



**BUSINESS PROCESS MODELING FOR CUSTOMER ORGANIZATIONS:
DEVELOPING A FRAMEWORK**

Lappeenranta–Lahti University of Technology LUT

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Jasir Abdikarim

Examiner: Professor Petri Niemi

ABSTRACT

Lappeenranta–Lahti University of Technology LUT

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Jasir Abdikarim

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The increasing complexity, rapid technological change, changing customer expectations, and heightened competition in the current business landscape have made the role of business process modeling more critical than ever. The primary aim of this thesis is to develop a framework for the case company to model business processes for its customer organizations. This master's thesis includes a review of current ways of working, challenges encountered, and the tools used.

This study has two parts, a literature review that focuses on business process management and business process modeling, and an empirical portion that involves qualitative research. The empirical part includes semi-structured interviews with employees from customer organizations and consultants from the case company, as well as empirical observations in the case company. The results from the interviews and observations were used to analyze the current state of business process modeling in the case company, and the framework was developed based on the current state analysis and theoretical best practices.

Findings revealed challenges such as lack of standardized approach, cross-functional collaboration, understanding outdated models, detail consistency, coherence, and stakeholder engagement. The proposed framework provides a structured method for analyzing, designing and implementing customers' business processes, consisting of eight steps with guidelines for primary and secondary responsibilities between the case company and its customers. Implementing the framework can guide the case company to standardized approach which results to coherent and consistent process models as well as engaged stakeholders and cross-functional collaboration.

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Kasvavan monimutkaisuuden, nopeiden teknologisten muutosten, asiakkaiden odotusten muuttumisen ja kiristyneen kilpailun vuoksi nykyinen liiketoimintaympäristö on tehnyt liiketoimintaprosessien mallintamisen roolista entistäkin tärkeämmän. Tämän opinnäytetyön tavoitteena on kehittää asiakasorganisaatioiden liiketoimintaprosessien mallintamisen viitekehys case-yritykselle. Diplomityö sisältää myös nykytilan kartoituksen ja analyysin liittyen nykyisiin toimintatapoihin, koettuihin haasteisiin ja käytettyihin työkaluihin.

Tämä tutkimus koostuu kahdesta osasta: kirjallisuuskatsauksesta, joka sisältää liiketoimintaprosessien hallinnan sekä mallintamisen teorian, ja empiirisestä osuudesta, joka on laadullinen tutkimus. Empiirisessä osuudessa on tehty empiiriset havainnot case-yrityksestä sekä teemahaastattelut asiakasorganisaation työntekijöille ja case-yrityksen konsulteille. Haastatteluiden ja havaintojen tuloksia käytettiin nykytilan analysointiin case-yrityksessä. Viitekehys kehitettiin nykytilan analyysin ja teoreettisten parhaiden käytäntöjen pohjalta.

Tutkimustulokset osoittivat haasteita, kuten puuttuvaa standardisoitua lähestymistapaa, eri funktioiden välistä yhteistyötä, olemassa olevien prosessimallien ymmärtämisen vaikeutta, epäjohtonmukaisuuksia yksityiskohdissa, mallien yhtenäisyyden puuttumista ja sidosryhmien osallistamista. Ehdotettu viitekehys tarjoaa strukturoidun menetelmän asiakasorganisaatioiden liiketoimintaprosessien analysointiin, suunnitteluun ja toteuttamiseen. Kehys koostuu kahdeksasta vaiheesta sekä suuntaa antavista ohjeista päävastuiden ja toissijaisten vastuiden jakamisesta case-yrityksen ja sen asiakkaiden välillä. Viitekehyksen implementointi voi ohjata case-yritystä standardisoituun lähestymistapaan, joka johtaa johdonmukaisiin ja yhtenäisiin prosessimalleihin, sekä sitoutuneisiin sidosryhmiin ja eri funktioiden yhteistyöhön.

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Jasir Abdikarim

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ABBREVIATIONS

BPM	Business Process Management
TQM	Total Quality Management
BPR	Business Process Reengineering
JIT	Just-In-Time
IT	Information Technology
KPI	Key Performance Indicator
CPO	Chief Process Officer
PAIS	Process-Aware Information Systems
7PMG	Seven Process Modeling Guidelines
IPO	Input-Process-Output
BPMN	Business Process Modeling and Notation
UML	Unified Modeling Language
EPC	Event-driven Process Chain
ARIS	Architecture of Integrated Information Systems
BPMI	Business Process Management Initiative

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1 Introduction

This thesis proposes a novel framework for business process modeling in customer enterprises for the case company, with an emphasis on developing comprehensive and accurate process models. The case company's customer organizations increasingly require process modeling for a variety of purposes, including the development of to-be process models to aid in digital transformation initiatives. Despite the widespread adoption of process modeling, there remains a lack of established best practices and standards for modeling business processes in customer organizations in the case company. This study presents a structured framework that offers a systematic approach to guide the case company in designing clear and consistent models that align with their customers' objectives. By developing this framework, the thesis aims to contribute to the development of a standardized and structured approach to modeling business processes for customer organizations in the case company. Such an approach can help customer organizations achieve greater transparency, consistency, and alignment, thereby leading to better decision-making and improved business outcomes.

In the introductory chapter of the master's thesis, the primary purpose is to provide a concise overview of the research methodology. However, before delving into the methodology, this chapter also provides some background on the topic of the thesis, highlighting its significance. In addition, the chapter presents a brief review of the relevant literature and outlines the research problem and research questions that will be addressed in the study. The limitations of the research are also discussed, and the overall structure of the thesis is presented.

1.1 Background

Due to globalization and increased competition, many organizations are compelled to make significant changes to their business processes (Hlupic & Robinson 1998). A business process consists of a series of activities that are organized in a logical sequence with the goal of achieving a desired outcome (Aguilar-Savén 2004). Business Process Management (BPM) is concerned with more than just improving individual tasks or activities; it focuses

on managing the entire series of events, actions, and decisions that contribute to creating value for both the organization and its customers (Dumas et al. 2018). Business process modeling is a method for understanding and analyzing these processes by creating visual models that depict their structure and dependencies. By using process models, an enterprise can gain a better understanding of its business processes and integrate them into a cohesive whole. Thus, it is important to model these processes accurately to achieve an accurate representation of the enterprise's operations. (Aguilar-Savén 2004)

Amidst the current business landscape characterized by increasing complexity, rapid technological change, changing customer expectations, and heightened competition, the role of business process modeling has become more critical than ever. Business process modeling has emerged as a critical tool for modern enterprises and provides businesses with a structured and systematic approach to manage complexity, facilitate digital transformation, optimize processes, and enhance the customer experience. By leveraging business process modeling, businesses can identify inefficiencies, reduce costs, improve quality, and stay competitive in a dynamic and ever-evolving marketplace.

Although there is a considerable amount of academic literature regarding business process modeling, there are indications that practitioners encounter difficulties with various aspects of the process and do not receive sufficient guidance from the academic literature to assist them in their efforts (Indulska et al. 2009). In practice, business process modeling is widely used, but research has not yet fully addressed important quality issues related to it. One major problem is that many individuals who are not experts in process modeling often participate in process documentation projects, resulting in a low level of modeling competence. While some approaches have been developed to improve model quality, they tend to have drawbacks. Some frameworks are too abstract to be useful for beginners and non-experts, while other collections of practical tips lack a strong research basis. (Mendling et al. 2010) Consequently, there is a scarcity of empirical studies on business process modeling, which limits the potential for future research in this field to provide guidance to practitioners (Eikebrokk et al. 2008).

1.2 Research objectives and scope

The main objective of this thesis is to develop a framework for the case company on how to model business processes for its customer organizations. The case company is one of the largest IT and business consulting services firms in the world that offers business process modeling services to its customers. To achieve this objective, the following main research question will be addressed:

- What are the best practices for business process modeling in customer enterprises?

Answering these sub-questions will provide the necessary information to address the main research question:

- What is the current state of business process modeling for the customer enterprises in the case company?
- What are the shortcomings of the current approach and what are the areas for improvement?
- What are the key factors that should be considered to ensure accurate business process models?
- What tools and techniques should be used when modeling business processes?

The study will involve a detailed analysis of the current state of business process modeling for customer organizations in the case company, including a review of existing ways of working and tools. The research will also involve a literature review of best practices in business process modeling. The output of this research will be a framework for business process modeling that is specifically tailored to the needs of the case company. The scope of this research will be limited to one customer organization, which is a customer of the case company in a specific industry sector. It is important to note that this research does not address the implementation and validation of the framework by the case company.

1.3 Research design

A qualitative research approach will be used for this study, as it is well-suited to explore the experiences and perspectives of customer's employees and the case company's consultants in business process modeling. According to Creswell (2014), qualitative research is a method used to investigate and comprehend how individuals or groups attribute meaning to a social or human problem. Creswell (2014) also suggests that qualitative research involves conducting interviews, observations or other data collection methods in the context where the problem occurs.

The research strategy involves empirical observation and semi-structured interviews. Bryman (2008) suggests that observation is a research technique that involves closely and methodically observing people or events with the goal of gathering data that can provide deeper insights into the phenomenon being studied. According to Patton (2002), semi-structured interview is a flexible and conversational method of inquiry that combines structured and unstructured approaches and often involves a mix of open-ended and closed-ended questions. All interviews are recorded and transcribed for later analysis. Additionally, all of the semi-structured interviews will be conducted in an anonymous manner to ensure confidentiality. The research strategy also involves conducting a literature review. According to Merriam & Tisdell (2016), a literature review is critical to qualitative research as it establishes the context, demonstrates the necessity for the research, and determines the study's significance in relation to existing literature.

A content analysis approach will be used to analyze the data collected from the interviews. According to Krippendorff (2019), content analysis is a research technique that involves analyzing text-based data in order to identify patterns and themes, and to make valid and reliable inferences based on that analysis. The data will be coded and categorized to identify themes and patterns related to the research questions. The study will take ethical considerations into account at all times, including obtaining permission from participants after providing them with all necessary information, keeping their personal information confidential, and ensuring that the study is conducted with respect and in an ethical manner.

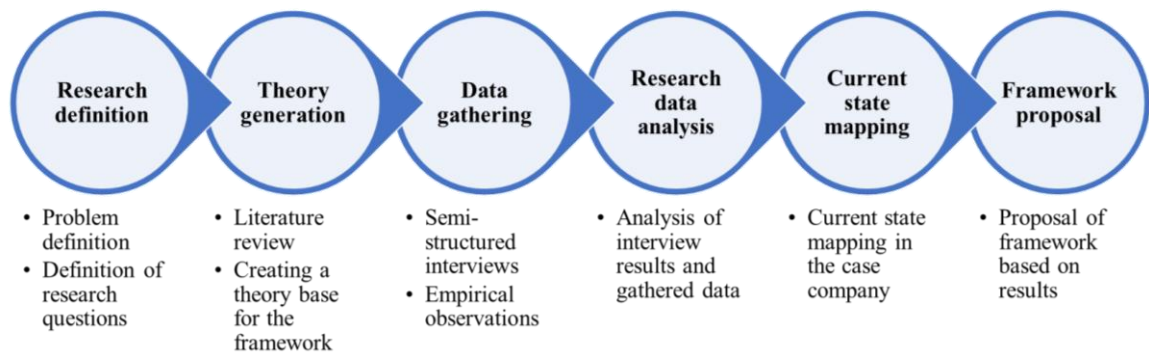


Figure 1. Research process

Figure 1 illustrates the process of this research. The research definition process encompasses the problem definition and research questions. Theoretical underpinnings are established by means of a comprehensive literature review, which forms the basis of a conceptual framework. Data for this study is gathered through the use of semi-structured interviews and empirical observations conducted in the case company. The gathered data is analyzed in the research data analysis process. Before proposing a framework, current state is mapped in the case company in order to understand how customer's business processes are modelled. Finally, a framework is proposed based on the analyzed data, the established theoretical foundation derived from the literature as well as the mapped current state.

