, the implementation of the model will not succeed.

Change resistance was brought up as a challenge affecting both the way of working, as well as the process being modelled. Process area experts and pro-

cess modellers might be set to their habits with no interest in improvement, which will make process modeling challenging. Modeling an idealistic world was said to be tempting, even when there would be no intension to make any efforts for this to become reality. One of the interviewees commented that it always surprises them how people are not prepared to improve processes as much as they could be improved, but instead tend to find excuses to how and why things should be kept as before. According to the interviewees people will have a hard time adjusting to change because it is always easier to go back to how things were done previously than it is for an organisation to learn something new. A few of the interviewees also felt that even before anything concrete has been done people generally start to worry about the effect of the possible changes will have to their own work and position in the company.

In addition to change resistance people seem to struggle with process thinking. According to the interviews people tend to think about processes through their own experiences and backgrounds, which results in complicated models portraying cases of detailed exceptions instead of the best practices model. An interviewee described this with an example of having a process that is currently done by three people, each with their own way of doing it. With all three ways the process can be done from start to finnish, and no way is better than the other. Still, all three people wants to make sure their way is portrayed in the model, to ensure it can be used in the future. Instead, regardless of all three ways being good, the focus should be on narrowing down to one process everyone would be using from then on. This would be a key take away of understanding process thinking, and according to the interviewee can usually only be achieve through diplomacy.

Other ways of people seeing things differently included people having a hard time understanding process management, process logic or in general thinking in a chronological and consistent matter. Two of the interviewees had prior experience of people not liking the word process and not understanding what was meant by it. Some people had claimed they do not have processes in their organization, clearly not understanding the difference between a process model and a process itself. This supports another interviewees comment stating that the level of maturity of understanding processes differs a lot between individuals. Creating the shared understanding repetitions was seen inevitable. One of the interviewees gave an example where a topic had been agreed to multiple time, but still in the training of the process model the same topic was again brought up for discussion.

The differences between people were also discussed by another interviewee, who described two types: 1. People who explain things in an illogical manner, first going through what is done in the end of a process, then moving to the needed inputs and so on. This was seen as a challenge especially for the person trying to capture the knowledge. The second type described was the people who in turn want to see processes more simplified than they actually are. Regarding both cases, the challenge was to have enough patience to work diligently and even unyieldingly as described by one of the interviewees.

4.3.2 Challenges of Implementation

In eight interviews challenges related to the implementing the process model were mentioned. One of the challenges brought up was how to know when to move on to implementation, since the models could be worked on for forever. A concern was that people try to make process models perfect, which results in highly detailed and idealistic models that cannot be executed in real life. On the other hand, a challenge was that people would think that once the process has been modelled it will be followed and remain good for ever, which in turn hurts improvement.

Another concern was due to previous experiences of process models being defined and then stored away never to be seen again. This results in models only a few people know about and that are not actively used, trusted or in any way useful or representative of what is actually being done. One of the interviewees commented that in past process modeling exercises 97% of people cannot even read the process models, which has resulted in the previous challenge in 95% of the cases.

4.3.3 Challenges with Resources

In seven interviews challenges related to resources were mentioned. These included challenges with time, allocation of the modeling work and the chosen tools. The interviewees felt that process modeling exercises with too much work in too little time will affect the quality of the models. Concerns were that time pressures don't allow for iterative work with validations rounds or listening and understanding what other people have to say. One interviewee also felt time pressures resulted in working too fast to keep up with conversations and made decisions.

Concerns regarding the allocation of the modeling work were mainly to do with experience and having enough people involved. Some referred to experiences where same resources were assigned to multiple roles in a modeling project, resulting in issues with scheduling and ensuring business continuity. One of the interviewees also brought up an interesting point of often focusing too much on what is done in Finland with people from Finland, resulting in a narrow view forgetting to think globally. Having people with not enough previous experience and expertise on process modeling both as modellers and area experts was also brought up as a challenge. This was seen to affect the ability to define clear flows to processes, ensure that models are on the same level quality and detail wise, and to provide support of industry best practices.