1.4 Research structure

This thesis consists of seven primary chapters, as outlined in Table 1. The introductory chapter provides the reader with an understanding of the research context, objectives, design, and overall structure of the thesis. Chapters two and three are dedicated to conducting an in-depth literature review of the topics related to the empirical study, specifically focusing on business process management and business process modeling. The importance of the literature review lies in its ability to inform the development of the research methodology and framework, as well as provide a deeper understanding of the research context.

Table 1. Research structure

Input	Chapter	Output
Information about the research context, goals, design and overall structure	1. Introduction	Understanding of research context, objectives, design and the overall structure
Literature, theories and best practices about origins and evolution of BPM, core elements of BPM and BPM lifecycle	2. Business processes	Overall knowledge and clear understanding about BPM and its importance
Literature, theories and best practices about business process modeling	3. Business process modeling	Overall knowledge about business process modeling and clear understanding about modeling techniques, process architecture, process documentation requirements etc.
Information about research methods and data collection analysis	4. Research methodology	Understanding the research method, data collection and analysis techniques, and validity and reliability of the study
Interview results and empirical observation	5. Current state analysis in the case company	Understanding the case company's current state regarding business process modeling in customer organizations.
Theoretical framework, interview results, empirical observation	6. Framework for the case company	Comprehensive framework for business process modeling in customer organizations
Current state analysis, framework	7. Conclusions	Overview of the main findings and conclusions of the study

Chapter four covers the research methodology, including data collection and analysis techniques, as well as the validity and reliability of the research. Chapters five and six make up the empirical portion of the study. Chapter five presents the current state of the case company's business process modeling in customer organizations, while chapter six proposes a framework for business process modeling in customer organizations specifically for the case company. It is worth noting that the literature review conducted in chapters two and three is integral to the development of this proposed framework. Finally, chapter seven serves as a summary of the main findings of the thesis. Overall, this thesis provides a comprehensive analysis of the relationship between business process management and business process modeling, and offers practical recommendations for improving business process modeling in customer organizations through the proposed framework.

2 Business processes

There are various methods for describing or defining business processes. According to Dumas et al. (2018), Business Process Management (BPM) is not solely focused on improving how individual activities are carried out, but rather on managing the complete sequences of events, activities, and decisions that contribute to generating value for both the organization and its customers. These sequences of events, activities, and decisions are known as processes. (Dumas et al. 2018)

According to Weske (2019), BPM is rooted in the idea that every product or service that a company delivers to the market is the result of a series of activities that are performed. Business processes serve as a critical tool for organizing and managing these activities, while also enhancing the overall understanding of the relationships between them (Weske 2019). As per Ould's (2005) definition, a process refers to a collection of activities that are carried out in a cohesive manner by a group of individuals with the aim of achieving specific goals. (Ould 2005)

Von Rosing, Von Scheel, and Scheer (2015) have provided a more comprehensive definition of BPM. They view it as a discipline that involves various activities such as modeling, automation, execution, control, measurement, and optimization of business processes. The goal of these activities is to support the enterprise's objectives, go beyond organizational and system boundaries, and involve all stakeholders such as employees, customers, and partners. This broad definition of business process management reflects the importance of managing processes holistically, from end to end, and in a way that maximizes value creation for all involved parties. (Von Rosing et al. 2015)

Martinsuo & Blomqvist (2010) argue that processes are essentially sequences of customer-value-adding activities that make use of various resources. Figure 2 illustrates this concept by depicting the relationship between a process and a customer. In other words, a process should provide value to the customer while efficiently utilizing resources.



Figure 2. Simplified view of a process (Martinsuo & Blomqvist 2010)

Every type of organization, whether it is a government agency, a non-profit organization, or a business, has a series of processes that they need to manage. Business processes are essentially the actions that companies take when providing a service or product to their customers. The way that these processes are designed and carried out can have an impact on both the quality of the service that customers experience and the efficiency of the service delivery. If an organization has better processes and executes them more effectively, it can outperform another organization offering similar services. This holds true not only for processes that involve customer interactions, but also for internal processes within the organization. (Dumas et al. 2018)

2.1 Origins and history of Business Process Management

In ancient times, people were mostly self-sufficient and produced their own food, tools, and other goods. As a result, they had a broad knowledge of various production processes and were considered generalists. As society evolved and cities and city-states emerged, people began to specialize in the production of specific goods or services. This led to the development of guilds during the Middle Ages, where workers focused on one specific trade or craft. During this time, workers had a good understanding of their own trade, but knew little about the processes involved in producing goods or services obtained from others. The Industrial Revolution marked a shift towards even greater specialization, where workers in factories focused on a single, narrow task. This trend continued into the twentieth century, as small manufacturers grew into major factories. Today, we live in a highly specialized world where workers are typically skilled in a narrow set of tasks within a larger process.

(Dumas et al. 2018) Figure 3 illustrates how the process moved out of focus from prehistoric times to industrial times.

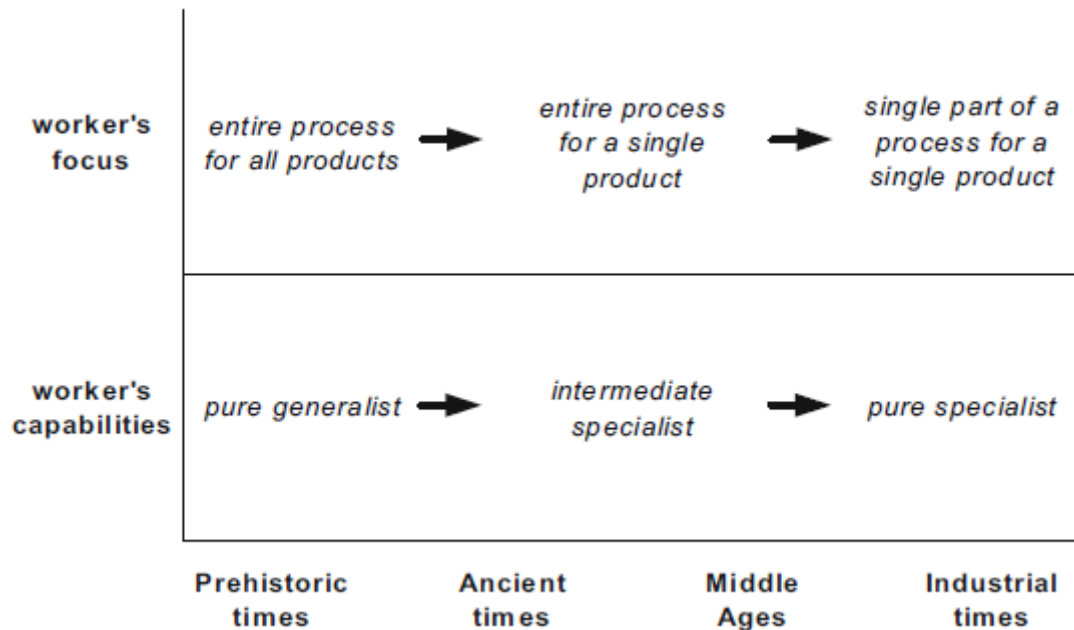


Figure 3. How the process moved out of focus through the ages (Dumas et al. 2018)

The concept of scientific management, introduced by Frederick W. Taylor, is closely associated with these changes. One of the main principles of Taylor's approach is the extreme division of labour and work analysis. Taylor's approach involved studying labour activities in great detail, such as the individual steps required to handle pig iron in steel mills, and developing very specific work instructions for workers. This approach was not only applied in industry but also in administrative settings, such as government organizations. The division of labour became the most dominant form of organizing work, resulting in workers becoming pure specialists concerned with only a single part of one business process. (Dumas et al. 2018)

In the late 1800s and throughout the 1900s, companies adopted a functional organizational structure that was based on the mindset of the Second Industrial Revolution. This approach dominated the corporate world for many decades, but towards the end of the 1980s, major American companies began to recognize that their emphasis on optimizing individual

functions within their organizations was leading to inefficiencies that were negatively impacting their competitiveness. These companies were spending a lot of money on projects aimed at improving efficiency, such as implementing new IT systems or reorganizing functional departments, but they were not seeing the desired improvements. As a result, they began to question the effectiveness of their functional organizational structure and started exploring new ways of operating that would better support their business goals. (Dumas et al. 2018)

2.2 Business Process Management

Business Process Management (BPM) refers to the methods, techniques, and tools used by an organization to manage and improve their business processes. The goal of BPM is to optimize how work is performed, ensure that outcomes are consistent, and identify opportunities for improvement. (Dumas et al. 2018)



Figure 4. An overview of approaches to business process change (Vom Brocke & Rosemann 2015)

BPM refers to a wide-ranging effort to improve how businesses are managed and operated. It involves enhancing the way business people think about and approach the management of their organizations with various approaches. In the realm of BPM, there are three major

process traditions: the management tradition, the quality control tradition, and the IT tradition (see Figure 4). Often, individuals from one of these traditions may ignore or undervalue the other approaches, feeling that their own approach is sufficient or superior. However, in recent times, the trend is for these three traditions to converge into a more unified and comprehensive approach to BPM. (Vom Brocke & Rosemann 2015)

According to Dumas, a business process is comprised of various events and activities that occur over time (see Figure 5). Events represent actions that happen instantaneously and trigger a sequence of activities. When a specific activity is relatively simple and can be seen as one unit of work, it's referred to as a task. The term "activity" encompasses both fine-grained and coarse-grained units of work. A typical business process also involves decision points, which are points in time when a decision is made that affects the execution of the process. Actors are another key component of a process, and can include human actors, organizations, and software systems acting on behalf of human actors or organizations. Physical objects, such as equipment, materials, and products, as well as informational objects, such as electronic documents and records, also play a role in the process. Actors can be internal or external to the organization where the process is executed, and those who operate within the organization are referred to as process participants. (Dumas et al. 2018)

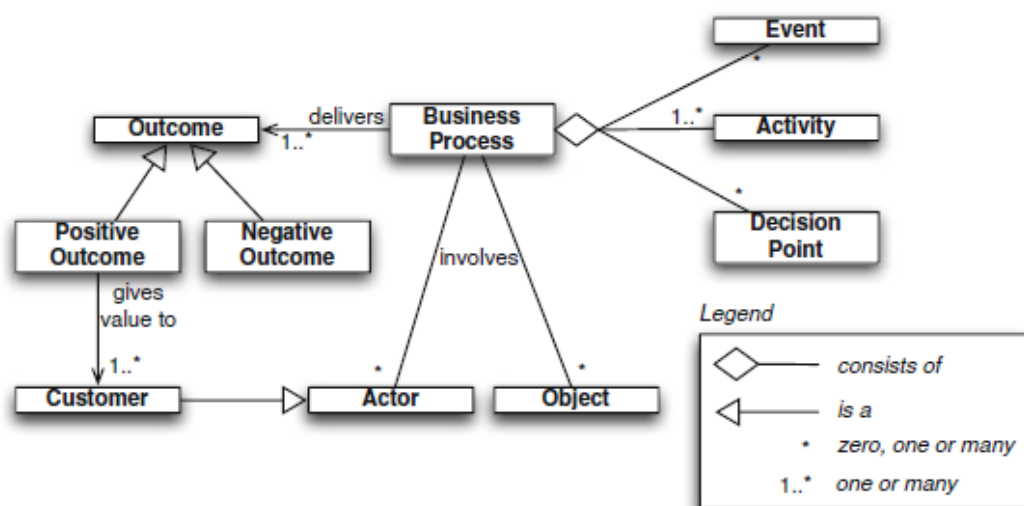


Figure 5. Ingredients of a business process (Dumas et al. 2018)

The execution of a business process ultimately results in one or more outcomes. Ideally, these outcomes should provide value to the actors involved in the process. However, in some cases, the value may not be fully achieved or may not be achieved at all, which is referred to as a negative outcome. Conversely, a positive outcome is one that delivers value to the actors involved in the process. Within a process, the actor who consumes the output is known as the customer. It's important to note that sometimes, there may be multiple customers within a single process. (Dumas et al. 2018)

Smart et al. suggest that a complete and effective BPM framework should not only focus on the practical application of BPM, but also take its conceptual foundations into account (see Figure 6). While much of the existing literature has emphasized the practical aspects of BPM, such as identifying, measuring, and managing processes, as well as implementing process improvement initiatives, it is also important to consider the theoretical underpinnings of BPM. These underpinnings deal with the fundamental nature and scope of BPM, as well as the thinking and decision-making processes that inform the adoption and implementation of BPM in a business context. Therefore, in order to fully embrace BPM, companies must pay attention to both the practical and conceptual components of the framework. (Smart et al. 2008)

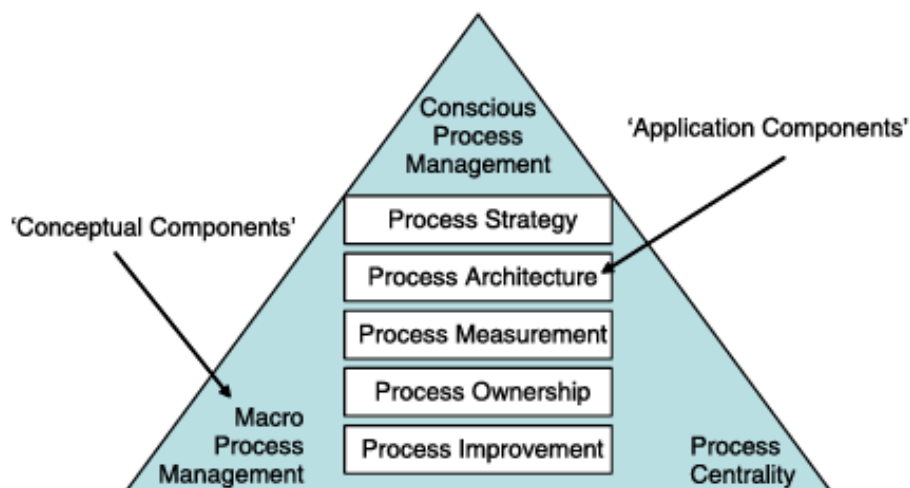


Figure 6. An integrated framework for BPM (Smart et al. 2008)

Improving the effectiveness of organizations using processes can involve different approaches such as transitioning to a process-focused method, introducing a new process, making significant changes to existing processes, or implementing smaller improvements to current processes. Although the implementation of these practices may differ, they all follow some basic steps that are illustrated in Figure 7. (Martinsuo & Blomqvist 2010)

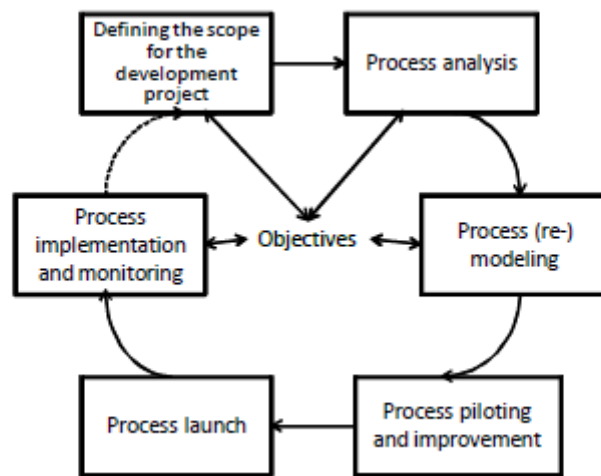


Figure 7. Basic steps in process development (Martinsuo & Blomqvist 2010)

While BPM is an essential discipline for managing and improving the operational performance of organizations, it is not the only approach available. Many other methodologies and techniques, such as Lean, Six Sigma and Total Quality Management (TQM), focus on enhancing organizational performance (Dumas et al. 2018) The field of BPM has been influenced by two main intellectual predecessors which are six sigma and business process reengineering. The first can be traced back to the work of Shewhart and Deming on statistical process control, which played a crucial role in the development of the modern quality movement. This quality movement has evolved over time and is now often associated with the methodology known as Six Sigma. BPM's other primary predecessor was Business Process Reengineering (BPR), which had both strengths and weaknesses that complemented those of the quality approach. (Vom Brocke & Rosemann 2015)

2.3 The six core elements of BPM

Over the past two decades, extensive interdisciplinary research and a wide range of BPM initiatives in businesses of all sizes and industries have led to the development of BPM as a comprehensive management discipline. In order to deploy BPM successfully and sustainably, it is necessary to address several complementary elements. These elements are essential to the holistic approach needed for effective management of business processes. Vom Brocke & Rosemann (2015) have developed a framework that outlines six essential elements for BPM, which provide structure and a way to break down the process (see Figure 8).

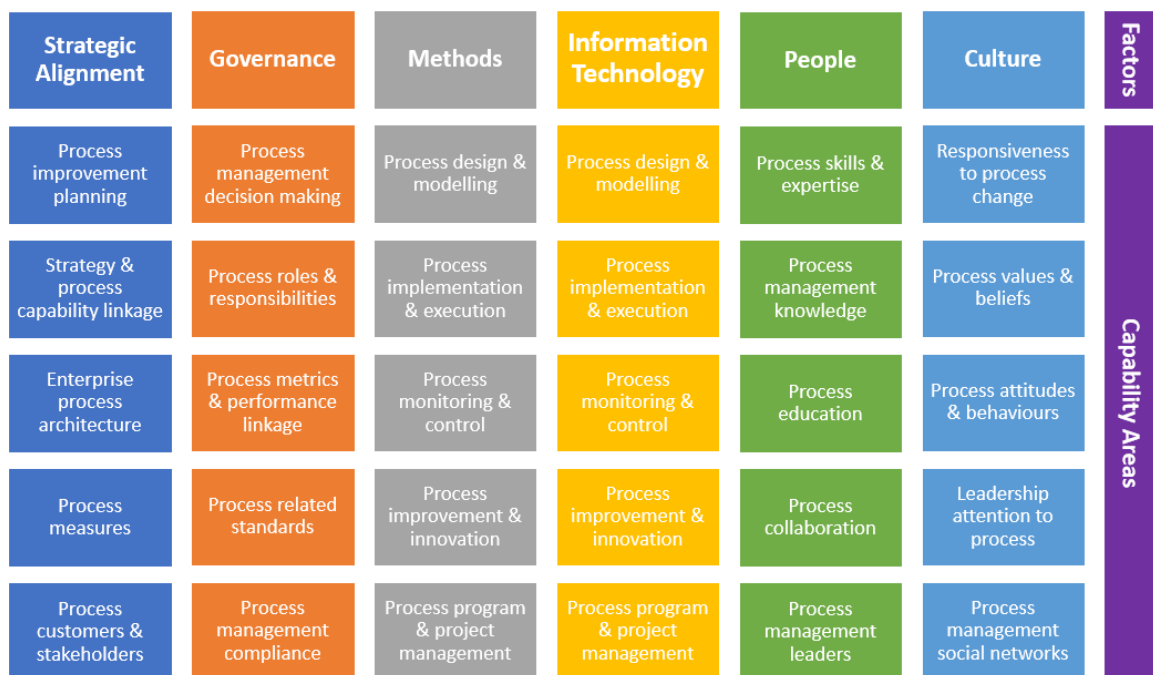


Figure 8. The six core elements of BPM (Vom Brocke & Rosemann 2015)

The six core elements of BPM, according to their framework, are strategic alignment, governance, methods, information technology, people, and culture. These elements are considered fundamental to the successful implementation of BPM and help ensure its effectiveness and efficiency in an organization. (Vom Brocke & Rosemann 2015) It is important to note that the root causes of failure in implementing BPM can be attributed to a

few key factors. These include a lack of alignment with overall strategic goals, a poorly defined or nonexistent governance structure, and a failure to recognize the importance of employees and organizational culture in the success of BPM implementation. (Dumas et al. 2018)

In BPM, strategic alignment refers to the connection between an organization's goals and its business processes, allowing for ongoing improvements in business performance. To assess strategic alignment, five key capability areas have been identified. To ensure that business processes are effective in achieving strategic goals, they need to be intentionally designed, managed, and measured in alignment with those strategic priorities. In doing so, specific process capabilities can offer a competitive advantage, such as faster execution or the ability to adapt processes quickly, and these can inform the overall strategy design, leading to what are known as process-enabled strategies. (Vom Brocke & Rosemann 2015) Dumas et al. (2018) suggest that to effectively execute the strategy, it is important to have clear visibility and understanding of the business processes and how they align with the organization's strategic goals. (Dumas et al. 2018) This means ensuring transparency in the processes and how they contribute to the overall strategic objectives.

BPM governance is responsible for ensuring that there is clear accountability and transparency regarding the roles and responsibilities at different levels of BPM. This includes portfolio, program, project, and operations levels. A key aspect of BPM governance is designing effective decision-making and reward processes to guide actions related to processes. (Vom Brocke & Rosemann 2015) According to Dumas et al. (2018), it is essential for companies to create a governance framework that defines clear lines of accountability, decision-making procedures, and quality control mechanisms.

In the context of BPM, "methods" refer to the various tools and techniques that support consistent activities across all levels of BPM - portfolio, program, project, and operations. (Vom Brocke & Rosemann 2015) Having the right skill set is crucial to the effective implementation of BPM methods and tools. (Dumas et al. 2018) These methods are designed to be applied to specific stages of the process lifecycle, which is unique to the "methods" and "information technology" factors. This has resulted in capability areas that reflect the process lifecycle stages, rather than specific capabilities of BPM methods or technology. One advantage of associating a method capability with a specific process lifecycle stage is that it allows the method to be assessed with regards to a specific purpose. Therefore, the

methods dimension of BPM focuses on the specific needs of each process lifecycle stage and considers elements such as the integration of process lifecycle methods with each other and with other management methods, the support provided by information technology, and the sophistication, suitability, accessibility, and actual usage of methods within each stage. (Vom Brocke & Rosemann 2015)

Information Technology (IT) is a critical aspect of BPM as it encompasses the software, hardware, and information systems that enable and support process activities. The assessment of IT is one of the core elements of BPM and follows a similar structure to the assessment of BPM methods, with a focus on the different stages of the process lifecycle. The IT components that support BPM are evaluated based on the specific needs of each process lifecycle stage, and this includes assessing the customizability, appropriateness of automation, and integration with other complementary IT solutions. To evaluate the IT components, criteria such as the sophistication, suitability, accessibility, and usage of the IT within each stage are also taken into consideration. (Vom Brocke & Rosemann 2015)

In BPM, the factor of "people" encompasses the human resources that are required to support the effective management of processes. This factor includes individuals and groups who possess the skills and knowledge to continually enhance and apply their process and process management skills in order to improve business performance. Unlike the information technology factor, which focuses on IT-related resources, the "people" factor is concerned with the human aspect of process management. This includes the individuals who are responsible for managing and executing processes, as well as those who are involved in the continuous improvement of processes through the application of their skills and knowledge. (Vom Brocke & Rosemann 2015) Dumas et al. (2018) believe that having the right skill set is crucial to the effective implementation of BPM methods and tools. Without the appropriate skills, employees may struggle to understand and utilize these tools to their full potential. This can result in a failure to achieve the desired benefits of BPM. (Dumas et al. 2018)