The selected tools were seen important in providing advantages and disadvantages to modeling work. The interviewees brought up tool related challenges such as the tool being heavy and not agile or dynamic, having a small font size or the tool showing a process as a list more than actually showing how the process flows. The interviewees also saw creating and editing models requiring lots of efforts and needing to be done as a part of a large project as chal-

lenges. This also included tools that do not allow connections to other documents, resulting in update needs in multiple places. One of the interviewees stated that the goals of a process modeling project should be defined before selecting the tool to ensure the selection of a suitable tool. An example of this mentioned by them was the QPR modeling tool being easier to communicate than ARIS modeling tool, making it suitable for explaining how things are done, but ARIS being more detailed and hence better for IT configurations.

Relating also to the tool, version handling of the process models was mentioned as a challenge in four interviews. The experience seemed to be that there are multiple versions of the same process models and no knowledge of which on is the latest version. The models were also seen as depicting the time they were done in, needing constant updating through system changes, business changes or industry best practices needs. One of the interviewees even stated that keeping process models up-to-date was the most challenging thing in BPM. Updating models was said to require both defining when they should be updated and when the changed models should be re-trained forward.

4.3.4 Challenges in Communication

Communication related challenges were mentioned in four interviews. During the modeling exercise misunderstandings might prevail from the use of process related terminology instead of the daily terminology used in the organisation. This might result in talking about different things with same names or vice versa. Another challenge was to create shared understanding of the used terminology between people from different backgrounds. During modeling it was also seen challenging to communicate and coordinate with other processes areas what are the relations and shared data inputs and outputs between processes.

Another communication related challenge was how to communicate the models after they are done to people not involved in the modeling work. Interviewees felt that even a simple process can be made to look extremely complicated. This was seen concerning as it might cause people to “lock-up” when first glancing at them, after which no intelligent discussions of the topic can be held. Another concern was that a complicated looking process might not show result in actually important steps being forgotten from the model. A simplified, understandable and easy to communicate version of the models with only the key information was seen necessary, instead of having to use the “25 different pages of processes” just to communicate what is done in one business area.

4.3.5 Challenges in the Process of Modeling

Some challenges of BPM that came up during the interviews were related to the process of modeling processes. Three of the interviewees felt that defining processes is in itself hard, not necessarily due to for example different understanding of processes but because it is hard to sit down to think about what the actual steps are and should be, and to define them in a process like way. It was also

thought to be challenging to model and discuss with enough piety to make sure no assumptions are made, and that shared understanding is created. Some other related challenges were making sure same thing is not modelled multiple times in different processes, modeling on a consistent level and defining were a process starts and ends and when it becomes another process.

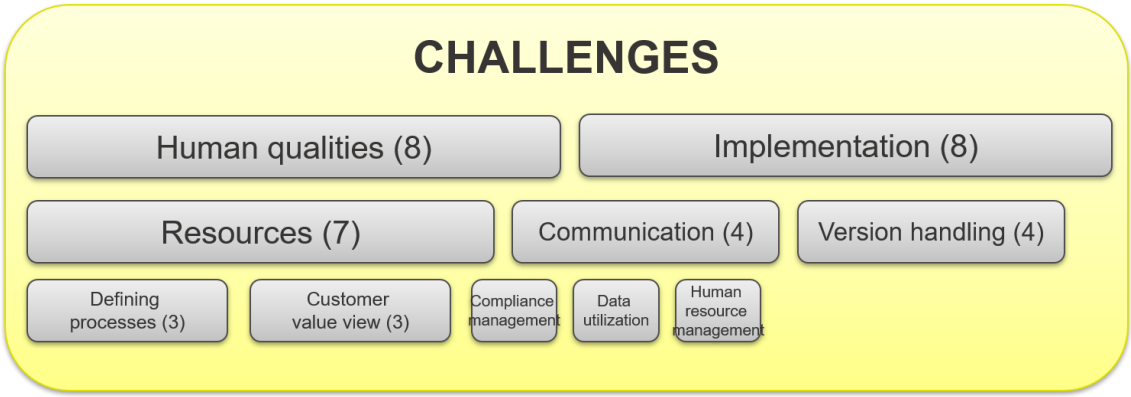
4.3.6 Customer View and Other Challenges

Three interviewees also brought up the challenge of keeping the value the customer receives from us in mind. Challenges were that customer processes might not be compatible with the changed processes or that due to time pressures there will be no time to consider how the process should go from the point of view of the customer. Another concern was that the customer value would be forgotten when trying to cut expenses, and that processes would be harmonized on the expense of the customer. One interviewee also brought up that in real life people aim to serve the customer the best they can, which might in some cases mean not following the process. The concern here was, how to identify which would in fact be better for the organisation itself, following the process or pleasing the customer.

Some other challenges mentioned in the interviews where that if a process and the process model are not connected to a system, the compliance to that process cannot be controlled in any way. Similarly, the low level of utilisation of data to create the process model was seen to create a challenge in the measurement of the process performance. Process modeling was also mentioned not to help with managing people and measuring and improving their performance.

From previous experiences with process modeling one interviewee saw that in some cases only when the process model is ready, and the work of implementation is started it becomes clear that modeling team has not had the needed understanding of the execution of the process and hence all the work has been for nothing. Another in turn stated they are not sure if process modeling is in fact worth the time and effort used, since it requires a lot of years before the benefits are even received. The challenges mentioned by interviewees and discussed in this section are presented in figure 7. Business process modeling challenges.

FIGURE 8 Business process modeling challenges



4.4 Notions and Effects of Process Modeling

This section turns the focus of the mentioned benefits, requirements and challenges of business process modeling to a broader outlook of the case study results. The first subsection will discuss the general standpoint of the interviewees towards business process modeling. The final subsection will discuss the mentions of benefits and challenges interviewees saw affecting their selves versus the case company in general.

4.4.1 Notions of Process Modeling

Through the analysis of the interviews the general standpoint towards BPM was examined. The notions of process modeling seemed to be positive or mainly positive with some hesitation. An exception of this were two interviewees with a hesitant or even negative view of modeling due to previous bad experiences of modeling exercises. Both interviewees described previous modeling exercises where the goal had not been achieved due to unsuccessful implementation and as a result they felt the entire exercise had been for nothing.

Four of the interviewees had both positive and negative prior experiences of BPM. One of them described the negative experience being due to authority figures not understanding why process modeling is done, but due to BPM favourable top management had still a positive standpoint towards modeling. Another interviewee had experienced the selected BPM tool not working as they had hoped and hence had some hesitance towards the used tool, but other than that were positive towards BPM in general. From the two others with both positive and negative experiences one seemed hesitant and the other mostly indifferent towards modeling. This can be assumed from comments such as “so far so good, I have seen worse [exercises]”.

Six of the interviewees had mainly positive previous experiences of process modeling. One of them had positive experiences of the modeling work it-

self but had not witnessed the implementation of the newly modelled processes and was hence somewhat hesitant towards it. Another one in turn had no previous BPM experiences that would affect their point of view and hence hand a positive standpoint towards BPM. The remaining of the interviewees hand only positive experiences of previous BPM exercises and had also positive notions of BPM in general.

As it is, the notions of the perceived benefits and challenges of BPM relied heavily on previous experiences. As an example, one interviewee speculated they would have had a more negative standpoint towards modeling processes before their latest experience with BPM, but due to the concrete benefits they felt they had received they now were feeling positive about modeling. The notions of the interviewees are described in table 3 Notions of process modeling.

TABLE 3 Notions of process modeling

	Notion			
Previous experience	Positive	Hesitant/Positive	Hesitant/Negative	Indifferent
Positive	X X X	X		
Both	X X	X		X
Negative			X X	
No experience	X			

Despite the overall general notions of BPM, when comparing mentions of BPM benefits and challenges, only two interviewees mentioned more benefits than challenges. In almost half of the interviews the amount of mentions of challenges was double or more the amount of mentions of benefits. This would suggest that even though the benefits received create a positive standpoint towards modeling, identifying individual benefits is still rather challenging compared to pointing out challenges encountered during or after modeling. To go even further, this could be argued to provide support for the previous findings of numerous mentions of BPM benefits with no scientific proof for their existence. On the other hand, benefits such as improved communication and understanding of other processes might seem somewhat intangible when compared to the very much concrete challenges of for example scheduling issues due to insufficient time and resources. This might result in less mentions of the benefits that are indeed important but not necessarily as concrete or evident in the everyday life of an organisation.

When taking into consideration the role of the interviewee interestingly all three interviewees involved previously as a supervisor mentioned challenges the most often when compared to benefits (more than 1,5 times more). One of the interviewees previously involved as a program director and one of the pro-

cess area experts were the only interviewees mentioning more benefits than challenges.