The final core element of BPM is culture, which encompasses the collective values and beliefs that shape the attitudes and behavior of individuals towards process-related activities. (Vom Brocke & Rosemann 2015) According to Dumas et al. (2018), organizational culture plays a critical role in determining the success of BPM initiatives. The extent to which process participants will adopt new process designs and the level of interest and value that

corporate leaders place on BPM is influenced by the prevailing culture within the organization. A culture that supports and prioritizes process improvement is more likely to result in a successful implementation of BPM, while a culture that is resistant to change may hinder the adoption of new BPM practices. (Dumas et al. 2018) Despite its relevance, culture has been under-researched in the context of BPM for many years. However, there has been significant progress in recent times towards understanding the role of culture in BPM. Specific values have been identified as essential for achieving BPM objectives. These values, known as the CERT values, include customer-orientation, excellence, responsibility, and teamwork. (Vom Brocke & Rosemann 2015)

2.3.1 Strategic alignment

A strategy-driven process improvement plan is a plan that outlines an organization's overall approach towards BPM. This plan should be based on the organization's strategy, and it should explain how process improvement initiatives will help achieve strategically important goals. The process improvement plan should also describe how the BPM initiative is related to other projects, such as implementing an Enterprise System. (Vom Brocke & Rosemann 2015)

When it comes to BPM, aligning your strategy with your business processes is a key factor. This means looking at whether your processes directly support your strategy, and whether your strategy considers the capabilities of your processes. For example, it is important to identify which processes might be affected if you change your strategy, or which ones could slow down the execution of your strategy. You also need to continually review your strategy in light of changes in your process capabilities. Another important consideration is how to allocate resources to different processes, such as which ones are core to your organization and should be done in-house, versus which ones could be outsourced or offshored. (Vom Brocke & Rosemann 2015)

An enterprise process architecture is an overview of the hierarchy of business processes in an organization. It shows the major business processes, the specific value chain for the industry or company, and the supporting processes like finance, human capital management, and IT services. It provides a high-level view of the organization's processes, without replicating its organizational structure. This process architecture is used as a starting point

for more detailed process analyses and models, and it serves as the primary process landscape. (Vom Brocke & Rosemann 2015) Dumas et al. (2018) describe process architecture as systematic and interconnected collection of all the processes that an organization utilizes to accomplish its objectives and goals effectively and efficiently. (Dumas et al. 2018)

To accurately assess process performance, it is important to have a shared understanding of process outputs and key performance indicators (KPIs). A hierarchy of process-oriented and cost-effective KPIs can help translate strategic objectives into specific process goals and enable effective process control. KPIs can take different forms, such as financial, quantitative, qualitative, or time-based data, and they will depend on the strategic drivers for the enterprise process in question. It is important to standardize KPIs across processes and process variants to enable consistent cross-process performance analysis. This can help identify the processes that contribute to a drop in overall customer satisfaction, for example. Additionally, some KPIs related to process characteristics like flexibility, reliability, or compliance can be equally important, but more challenging to measure. (Vom Brocke & Rosemann 2015)

Strategies are often closely tied to individuals and stakeholder groups with significant influence. Therefore, when assessing BPM from a strategic standpoint, it is important to understand the priorities of key customers and other stakeholders, such as senior management, shareholders, and government bodies. This involves investigating how processes that involve external parties are managed, how external perspectives are incorporated into process design, and the degree of influence that external stakeholders have on the process design. Taking these factors into account is crucial when assessing BPM strategically. (Vom Brocke & Rosemann 2015)

2.3.2 Governance

One of the key challenges for BPM governance is ensuring that there are clear and consistent decision-making processes in place that guide actions in both expected and unexpected circumstances. Decisions regarding BPM must be made quickly and efficiently, and there needs to be a clear understanding of who is authorized to make which decisions. Additionally, BPM governance should be able to influence resource allocation and

organizational responses to process changes. To accomplish this, it is important to align BPM governance with other related governance processes, such as IT change management or business continuity management. (Vom Brocke & Rosemann 2015)

A critical aspect of BPM governance is defining the roles and responsibilities of individuals involved in BPM. This includes everyone from business process analysts to process owners, and even potential chief process officers (CPOs). It also encompasses committees and decision-making bodies, such as Process Councils and Process Steering Committees. It is important that each role's specific duties and responsibilities are clearly defined, and that reporting structures are precise and well-defined. This helps ensure that there is a clear understanding of who is responsible for what, and that there is accountability throughout the BPM process. (Vom Brocke & Rosemann 2015)

In order to ensure that process performance is aligned with strategic goals, it is important to establish processes that enable the direct linkage of process outputs with strategic objectives. This involves defining accountabilities and establishing procedures for collecting the necessary metrics and linking them to performance criteria. This aspect of BPM is commonly referred to as BPM governance, and it is responsible for establishing the processes necessary to measure and evaluate process performance against strategic goals. (Vom Brocke & Rosemann 2015)

To ensure effective management of processes within an organization, it is essential to have clearly defined and documented process management standards. This should involve coordinating process management initiatives across the entire organization and establishing guidelines for measuring and managing processes, resolving issues, and determining rewards and compensation structures. To ensure effective BPM governance, it is also important to have process management controls in place, which include regular review cycles to maintain the quality and relevance of process management principles. One key aspect of BPM success is finding the right balance between standardizing these principles while still allowing for flexibility to adapt to unique business needs. Additionally, appropriate compliance management is crucial for effective process management control, as it ensures that processes align with legal and regulatory requirements. (Vom Brocke & Rosemann 2015)

2.3.3 Methods

Process design and modeling involves the methods and techniques used to identify and conceptualize both current (as-is) and future (to-be) business processes. The main focus of these methods is not limited to just process modeling techniques but also involves process analysis methods. Process implementation and execution are the stages of the process lifecycle that follow process design and modeling. During this stage, the methods used help to turn process models into executable business process specifications. The process control and measurement stage is a crucial step in the process lifecycle. It involves using specific methods to collect and consolidate process-related data, including data related to process control such as risks, as well as process performance measures such as time, cost, and quality. (Vom Brocke & Rosemann 2015)

The stage of process improvement and innovation involves methods that aid in the creation of enhanced business processes. It includes various approaches that support activities such as process enhancement, process innovation, process utilization, and process derivation. Process enhancement may involve reordering steps in a process to improve its efficiency, while process innovation could involve using design-led techniques to create new and innovative processes. Better utilization of existing resources like people, data, or systems can also be considered as a method of process improvement, as well as the use of reference models or benchmarking to derive new and improved processes. The assessment component for process project management and program management involves evaluating the methods used to manage BPM across the entire enterprise, as well as for specific BPM projects. This includes assessing the tools and techniques used for project planning, execution, and control, as well as the approaches used to manage project portfolios and programs. Effective project and program management is critical for ensuring the success of BPM initiatives, and this assessment component helps to identify strengths and weaknesses in these areas. (Vom Brocke & Rosemann 2015)

2.3.4 Information technology

IT solutions for process design and modeling refer to the technology and software that assist in the creation and analysis of business process models. These solutions include process

mining, which involves the automated derivation of process models from log files, as well as tools for business process modeling and analysis, such as process animation and simulation. These solutions are designed to support and enhance the efficiency and accuracy of the process design and modeling stage of the BPM lifecycle. IT-enabled process implementation and execution refers to the software and technologies that automate the process of turning process models into executable specifications and allow for the workflow-based execution of these processes. This includes solutions such as business rules engines and case management systems that enable process automation. This category of software is often referred to as process-aware information systems (PAIS). The latest advancements in information processing capabilities of PAIS, such as in-memory-databases, enable new principles of process design such as context-aware and real-time process management. (Vom Brocke & Rosemann 2015)

Solutions for process control and measurement aim to automate the management of process escalation, exception handling, and provide visualizations of process performance through dashboards. Such solutions also offer process controlling capabilities. On the other hand, tools for process improvement and innovation aim to provide automated support for generating improved business processes. Some of these solutions could provide agile and self-learning tools that can continuously adjust business processes based on contextual changes. Process project management and program management tools aim to help manage different types of BPM initiatives. These tools provide decision support systems for process owners and facilitate overall management of BPM projects. (Vom Brocke & Rosemann 2015)

2.3.5 People

Process skills and expertise refer to the proficiency and knowledge of individuals and groups involved in a process, considering the specific demands of that process. This skillset is crucial for process owners and all stakeholders involved in process management and operations. In addition to technical and methodological competencies, effective communication and social skills are essential for successful BPM professionals. Having a comprehensive and deep understanding of a process and its related components, as well as

the ability to continuously develop and improve these capabilities, is critical to achieving process excellence. (Vom Brocke & Rosemann 2015)

The capability area of process management knowledge refers to the level of understanding and expertise of BPM principles and practices. It involves both explicit and tacit knowledge about process management methods and the impact of information technology on business process outcomes. The assessment of this area considers the depth of knowledge and the ability to apply it in a variety of contexts, with a specific focus on business process analysts. (Vom Brocke & Rosemann 2015)

The process education and learning capability area evaluates the organization's dedication to continuously developing and maintaining process-related skills and knowledge. This includes assessing the existence, appropriateness, scope, and actual success of BPM education programs, as well as the qualifications of BPM educators and certification programs. This capability area focuses on the ongoing learning and development of stakeholders involved in the management and operations of business processes. It measures the organization's commitment to creating a culture of continuous learning and improvement in the field of BPM. (Vom Brocke & Rosemann 2015)

Process collaboration and communication capability area refers to how different individuals and teams collaborate and communicate to achieve desired process outcomes. It involves evaluating the communication patterns among stakeholders, as well as how process-related knowledge is discovered, explored, and shared. The last "people" capability area focuses on process management leaders. This assesses their willingness to lead and take responsibility for business processes and be accountable for their outcomes. This capability area also evaluates the degree to which process leadership skills and management styles are practiced by the leaders. In essence, it captures the overall leadership capability of individuals in charge of managing and overseeing business processes. (Vom Brocke & Rosemann 2015)

2.3.6 Culture

The capability area of responsiveness to process change focuses on the organization's readiness to embrace and adapt to process change. It involves examining the organization's willingness to accept change, and its ability to make changes that cross functional boundaries

and align with process goals. The process values and beliefs capability area evaluates the overall mindset and culture surrounding BPM within the organization. This includes the shared beliefs and values of the key stakeholders involved in BPM, and their ongoing commitment to the principles and practices of BPM. Longevity is a key aspect of this capability area, as it reflects the sustained dedication and investment in BPM over time. (Vom Brocke & Rosemann 2015)

The "culture" factor includes the assessment of process attitudes and behavior of those involved in and affected by BPM. This encompasses a willingness to question existing BPM practices and a commitment to making process improvements. It also evaluates actual process-related behavior such as adherence to process design and prioritization of resources. The leadership attention to process management evaluates the level of commitment and attention to processes shown by senior executives, the degree of attention paid to process on all levels, and the quality of process leadership. The assessment of process management social networks includes the existence and influence of BPM communities of practice, the usage of social network techniques, and the recognition and use of informal BPM networks. (Vom Brocke & Rosemann 2015)

2.4 The BPM Lifecycle

There are a wide range of approaches to improving the performance of organizations through processes. (Martinsuo & Blomqvist 2010) Often, the first question a team beginning on a BPM program must answer is, "Which business processes do we intend to enhance?" Before the notion of using BPM is ever considered, it is likely that the team is already aware of the operational difficulties it must address and the business processes that are causing those operational problems. Depending on how much process thinking has occurred in the company earlier, these questions may be easy or difficult to answer. If the organization has previously engaged in BPM activities, it is likely that a catalog of business processes is accessible and that their scope has been specified, at least to some extent. (Dumas et al. 2018) Regardless of whether the implementation strategies involve adopting a process-oriented approach, introducing a new business process, redesigning an existing process, or implementing various process improvements, the shared fundamental processes can be identified. (Martinsuo & Blomqvist 2010)

Many authors such as Dumas et al. (2018), Weske (2019), Martinsuo & Blomqvist (2010) use the circular model to describe the BPM lifecycle. According to Weske, the BPM lifecycle includes several interconnected phases. The phases are structured in a cyclical manner, illustrating their logical interdependencies. These dependencies do not imply that the phases must be conducted in a specific chronological order. During each of these phases, several design and development activities are done, and it is relatively uncommon for incremental and evolutionary techniques to involve concurrent activity in multiple phases. (Weske 2019) According to Hammer, "every good process eventually becomes a bad process" if it is not regularly altered and enhanced to keep up with the ever-changing world of customer needs, technology, and competition. The BPM lifecycle should therefore be viewed as circular. (Dumas et al. 2018)