In general, process area experts seemed to mention benefits and challenges more evenly than interviewees in other roles. The results are presented in table 4 Impact of role to perceived BPM benefits and challenges. These results would suggest the more an individual is involved and invested in BPM the more benefits they are able to identify compared to the number of challenges. More than half of the interviewees had been previously involved in BPM in multiple roles, however no connection was found between working in multiple roles and the ratio of mentions between benefits and challenges.

4.4.2 Individual and Organizational Effects of Process Modeling

The benefits and challenges of BPM can be seen to affect the organisation as a whole or employees and their work as individuals. These differences were discussed by the interviewees as effects they see for themselves versus the case company in general. The number of benefits received, and challenges faced individually where compared to more general benefits and challenges to the case company.

In general, individual benefits and challenges where mentioned rarely, and all of them by the same seven interviewees. These included for example individual benefits from software related improvements to a process are expert working closely with IT, support for process management being an individual benefit accounted by a steering group member and processes being easier to train forward a benefit mentioned by a supervisor. Other individual benefits were getting a better understanding of processes reported by a supervisor and a process area expert, being able to demand others to follow the process mentioned by an advisor and core team member, and two process area experts, a supervisor and an advisor and core team member noting the previously described benefit of "mental support".

The challenges identified for the interviewees individually can be divided into challenges during and after the creation the models. During modeling the ones mentioned by the interviewees were not having enough time for validation and reviewing the created models (brought up by an advisor and core team member), needing to make too many compromises to create unified models (supervisor) and the actual process of creating process models being hard (process area expert, process area expert, process modeling expert, no prior experience). With this it was meant that the actual work of sitting down to think what the steps in a process are and should be and defining them in a process like way is challenging.

The concerns for the interviewees after modeling were the challenge of communicating forward the complicated looking models (two process area experts, steering group member, process owner, advisor, core team member and a process area lead), needing to start big projects to update the models due to the tool not being agile (supervisor, process area expert, process owner) and strug-

gling with the compliance of the process if the process is not connected to a system (supervisor, process manager, process area expert, process owner). These results of mentions of individual challenges are presented in table 4 Impact of role to perceived BPM benefits and challenges under the "Individual" column.

From the analysis of the impact of the role of an interviewee to the benefits mentioned some other speculations can be made. Interviewees that had previously worked in a certain role in BPM work could bring up benefits related to those positions. Examples of these would be a project director bringing up benefits such as data management and documentation, a process modeling expert mentioning the benefit of creating process modeling understanding to the company, and a steering group member considering the benefits for management.

Another result drawn from the analysis of the roles is the interviewees identifying as Supervisors, only mentioned benefits related to software, communication and compliance. This is in line with interviewees with supervisor role mentioning in general less benefits in relation to challenges. This could be seen as support for the notion of individuals being able to identify more benefits in regard to challenges the more they are involved and invested in BPM.

TABLE 4 Impact of role to perceived BPM benefits and challenges

Role	Mentions of benefits		Mentions of challenges		Ratio (All)
	Individual	All	Individual	All	
Process area lead		1	1	11	11
Supervisor (3)	**2**	9	3	30	3,33
No prior experience		3	1	6	2
Core team member	**2**	5	3	9	1,8
Advisor	**2**	5	3	9	1,8
Process owner (2)	**1**	14	4	23	1,64
Process area expert (6)	**5**	37	6	55	1,48
Steering group member	**1**	9	1	13	1,44
Process modeling expert		10	1	12	1,2
Program director		12		6	0,5
	13	105	23	174	1,65

In the subsection 3.1. the case company and there recently started United programme were described. The goals for the United programme included the creation of an efficient, systematic and unified way of working, ensuring the development of operations as one efficient unit, and creating transparency. The targets also included sharing best practices, providing unified data, creating an image of one unified high-quality company, achieving more efficiency through unified development resources, as well as saving time and achieving profitability and consistent leadership. After the announcement of the United programme, these targeted benefits of BPM had been communicated regularly and repeatedly within the organisation.

Despite the regular and repeated communication of these ten core benefits, they were somewhat surprisingly not particularly obviously represented in the interviews. Benefits of efficiency and systematic way of working were men-

tioned in less than half of the interviews, transparency in three and time savings, sharing best practices and unified data each in two. Efficiency through unified development resources and developing operations as one efficient unit could be said to have supported the notions of unifying IT through unified business processes. These were included in the software related improvements, mentioned in seven interviews. The targets of creating an image of one unified high-quality company, profitability and consistent leadership were hardly mentioned in the interviews.

When comparing the effect of the communication of the targets and previous experiences to the perceived benefits of BPM it seems fair to conclude the importance of previous experiences provides more effect. This claim is also supported by numerous studies on the effect of previous experience on resistance to change (see e.g. Coghlan, 1993; Ford & Ford, 2009). These have shown employees tend to remember previous experiences when introduced to new proposals (Ford & Ford, 2009). With this note, the success of previous BPM seems to be a crucial factor for the success and receiving of benefits from similar following exercises.

5 DISCUSSION

In this section the meaning of the case study results presented in the previous section are further discussed. The categorization created in the subsection 2.4 Creation of a Categorization of Benefits is reviewed and compared in relation to the findings of the interviews. This section aspires to create an understanding on how the findings from the case company are situated in regard to previous research as well as to analyse the implications of the results to practice.

5.1 Implications for Research

To dive deeper into the contributions of this research the benefits mentioned in the interviews were compared to the benefits found and the categorization created in section 3 Literature review. The results from the interviews seemed to be very much in line with the created categories as shown in table 5 Categorizing case company benefits.

Regarding the categories four main exceptions can be identified; Benefits fitting to the categories of 1. process innovation, 2. process analysis and 3. change management were not mentioned in any of the held interviews. The keyword transparency on the other hand was brought up in three interviews, when in prior literature it was mentioned only once. This could suggest that the potential of process models as tools for innovation and analysis as well as the potential of process governance have not been fully understood or considered in the case company. The overly represented benefit of transparency in turn could be seen as an indicator of a low level of maturity in transparency in the case company.

In addition to the perceived benefits mentioned by the interviewees a few of them also mentioned tangible evidence for the benefits received from BPM. In the case company some prior BPM projects had provided measurements to showcase the achieved benefits. Previously long-term efficiency benefits had been achieved through BPM, moving from five mills producing 2,5 million tons

of goods with 2000 employees to four mills producing 3,5 million tons of goods with 1000 employees. This change had been achieved by unifying processes through BPM and making process model-based changes to processes during the span of 18 years.

Another benefit achieved through the span of two years was the improved average processing time of product complaints from 39 to 24 days. This had also been achieved through changes kicked-off by a process modeling exercise. Two of the interviewees also described they had used process models to specify requirements for software development. This would suggest that at least some tangible efficiency and software related improvements had been actualized in the cases organisation after BPM.

TABLE 5 Categorizing case company benefits

Category	**Literature review key words**	**Interview keywords**
Software improvement	develop software (8), specify software requirements (6), select software (4), implement software (4)	software related improvements (7)
Process management	manage processes (6), reorganize processes (2), re-engineer processes (3), re-design processes, re-use processes	manage processes
Knowledge management	manage knowledge (5), formalize knowledge (4), documentation (3), utilize information	Documentation, data management
Process improvement	improve processes (13)	improving processes (3)
Process understanding	understanding (11)	understanding (8)
Communication	communication (8), shared terminology	communication (10), shared terminology (3)
Process definition	define BPs (2), specify processes (2), formalize processes, engineer processes, design processes, certificate processes	defining processes (5)
Process innovation	innovate processes (6)	
Process automation	automate processes (6)	automation
Efficiency	efficiency (3), activity-based costing (2), human resource planning	efficiency (5)
Process analysis	analyse processes (4)	
Change management	manage change (4)	
Modeling support	support modeling (4)	creating process modeling understanding
Organizational management and support	organizational management, manage complexity, manage cooperation, organizational analysis, enterprise integration, transparency, support compliance, business value, competitive advantage	transparency (3), support compliance (2), manage complexity

As mentioned in section 2. Literature review one of the most thorough listings so far of BPM benefits has been created by Indulska et al. (2009). Their listing of the top 10 perceived benefits of BPM (p. 11) included process improvement, improved and consistent understanding of business processes, improved communication, improved ability for process automation, execution or enactment, defining, identifying and modeling adequate levels of abstraction, greater ability to analyse processes for problems, time or cost reductions, support identifying, capturing and managing organizational knowledge, re-using previously designed and validated processes, improved ability to see how a process might operate, and its implications and support for business change management practices, results or impacts. Another thoroughly discussed categorization of BPM benefits by Kesari et al. (2003) created a division of 1. Documentation benefits, 2. Design benefits, 3. Use benefits and 4. Potential Disadvantages.