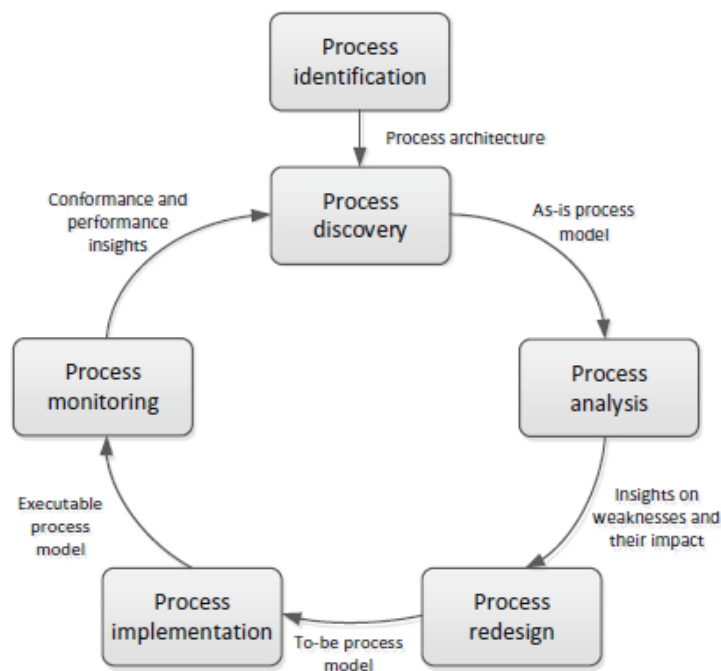


Figure 9. The BPM lifecycle (Dumas et al. 2018)

The figure above depicts Dumas' BPM lifecycle which includes process identification, discovery, analysis, redesign, implementation and monitoring phases (see Figure 9). In the following subsections, these Dumas' BPM lifecycle phases will be introduced individually.

2.4.1 Process identification

When organizations first begin to engage in BPM, the BPM team must first identify the specific processes that are relevant to the problem they are trying to solve. This involves narrowing down the scope of the processes and identifying any relationships between them. This initial phase is known as process identification, which ultimately leads to the creation of a process architecture that encompasses the interconnected processes that drive an organization's work towards achieving its goals. The ultimate aim of engaging in BPM is to ensure that the processes being analyzed lead to consistent positive outcomes and maximum value for the organization's clients. To achieve this, it is important to measure the value delivered by each process, and this is done by defining process performance metrics related to cost, time, quality, and flexibility. Only then can an organization analyze its processes in detail and determine whether they are operating at optimal levels or need improvements. (Dumas et al. 2018)

Cost-related measures are a common type of performance measure used in BPM. This includes metrics such as the cost of materials or labor required to carry out a process. Time-related measures are also frequently used in BPM. This includes metrics such as cycle time (the time it takes to complete a process from start to finish), lead time (the time it takes to fulfill a customer order), or throughput (the rate at which a process can produce outputs). Quality-related measures, specifically error rates, are also important in BPM. This measure helps to identify the percentage of times that an execution of the process ends up in a negative outcome. Finally, flexibility measures capture the ability of a process to adapt and maintain its performance even under changing or abnormal conditions. The identification of performance measures and their associated performance objectives is a crucial step in any BPM initiative. It is typically part of the process identification phase, although in some cases, it may be deferred to later stages. (Dumas et al. 2018)

By defining and measuring these performance metrics, an organization can determine how well its processes are performing, identify areas for improvement, and ultimately optimize its operations for maximum efficiency and effectiveness.

2.4.2 Process discovery

After identifying the relevant processes and performance measures, the next step for a BPM team is to gain a detailed understanding of the business process. This phase is known as process discovery. One of the key outputs of this phase is an as-is process model, which reflects the current understanding of how work is done within the organization. Process models are important for facilitating communication between stakeholders involved in the BPM initiative. To ensure that they are easy to understand, diagrams are often used to model business processes. This makes it easier to comprehend the process, and if the diagrams are made using a modeling language that is understood by all stakeholders, there is less room for misunderstanding. However, it is worth noting that these diagrams may still be accompanied by textual descriptions. In fact, it is common for analysts to document a process using a combination of diagrams and text. (Dumas et al. 2018)

Ultimately, the goal of the process discovery phase is to gain a comprehensive understanding of the business process, as this is the foundation for any further analysis or improvement. By using process models, BPM teams can visualize and communicate the current state of the process, which is essential for identifying areas of inefficiency or waste and implementing targeted improvements.

2.4.3 Process analysis

After gaining a detailed understanding of the as-is process, the next step in the BPM initiative is to identify and analyze any issues within the process. This assessment typically involves measuring the current state of the process with respect to specific performance measures. Once issues have been identified and analyzed, the next phase is to explore potential remedies. This involves considering multiple options for addressing a problem, while also keeping in mind that changing a process can be difficult. People are often resistant to changes in their work processes, and modifying the information systems that support the process can be costly and may require changes in other organizations, such as suppliers. Additionally, changing one aspect of a process to address an issue may have unintended consequences and potentially cause new problems down the road. (Dumas et al. 2018)

Therefore, it is important for the BPM team to carefully evaluate all potential solutions and choose the one that has the greatest potential to improve the process while minimizing the risk of negative side effects.

2.4.4 Process redesign

After analyzing the issues in a process and exploring potential remedies, the BPM team can propose a redesigned version of the process. This redesigned process, known as the to-be process design, is the primary output of the process redesign phase. (Dumas et al. 2018) The aim of process design is to make sure that the process performance is appropriate and adequate for the process objectives (Slack 2022). Table 2 illustrates how the goals and targets of an organization's overall strategy can influence the objectives and outcomes of its process design and performance.

It is important to note that the analysis and redesign processes are closely connected, and there may be multiple options for redesigning the process. Each option needs to be thoroughly analyzed so that the team can make an informed decision on which option is the most appropriate. (Dumas et al. 2018) In this way, the team can ensure that the new process design addresses the identified issues and meets the organization's performance objectives.

Determining the appropriate level of standardization is one of the most important goals of process design, particularly in larger organizations. Standardization refers to the implementation of a consistent set of activities, procedures, and tools across processes. Various methods to similar or identical tasks may develop over time in larger organizations, leading to inconsistency and inefficiency. Allowing for a variety of methods may provide individuals and teams with autonomy and flexibility, but it ultimately leads to confusion and misunderstanding. Standardization is therefore essential for ensuring efficiency and minimizing potential errors or discrepancies in the process design. (Slack 2022)

Table 2. The impact of strategic performance objectives on process design objectives and performance (adjusted from Slack 2022)

Operations performance objective	Typical process design objectives	Some benefits of good process design
Quality	<ul style="list-style-type: none"> • Provide appropriate resources, capable of achieving the specification of products or services • Error-free processing 	<ul style="list-style-type: none"> • Products and services produced ‘on-specification’ • Less recycling and wasted effort within the process
Speed	<ul style="list-style-type: none"> • Minimum throughput time • Output rate appropriate for demand 	<ul style="list-style-type: none"> • Short customer waiting time • Low in-process inventory
Dependability	<ul style="list-style-type: none"> • Provide dependable process resources • Reliable process output timing and volume 	<ul style="list-style-type: none"> • On-time deliveries of products and services • Less disruption, confusion and rescheduling within the process
Flexibility	<ul style="list-style-type: none"> • Provide resources with an appropriate range of capabilities • Change easily between processing states (what, how, or how much is being processed?) 	<ul style="list-style-type: none"> • Ability to process a wide range of products and services • Low cost/fast product and service change • Low cost/fast volume and timing changes • Ability to cope with unexpected events (e.g. a supply or processing failure)
Cost	<ul style="list-style-type: none"> • Appropriate capacity to meet demand • Eliminate process waste in terms of: Excess capacity Excess process capability In-process delays In-process errors Inappropriate process inputs 	<ul style="list-style-type: none"> • Low processing costs • Low resource costs (capital costs) • Low delay/inventory costs (working capital costs)
Sustainability	<ul style="list-style-type: none"> • Minimise energy usage • Reduce local impact on community • Produce for easy disassembly 	<ul style="list-style-type: none"> • Lower negative environmental and societal impact

2.4.5 Process implementation

The process implementation phase involves two key aspects: organizational change management and process automation. Organizational change management involves a series of activities to change the way people work within the process. (Dumas et al. 2018)

This includes:

- Communication and explanation of the changes to process participants so they understand what is changing and why.
- Development of a change management plan to ensure a smooth transition.
- Training for users to ensure they are prepared to adopt the new process.

Additionally, monitoring is required to identify and address any issues that arise during the transition. Process automation refers to the technical changes required to implement the redesigned process, which may include changes to IT systems, processes and procedures. Both aspects are critical to ensure successful implementation of the redesigned process. (Dumas et al. 2018)

2.4.6 Process monitoring

After a business process has been implemented, it is important to monitor and evaluate its performance to ensure it meets expectations. This is known as the process monitoring phase. Through process monitoring, analysts can collect data on the process performance and identify any necessary adjustments or improvements. Without continuous monitoring and improvement, the process is likely to degrade over time. As noted by Hammer, a well-designed process will eventually become a bad process if it is not continuously adapted and improved to keep up with changes in customer needs, technology, and competition. Therefore, the process monitoring phase is critical to the success of any BPM initiative. (Dumas et al. 2018)

3 Business Process Modeling

Business process modeling is a crucial aspect of BPM and it is performed for a variety of BPM-related reasons at different stages of the BPM lifecycle. (Beckmann 2011; Dumas et al. 2018) There is no business process management in practice without the process modelling. It must be noted though, that the process modelling itself is not goal – it is a way to model operational activities in order to understand, analyse and improve them. (Laamanen 2001) Prior to beginning the modelling process, it is crucial to have a clear understanding of the reason for creating the process models. The appearance of the models produced will vary depending on their intended purpose. Process modeling serves various purposes, such as gaining a comprehensive understanding of the process and sharing that understanding with those who regularly participate in it. As process participants typically perform specialized activities, they may not have a full understanding of the process's complexity. (Dumas et al. 2018) Hence, process models help identify and prevent issues and offer a better understanding of the process. This step towards a thorough understanding of business processes is a prerequisite for process analysis, redesign, or automation.

Table 3. Overview of seven process modeling guidelines (Mendling et al. 2009)

G1	Use as few elements in the model as possible
G2	Minimize the routing paths per element
G3	Use one start and one end event
G4	Model as structured as possible
G5	Avoid OR routing elements
G6	Use verb-object activity labels
G7	Decompose a model with more than 50 elements

Mendling et al. (2009) have conducted a thorough analysis of previous research exploring the connections between model structure, error probability, and understanding. Based on this analysis, they have developed a series of seven process modeling guidelines (7PMG) that

draw from solid empirical evidence while still being practical and accessible for practitioners. These guidelines are illustrated and summarized in Table 3.