When comparing the results of this research to the results of these previous studies the results are mostly aligned. Some examples of benefits mentioned in all of the above are efficiency, improved understanding and support for communication.

The main difference comes when considering the beneficial effect of BPM to modeling itself. Kesari et al. (2003) state flexible template as one of the documentation benefits and Indulska et al. (2009) in turn discuss the benefits of defining, identifying and modeling on adequate levels of abstraction. These would be benefits situated in the "modeling support" category in the categorization of BPM created in section 2.4. As discussed in section 4, only one of the interviewees from the case company mentioned any benefits related to modeling support.

An explanation for this could be the difference in the knowledge of BPM of the interviewees; In the previous studies the interviewees were either experts on the field of BPM, such as academies, practitioners and vendors (Indulska et al., 2009) or practicing consultants using BPM in their daily work life (Kesari et al., 2003). In the case company the interviewee mentioning the improvement of BPM understanding through process modeling exercises had previously worked as a process modeling expert, which would suggest the expert role in BPM would affect the capability to observe modeling support related benefits.

When considering the difference of the interviewees in comparison to the result aligned in all results, this research further supports the findings from the previous studies. The previous knowledge of the interviewee on BPM does not seem to affect the perceived benefits of BPM in a notable manner when talking about other than modeling support related benefits.

The most thorough previous research on BPM challenges by Aloitaibi (2014) categorized challenges facing BPM into 1. Challenges between business and IT, 2. Security issues and 3. Managing customer power. Kesari et al. (2003) in turn mentioned the challenges of possibility of over-analysis, possibility of misinterpretation(s) and possibility of developer bias(es). In addition to these some more recent studies mentioned the challenge of selecting a suitable process modeller for successful BPM.

In relation to these results the findings of this research seem somewhat conflicted, which again seems to be largely due to the expert status of the previous interviewees. Aloitaibi (2014) discusses the potential challenge of security issues, which was completely absent in the case company interviews. Kesari et al. (2003) in turn discuss the possibility of developer bias, which again relates to the modeling support category mostly not mentioned in the case company. The main contribution here seems to be the differentiating view of a "regular" employee to the benefits but especially challenges encountered in comparison to process modeling experts.

5.2 From Modeling to Continuous Improvement of Processes

When comparing the requirements for successful BPM mentioned in the case study interviews to the requirements identified from previous research in subsection 3.4, most of them would fit without difficulty to the previously created frameworks. However, the concerns from the interviewees regarding what to do after the process models have been created were largely left without mentions. These include the requirements of process modeling being seen as a process itself and the implementation and measurement of process models.

The lack of consideration of requirements for receiving BPM benefits after the modeling work is done can be explained by this changing the focus from business process modeling to business process management. Business process management has been described by Swenson and von Rosing (2015, p. 87) as "a discipline involving any combination of modeling, automation, execution, control, measurement, and optimization of business activity flows in applicable combination to support enterprise goals, spanning organizational and system boundaries, and involving employees, customers, and partners within and beyond the enterprise boundaries." Smart, Maddern and Maull (2009) have in turn proposed a framework for business process modeling, presenting five key characteristics of business process management. From these characteristics identifying process owners, process measurement and process improvement can be based on the knowledge created from the interviews argued to be equally requirements for the success of BPM.

According to Smart, Maddern and Maull (2009, p. 496) identifying process owners and allocating them to business processes is a key requirement for business process management identified by multiple authors. A process owner works at the interfaces to other processes to prevent the creation of silos and is the one responsible for the performance of the process. Process measurement in turn is needed to monitor the performance of a process in comparison to targets and to prioritize corrective actions. A structured, consistent approach to process improvement is also said to be crucial to the realizing of benefits of business process management. (Smart, Maddern & Maull, 2009, p. 496-498) When comparing these requirements for successful business process management it seems fair to assume they can be applied further to business process modeling.