1. To maximize model understandability and minimize the likelihood of errors, it is recommended to use as few elements in the model as possible (Mendling et al. 2009). Research has shown that larger models tend to be more difficult to understand (Mendling et al. 2007a) and have a higher probability of errors than smaller models (Mendling et al. 2008; Mendling et al. 2007b). Therefore, it is advisable to keep the model as simple as possible by only including the necessary elements (Mendling et al. 2009).
2. To improve model understandability, it is recommended to minimize the number of routing paths per element in the process model (Mendling et al. 2009). Research has found that as the degree of an element in the model increases (i.e. the number of input and output arcs), the model becomes more difficult to comprehend. (Mendling et al. 2007a) Studies have also shown a strong connection between the number of modeling errors and the average or maximum degree of elements in the model. (Mendling et al. 2007b) Therefore, it is advisable to keep the routing paths per element as low as possible in order to enhance the model's overall comprehensibility and minimize the likelihood of errors. (Mendling et al. 2009)
3. To reduce the likelihood of errors in workflow design, it is recommended to use only one start and one end event. This is because having multiple start and end events has been found to increase the probability of errors. (Mendling et al. 2007b) Additionally, most workflow engines require a single start and end node, and models that meet this requirement are generally easier to comprehend and analyze. (van der Aalst et al. 2003) Therefore, using a single start and end event in workflow design is a best practice that can improve overall workflow quality and reduce the risk of errors. (Mendling et al. 2009)
4. In order to optimize the quality and comprehensibility of a process model, it is recommended to structure the model as much as possible. A structured process model is one in which each split connector is matched with a corresponding join connector of the same type. This kind of structured model can be thought of as having balanced brackets, in that every opening bracket has a corresponding closing bracket of the

same type. (Mendling et al. 2009) On the other hand, unstructured models are more prone to errors (Mendling et al. 2007b) and are generally more difficult for people to understand (Mendling et al. 2007a). Therefore, structuring a process model is an important best practice for improving its accuracy and comprehensibility. (Mendling et al. 2009)

5. It is recommended to avoid using OR routing elements in process models as much as possible. (Mendling et al. 2009) Models that exclusively use AND and XOR connectors tend to have fewer errors than those that include OR connectors. (Mendling et al. 2007b) Additionally, there are certain ambiguities in the semantics of the OR-join, which can create implementation problems and paradoxes. (Kindler 2006) Therefore, minimizing the use of OR routing elements in process models is an important best practice for reducing errors and improving overall model accuracy. (Mendling et al. 2009)
6. When labeling activities in process models, it is recommended to use a verb-object style (Mendling et al. 2009). This labeling style has been found to be significantly less ambiguous and more useful than other labeling styles, such as action-noun labels or labels that do not follow either style (Mendling et al. 2010). This preference for verb-object activity labels has been demonstrated through a wide exploration of labeling styles used in actual process models, which revealed that two popular styles exist, as well as a rest category (Recker et al. 2006). Therefore, using a verb-object style for activity labeling is an important best practice for creating clear and useful process models (Mendling et al. 2009).
7. In order to minimize errors in process modeling, it is recommended to break down models that contain more than 50 elements into smaller components (Mendling et al. 2009). This is based on research showing a positive correlation between the size of a model and its likelihood of containing errors, with models exceeding 50 elements having a greater than 50% chance of including errors (Mendling et al. 2007b). As a best practice, it is advised to replace large sub-components with a single entry and exit point by consolidating them into a separate model and referencing that model from the main one (Vanhatalo et al. 2009). By following this guideline, it is possible to reduce the likelihood of errors in larger process models and improve overall model accuracy and usability (Mendling et al. 2009).

One limitation of the 7PMG guidelines that should be noted is that they only pertain to the organization and representation of a process model, rather than its actual content. In other words, while 7PMG offers valuable insights into the structure of a process model, it does not address specific details related to the modeling technique, such as the notation or language used to create the model, or the modeling tool, such as the software package utilized to support the use of a particular modeling notation. These additional factors are closely related to the use of the 7PMG guidelines, but are not directly addressed by them. (Mendling et al. 2009) As such, they should be considered in conjunction with 7PMG in order to create accurate and effective process models.

Since at least the 1970s, process modeling has been utilized in the domains of IT and organizational development. Several techniques, such as Structured Analysis, Business Process Reengineering, and Workflow Management have led to varying levels of interest in this subject. With the broad adoption of BPM in recent years, process modeling has grown even more prevalent, but with an emphasis on a restricted number of modeling methodologies. Historically, processes have been seen as functions or transformations, with the input-process-output (IPO) model serving as the foundation for early process modeling languages. When process modeling has been combined with other types of conceptual modeling, however, other versions of this method have emerged. (Glykas 2013) It is important to note that the very existence of a model requires the existence of a corresponding concept for that model (Robinson et al. 2015, 2818).

3.1 Process architecture

Process architecture, which is also referred to as process hierarchy, is an essential concept for any company looking to describe their processes. To ensure consistency and comparability across different processes, it is crucial for the company to establish a clear process architecture and standardize the methods used for process description. By doing so, the descriptions can effectively convey the relevant information at the appropriate level of detail. (Lecklin 2006)

In order to establish a process architecture and identify critical processes, it is important to first identify the primary business customers and understand the chain of interactions between the customers, the company, and the suppliers. Figure 10 illustrates an example of

enterprise's core process architecture. Companies should also analyze their current operating environment and their participation in the broader value chains to identify relevant processes. This is important because the company operates within a larger ecosystem, and understanding its position within that ecosystem is crucial to identifying relevant processes. Furthermore, they suggest that when developing individual processes, it is crucial to consider how they fit into the larger process architecture. Therefore, the position of a process within the broader structure should be the starting point for its development. (Martinsuo & Blomqvist 2010)

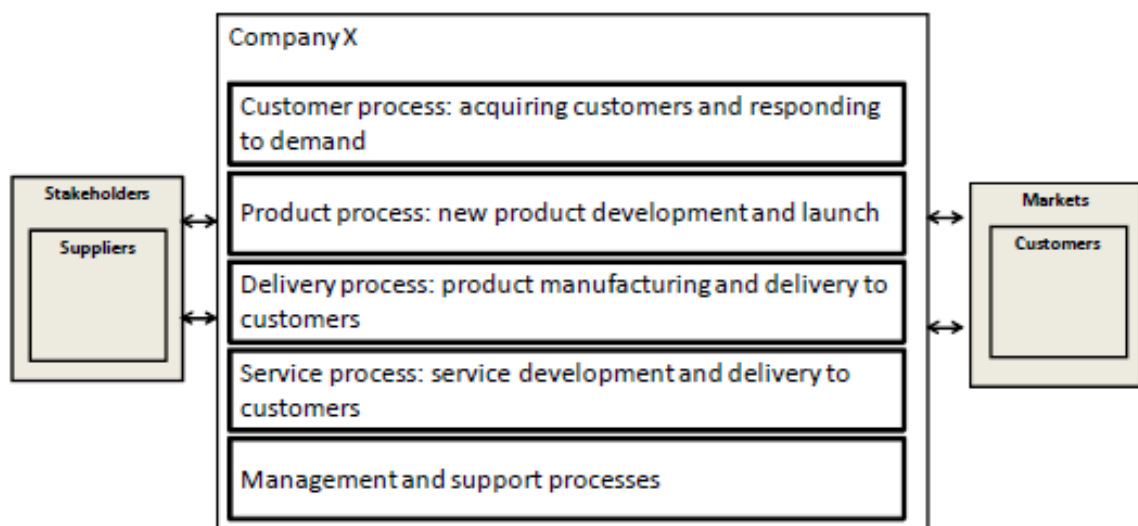


Figure 10. An example of enterprise's core process architecture (Martinsuo & Blomqvist 2010)

Smith & Fingar (2007) argue that process classification is a crucial aspect of managing business processes effectively. There are several ways to categorize processes, including process types, functional categories, and value chain stages. Process types refer to the nature of the process, such as structured or unstructured, or workflow-like or event-driven. Functional categories group processes according to their business function, such as marketing, sales, or logistics. Value chain stages distinguish between processes that are part of the different stages of the value chain, including inbound logistics, operations, outbound logistics, marketing and sales, and service. The selection of classification criteria depends

on the specific needs of the organization and the purpose of the process analysis. (Smith & Fingar 2007) The success of a company relies on the efficiency and effectiveness of its core processes. If a company's key operations are competitive, the company as a whole will be competitive. (Gošnik 2009)

The defining features of core processes align with the core capabilities of a company, which include the following:

1. The core processes should offer clear benefits to customers.
2. The core processes should be challenging for competitors to replicate.
3. The core processes should be indispensable and cannot be replaced by alternative solutions. (Gošnik 2009; Dumas et al. 2018)

Laamanen (2001) believes that it is crucial to include the word "customer" in the process to avoid sending a message that the customer is not important. By excluding the customer from the process, it suggests that the organization does not prioritize the needs of the customer. (Laamanen 2001) Martinsuo & Blomqvist (2010) share the view that the core processes are directly related to creating value for the customer (which can be internal or external), while the support processes enable the core processes to function efficiently. They add that it is possible to break down the main processes into several sub-processes, which can be arranged hierarchically across multiple levels. (Martinsuo & Blomqvist 2010) Often, a multi-level approach involving two, three, or even four levels is required for a comprehensive analysis of a process. (Rummler & Brache 2012) This hierarchical structure allows organizations to gain a more nuanced understanding of their processes and their interrelationships as well as identify improvement opportunities.

Identifying the entirety of a company's customer chains and value chains can aid in pinpointing the processes that are essential and provide the most value to customers. To understand the direct customers and how they connect to the extended value chain, it is necessary to analyze these core processes in depth. (Martinsuo & Blomqvist 2010) Figure 11 illustrates a typical business value chain. It is also essential to comprehend the added value that each core process creates for customers and how that value is created. Determining the required resources and support for each core process is essential for ensuring that they are effective and deliver customer value. (Martinsuo & Blomqvist 2010)

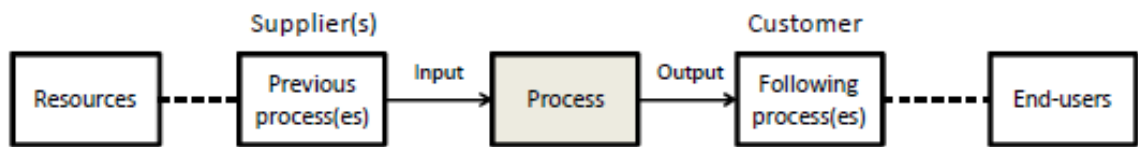


Figure 11. A typical business value chain. (Martinsuo & Blomqvist 2010)

When creating a process architecture, it is essential to consider the names of the processes. Output-based and task-based naming conventions are the two most common. It is essential that all process titles in a process map adhere to the same naming logic and clearly describe each process's primary objectives. (Martinsuo & Blomqvist 2010)

3.2 Process documentation and description requirements

Usability is a key aspect of process documentation quality. Although understanding the process is essential to any process analysis, the process model itself should be straightforward and simple to understand. Large process documentation initiatives mainly rely on inexperienced and non-expert modelers, making it crucial to provide enough advice. To grasp the impact of a difficult-to-evaluate model, it must be understood that dozens, hundreds, or even thousands of process models may be created throughout the execution of a single project. This shows why a process model that can be utilized immediately for its intended purpose is of considerable economic value. (Mendling et al. 2009)

According to Martinsuo & Blomqvist, there are numerous ways to create detailed descriptions of a process, and there is no one universally accepted approach that is considered the best or standard practice. Different methods of process description can provide unique perspectives and varying levels of detail. (Martinsuo & Blomqvist 2010) However, Laamanen suggests that when documenting business processes, it is important to consider the following questions:

- What requirements should be established to ensure that process descriptions are of high quality?

- What information needs to be included in the process descriptions in order for people to understand how the organization operates?
- Why is it important to have this understanding of the organization's operations?
- What is the purpose of communicating the process descriptions, and what message do we want to convey?

A proper process description, according to Laamanen, should include the essential aspects of the process as well as their interdependencies. It should also assist stakeholders in comprehending the entire process and their individual roles in accomplishing its objectives. In addition, a proper process description should foster collaboration among process participants and provide adaptability to changing circumstances or requirements. (Laamanen 2001) In summary, Laamanen (2001) emphasizes the importance of creating high-quality process descriptions that provide a clear understanding of the organization's operations and serve a specific purpose in communicating important information to stakeholders. Essentially, a good process description should be comprehensive, clear, and adaptable, supporting effective communication and collaboration among stakeholders. According to Martinsuo & Blomqvist (2010), a general description of a process should identify the key phases and decision points, describe the activities and decisions at a high level, and identify the inputs, outputs, interfaces, resources, and support required for each activity, including any necessary systems.