In the beginning of this thesis it was demonstrated that despite multiple research articles based on the importance of BPM, only few of them give evidence to support this claim. Kesari, Chang and Seddon (2003) even stated "it just seems to be assumed that process models are useful" (p.1). Through the analysis of the literature review and interviews benefits such as improved communication and understanding, as well as efficiency seem to be supported, but still measurable evidence is needed.

In addition, the benefits associated with BPM seem to be related to the modeling work and mostly disregard implementation of process models and in general the time after modeling. The focus from BPM is generally moved to business process management once the modeling is done, but the consideration of BPM success should not be discarded before successful implementation. In prior research it also seems to be regularly assumed that process modeling is done as a project, but in the interviewees also modeling independently from a separate modeling or development project was discussed. In prior research the difference between modeling done as internal projects, by external consults or apart from a project has rarely been considered. With this the need for better understanding of the actualization of business process modeling benefits both in organizations and in research has been demonstrated.

5.3 Limitations and Ideas for Future Research

While the study has provided some important new insights, it is subject to three main limitations. First, although the results give implications that the role of the employee might affect the perceived views of the benefits of BPM in large enterprises, only a limited sample of people was interviewed, which can make the results of this study hard to generalise. Second, the honesty of the answers reported by the interviewees cannot be ensured. However, from the quotes of the interviews it can be argued that the answers seemed largely honest and due to confidential treatment of the data no motive for dishonesty was detected. Third, although the interview questions were piloted, and questions reviewed with people not associated with BPM, the close relationship of the researcher with both modeling and the case company might have had some effect on the presentation and analysis of the answers. Also, the answers from the interviewees to the researcher might have been biased, due to the researcher working as a modeling expert in some of the modeling projects the interviewees had taken part in.

In the future, research on BPM benefits should be continued to ensure it does not phase the same fate as BPR, consensus being it rarely delivers the targeted benefits (Smart, Maddern & Maull, 2009, p. 493). Currently, the focus of business process modeling research often ends in before the implementation of the models, but the research areas of business process modeling and business process management should be increasingly examined together due to their intertwined nature.

Some ideas for future research would be to continue the work started here by researching the different ways of measuring the success of BPM through its effect on the execution of processes. Another research area would be to explore the ways BPM benefits have been communicated in organizations and the degree of success dependent on this communication. In addition, the possible effects of modeling done as internal projects, by external consults or apart from a project could be examined. Finally, it has been indicated that the role of the employee in the modeling project might affect the perceived benefits of modeling, but the effect of the business area is yet to be discussed.

6 CONCLUSIONS

The goal of this research was to further demonstrate the need for better understanding of the actualization of business process modeling benefits both in organizations and in research. The hypothesis behind this study was that the benefits of business process modeling seem to be commonly assumed but the evidence for their actualization and the requirements for it has been insufficiently examined.

The two main aspirations behind this thesis were: 1. To continue the work of categorizing BPM benefits by conducting a systematic literature review and 2. Turn the focus from the claimed benefits of BPM to the requirements for the actualization of the benefits of BPM in organizations. These topics were approached trough three research questions:

1. What kind of benefits are associated with business process modeling?
2. What is required for successful business process modeling?
3. How can business process modeling benefits be actualized in organisations?

This thesis first introduced the topic of BPM and continued to a literature review exploring the benefits previously associated with BPM. Prior literature has tackled the topic of BPM with different focus areas, but a report presenting a broader understanding of the topic was lacking. From the literature search a total of 13 relevant results were initially accounted to this literature review. With these 13 research articles, backward reference searching was used in order to further investigate the topic.

From the benefits of BPM mentioned in the research articles included in this literature review keywords were created, which were then used to create a categorization of BPM benefits. The categories of BPM found were software improvement, process improvement, process understanding, process innovation, process automation, process analysis, process definition, process management, change management, knowledge management, communication, efficiency, modeling support and organizational management and support.

Following, a qualitative case study was conducted in order to broaden the topic to the actualization of the benefits found in the literature review to the benefits found in organizations. For this, eleven stakeholders involved in BPM projects with varying intensity were interviewed. The results of the interviews were reviewed through three key themes relevant for this research: 1. Benefits of BPM, 2. Requirements for successful BPM and 3. Challenges of BPM.