3.3 Business process modeling techniques

There are a variety of methods for modeling business processes (Aguilar-Savén 2004). The nature and purpose of a process to be modeled can influence the modeling technique and level of detail required (Martinsuo & Blomqvist 2010). Choosing the appropriate process modeling technique and tool for a given analysis requires careful consideration of the analysis's objective and familiarity with the available modeling options (Aguilar-Savén 2004). Even for modeling fundamental processes, multiple modeling techniques are beneficial for attaining distinct objectives (Glykas 2013).

3.3.1 Process mapping

Process mapping is a technique for describing business processes in terms of the interrelationships between their various activities that add value to a process, as well as the people, information and material flows associated with those activities. (Slack 2022; Martinsuo & Blomqvist 2010) The first step is to determine the beginning and end of the entire process, as well as the inputs and outputs, and to ensure that they are tightly linked to the customers' needs. This ensures that the process is centered on providing value to the customer. When documenting the as-is processes, it is ideal to concentrate on value-adding activities, information flows, and material flows as they occur. However, it may be more effective to describe the to-be processes by beginning at the end and working backwards. (Martinsuo & Blomqvist 2010)










Symbol	Meaning
	Start or finish
	Activity or process
	Material or information flow (can be shown with different line colors/styles)
	Decision point
	Document
	Information system/data storage
	Inventory
	Data
	Delay

Figure 12. The standard symbols that are commonly used in flowcharts and process flow diagrams (Martinsuo & Blomqvist 2010)

To facilitate this procedure, various types of activities are classified using process modeling symbols. These symbols can be arranged sequentially or in parallel to depict the order and

relationships between the various process activities. (Slack et al. 2022) The standard symbols that are commonly used in flowcharts and process flow diagrams are presented in Figure 12.

When creating a map of the as-is process, it is important to recognize that not all aspects of the process may meet the desired standards, and the description may be unclear and disorganized. However, documenting the current process can help create a more structured approach to work. The main purpose of process modeling is to identify areas that need improvement, and therefore it is important to keep the as-is and desired to-be models separate. A process review, which involves gathering the people involved in the process and prioritizing areas for improvement, is a useful tool for identifying the needs for process development. To effectively describe to-be process, it is important to ensure that the process model is straightforward and achievable. A review of the to-be process should be conducted to confirm that it aligns with best practices and achieves its intended goals. This review should also verify that all activities within the to-be process add value for the customer, resources are allocated appropriately for each activity, and any necessary information and materials are accounted for. Any activities, resources, or systems that do not contribute to customer value should be removed from the to-be process. (Martinsuo & Blomqvist 2010)

When dealing with large and complex processes, it can be difficult to create detailed process maps. Consequently, it is common to begin by mapping the process at a higher, more aggregated level, a method known as high-level process mapping. This involves portraying the process as a straightforward input-transformation-output model, ignoring the specifics of how inputs are turned into outputs. (Slack et al. 2022) It is important to note that processes that involve high levels of uncertainty may not be able to be modeled in great detail, whereas those that are critical for safety or security reasons must be modeled in great detail. Therefore, it is important to identify the necessary content and level of detail required for process modeling before beginning the modeling process. This will ensure that the resulting model accurately represents the process being modeled and meets the specific needs of the organization. (Martinsuo & Blomqvist 2010)

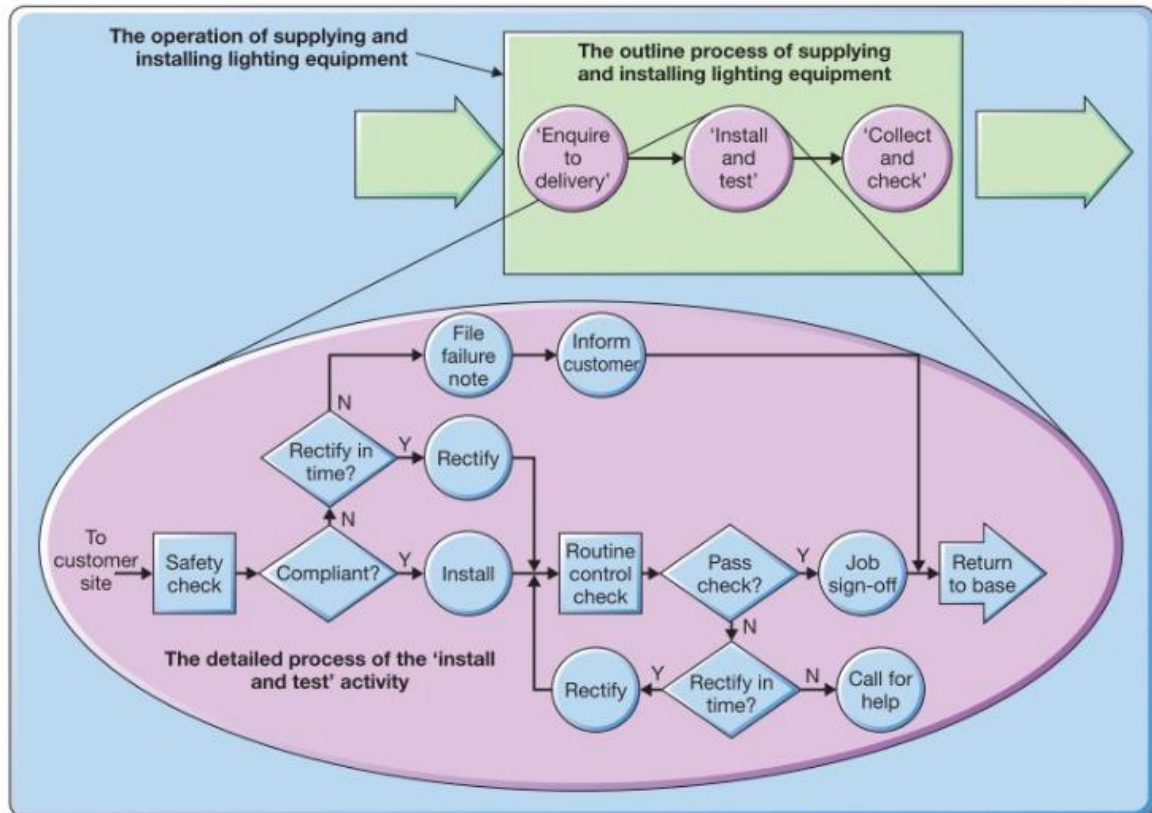


Figure 13. Example process mapped at three levels (Slack et al. 2022)

Slightly more detailed level of process mapping can then be used to identify the sequence of activities (see Figure 13). Finally, a detailed process map is created that includes all process-related activities. In some instances, a micro-detailed process map may also be created to specify each and every activity's motion. (Slack et al. 2022) Overall, the level of detail included in a process map will depend on the complexity of the process being mapped and the purpose of the map itself. Mapping processes at different levels of detail can help to identify inefficiencies and areas for improvement, and ultimately lead to more effective and efficient processes.

3.3.2 Business process flowchart and diagram technique

According to Lakin, Capon & Botten (1996), a formal visual representation of a sequence of program logic, work process, manufacturing process, organizational hierarchy, or any other structured process is known as a flowchart which is illustrated in Figure 14.

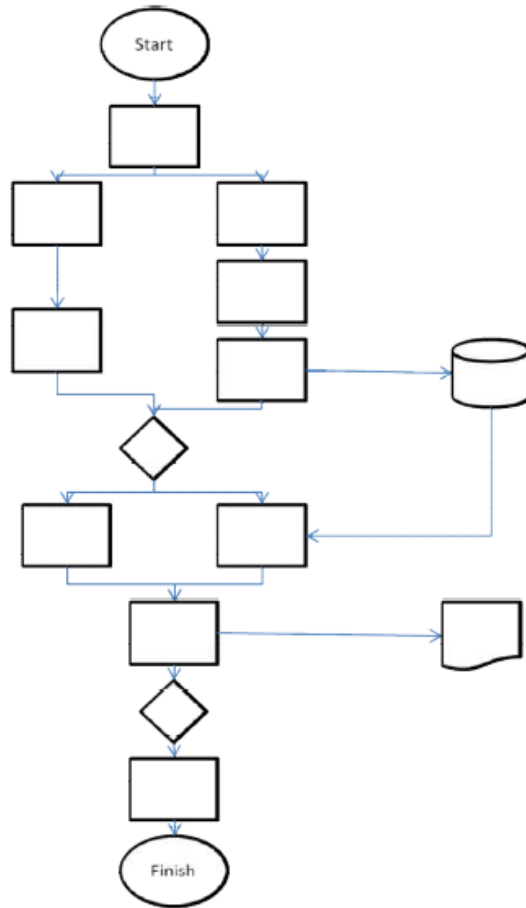


Figure 14. Example of a process flowchart (Martinsuo & Blomqvist 2010)

A flowchart is a visual representation that utilizes symbols to depict operations, data, equipment, and the flow direction involved in defining, analyzing, or solving a problem. The flowchart modeling technique employs sequential flow of actions and represents processes using flowcharts. This method does not support the breakdown of activities. The flowchart model is considered one of the earliest process notations and has been utilized for several years, though its exact origin date is unknown. (Aguilar-Savén 2004)

The key feature of flowcharts is their adaptable nature, as a process can be depicted in various forms. The standard provides only the notation, leaving it up to the chart's creator to determine how to combine the various building blocks. When examining a flowchart representation, it is straightforward to identify the processes it illustrates. The standard's

primary advantage is its ability to facilitate communication. The flowchart model is highly user-friendly and does not require a significant amount of time to create a process sketch. (Aguilar-Savén 2004) Figure 15 illustrates a process flow diagram, which is a bit different from process flowchart.

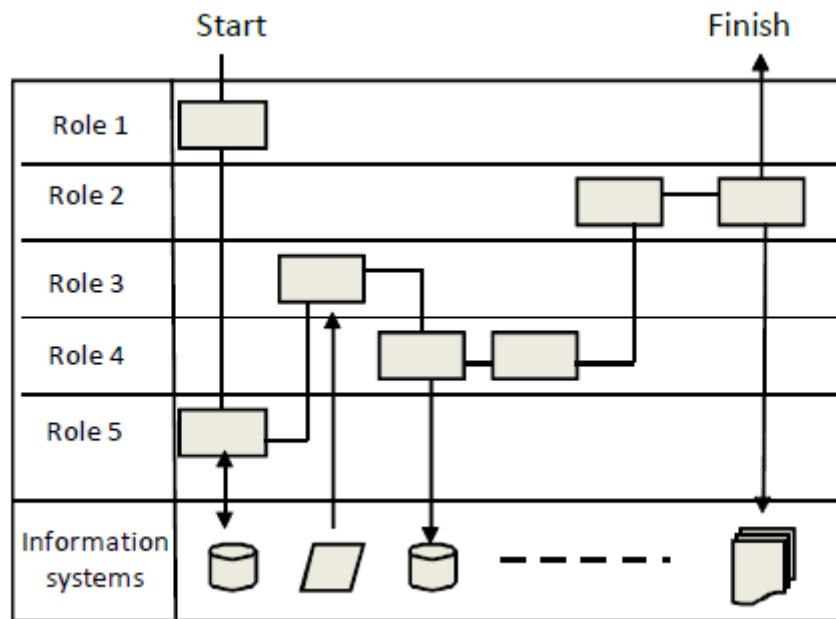


Figure 15. Example of process flow diagram containing roles and IT-systems (Martinsuo & Blomqvist 2010)

One of the limitations of the flowchart standard is its excessive flexibility, which can result in an unclear boundary for the process being modeled. Flowcharts tend to become quite extensive, even at the evaluation stage. Additionally, the lack of differentiation between main and sub-activities can make the chart difficult to read. Since there are no sub-layers, navigating the chart and locating specific information can be challenging. While following the sequence of events may be straightforward, there is a significant risk of getting lost in the chart due to its complexity. (Aguilar-Savén 2004)

In summary, the flowchart technique is most effective when used to manage highly detailed processes but may not be well-suited for providing an overall view. The chart may lack a natural method of describing the performers or responsibilities involved, which can make it

challenging to connect organizational functions, or departments, to activities. (Aguilar-Savén 2004) However, Martinsuo & Blomqvist (2010) introduced process flow diagram which contains the roles and IT systems.