This thesis then went on to compare the categorization created in section 3. Literature review in relation to the findings of the interviews. The aim was to create an understanding on how the findings from the case company are situated in regard to previous research and to analyse the implications of the results to practice.

This study makes three main contributions to the literature on business process modeling. The first and main contribution is the demonstrated need for more research on the area of business process modeling benefits and their actualisation. The results of the literature review and case study would suggest that the benefits associated with BPM seem to be related to the modeling work and mostly disregard implementation of process models and in general the time after modeling. This supports the previous notions of researches and practitioners assuming the usefulness of business processes and modeling, but actual evidence for this being lacking. With this the need for better understanding of the actualization of business process modeling benefits both in organizations and in research has been demonstrated.

Second, this thesis presents some ideas on what is required for the benefits of business process modeling to be actualized in organisations, as well as what kind of benefits and challenges are currently associated with process modeling. The result show support for previously found benefits such as support for communication, improved understanding, software and process improvement, efficiency and having clearly defined processes.

To receive the previously mentioned benefits this research suggests the requirements of involvement of correct people and change drivers, communication, planning, exception handling and measuring process models. It also presents the need for implementing and measuring process models and regardless of modeling done apart or in a project the need for project management.

In addition to these requirements some challenges that should be taken into consideration found in this thesis were the human qualities of people, the challenges of implementation and the process of modeling processes itself, sufficient resources, communication and the possible need for taking the customer into consideration.

Furthermore, this report demonstrates the role of previous experience on the notions of process modeling and considers the effect of employee role on perceived benefits and challenges. The results suggest that the more an employee is involved in process modeling and the better previous experiences they have of it, the more benefits they will be able to identify in comparison to challenges.

Third, this study creates an up-to-date listing of the benefits associated with BPM in prior research. With this categorization a more thorough understanding of the benefits associated with BPM is created. This listing creates a base for understanding the reasons behind BPM projects in organizations and BPM research. It can be used to improve internal buy-in for BPM projects and to evaluate if the possible benefits of BPM have been properly communicated to relevant stakeholders. A categorization as such can also help evaluate if the possible benefits of BPM have been actualized in an organization after modeling.

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APPENDIX 1 INTERVIEW TEMPLATE

Interview Template

Employee role / Experience

1. What is your role in the case company?
2. What was the latest BPM project you took part in?
3. Have you taken part to other BPM projects?
4. What has been your role in the BPM project(s) you have taken part to?

Benefits

5. In general, how do you see the process modeling projects, and their value for the organization? Are they worth while?
6. Do you think process modeling produced relevant and reliable data? Why / why not? How can you tell that the data is relevant and reliable?
7. Do you think process modeling has provided you with some benefits in your own work? What are those benefits? What do you think are the most significant benefits?
8. Do you think process modeling has provided some benefits for MB in general? What are those benefits? What is targeted by the organization, and were the targeted benefits achieved?

Challenges

9. Did you encounter any problems/challenges/issues in modeling? / Are you aware of any --- encountered during modeling?
10. Did you encounter any problems/challenges/issues after modeling? / Are you aware of any –-- encountered after modeling?
11. How did you overcome the problems/challenges/issues? / How were these --- overcome?

Other

12. What do you think were the critical success factors for the modeling? / What do you think is required to model efficiently?

13. Was there something about modeling that surprised you?
14. Were there some topics/issues that came up regularly during modeling?

15. Do you have any other things in mind regarding process modeling?

APPENDIX 2 INTERVIEW DATA

Interview Data

BPM role	Mentions of challenges	Mentions of benefits	Interview duration
Advisor Core team member	**9**	**5**	**26 mins**
No prior experience	6	3	**18 mins**
Process area expert Steering group member Process owner	**13**	**9**	**27 mins**
Process area expert	**2**	**6**	**16 mins**
Process area expert Process area lead	**11**	**1**	**35 mins**
Process area expert	**7**	**6**	**15 mins**
Process modeling expert Process area expert	**12**	**10**	**48 mins**
Project director	**6**	**12**	**37 mins**
Supervisor	**13**	**1**	**34 mins**
Supervisor	**7**	**3**	**17 mins**
Supervisor Process manager Process owner Process area expert	**10**	**5**	**35 mins**