3.4 Business process modeling tools and languages

Several IT applications have been created to help create process diagrams, including tools for visualization such as flowcharts and process flow diagrams. (Martinsuo & Blomqvist 2010) Process modeling tools have significantly simplified the standardization, archiving, and distribution of process diagrams. Several businesses have adopted these tools because they are viewed as vastly superior alternatives to pen and paper or even conventional graphical design tools, such as Microsoft's Visio or Powerpoint. (Mendling et al. 2009) However, during the process development phase, it may be more practical to help visualize the as-is or to-be processes by hand-drawing or utilizing flashcards and post-it notes. (Martinsuo & Blomqvist 2010) By involving all participants in the outlining of the process, many perspectives can be gained, problem areas can be identified and addressed in real-time, and staff members can more easily commit to their revised roles. Mendling et al. (2009) argue that despite the help provided by technologies, users receive little assistance in developing process models that business professionals can easily examine and comprehend.

There are three popular languages for business process modeling, which are Business Process Model and Notation (BPMN), Unified Modeling Language (UML), and Event-Driven Process Chain (EPC). During the 1990s, when object-oriented programming was becoming more popular, there was a desire to create a single method for software development. This led to the creation of the UML, which is a standardized way to represent software designs and systems using various types of diagrams and visual notations. Scheer introduced the EPC in 1992 as a way to create semi-formal charts for visualizing business processes. EPC was developed as part of the ARIS (Architecture of Integrated Information Systems) framework, which was initially used for the SAP R3 enterprise resource planning system. (Kožíšek & Vrana 2017)

The Business Process Management Initiative (BPMI) introduced the BPMN in 2004 with the goal of creating a notation that could be easily understood by both business users and developers for charting business processes (Kožíšek & Vrana 2017). BPMN has become the

widely-accepted norm for visually depicting the various processes that take place in nearly all types of organizations (Chinosi & Trombetta 2012; OMG 2010), and it was developed based on the experience and feedback from existing notations such as UML and EPC (Kožíšek & Vrana 2017).

The main aim of BPMN was to provide a standardized language for representing business processes using visual symbols and diagrams (Kožíšek & Vrana 2017). It employs a graphical language that is both comprehensive and flexible, enabling organizations to accurately communicate and analyze their processes (see Figure 16). Given its widespread use, BPMN offers a common language and understanding that can improve collaboration, communication, and operational efficiency across different organizations. (Chinosi & Trombetta 2012) BPMN is designed to be utilized by stakeholders involved in designing, managing, and executing business processes. It strikes a balance between accessibility and precision, as BPMN diagrams can be translated into software process components. The notation used in BPMN is similar to a flowchart and is not tied to any particular implementation environment, making it easy to use across various settings. (OMG 2010)

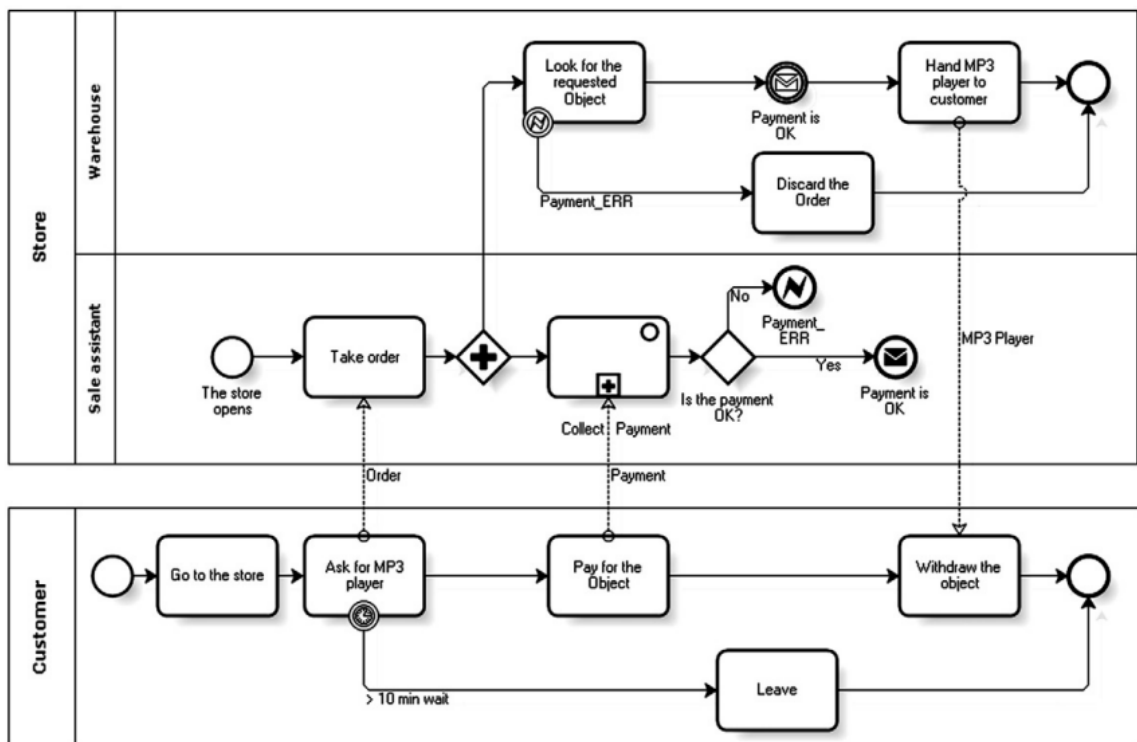


Figure 16. Example process modeled with BPMN (Chinosi & Trombetta 2012)

The introduction of BPMN 2.0 expanded the range of what the notation could represent. In addition to showing processes, BPMN 2.0 can also represent choreographies, which illustrate the exchange of messages between process participants, collaborations that demonstrate the interaction between different participants, and conversations that provide a high-level perspective on the collaboration of multiple participants. This expanded scope of BPMN 2.0 enables it to provide a more comprehensive representation of business processes and their interactions. (Kožíšek & Vrana 2017) For the most part, it is adequate to utilize just the process diagram in many situations. (Kluza et. al 2017)

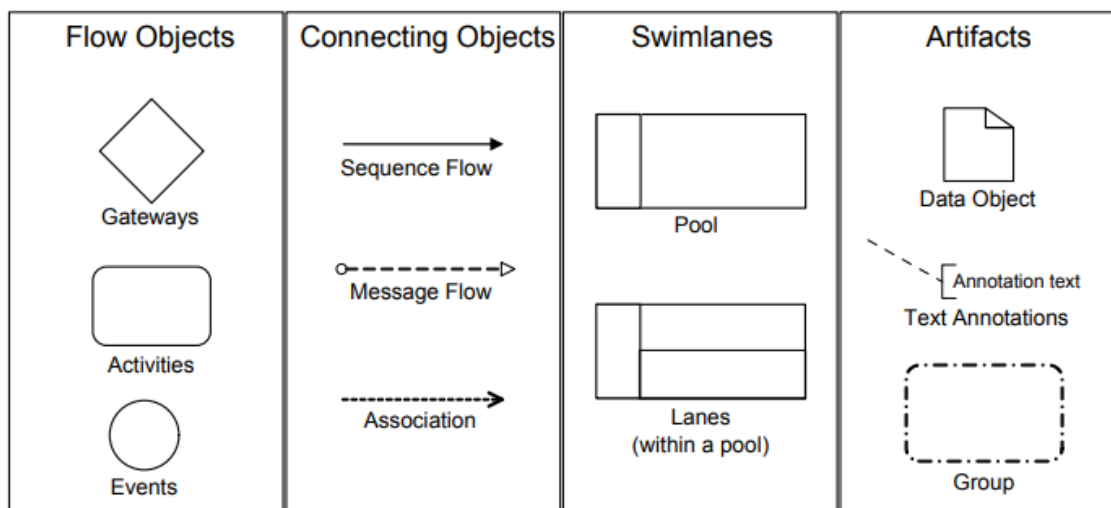


Figure 17. BPMN basic elements (Kluza et. al 2017)

The basic elements of BPMN (see Figure 17) are explained further (Kožíšek & Vrana 2017; OMG 2010):

- The fundamental graphical elements of a business process are called flow objects. These consist of three main types: the activity element, which represents the work being done; the event element, which signifies a trigger or result of the process; and the gateway, which governs the flow of the process. Together, these flow objects form the basic building blocks for creating visual representations of business processes.

- Data is a component of a business process that specifies the input required for a particular activity or the output produced by that activity. It serves as information that enables the process to function correctly and efficiently.
- The act of connecting various components together is important in business process modeling. One way to do this is through a sequence flow, which outlines the order of activities in the process. Another way is through message flow, which describes how different participants communicate with one another. The last method is association, which links other components of BPMN.
- Swim-lanes and pools are visual representations that depict the various participants involved in a process.
- Artifacts are components in business process modeling that offer supplementary information to the process that cannot be modeled by other elements.

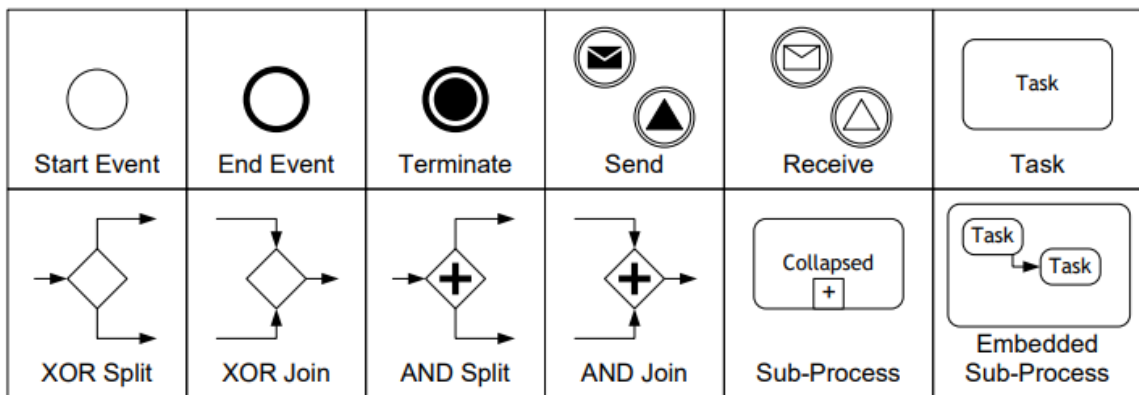


Figure 18. More elements of BPMN diagrams (Figl et. al 2009)

BPMN employs diverse event types, symbols, and tasks to define the beginning and end of a process, capture its steps, and specify routing constraints (see Figure 18). Symbols can be augmented to describe different events, and there are various types of tasks available. Filled and unfilled symbols within a circle represent sending and receiving intermediate events, respectively, and gateways are used to specify routing constraints. (Figl et. al 2009; OMG 2010)

4 Research methodology

This chapter explains how the research for this master's thesis was conducted. It starts with the research method that was used to answer the research questions. Then, it describes how data was collected and analyzed, and how the reliability and accuracy of the data was ensured.

4.1 Research method

This master's thesis is based on a qualitative research method. According to Creswell (2014), qualitative research is a method used to investigate and comprehend how individuals or groups attribute meaning to a social or human problem. Qualitative research is particularly useful when the topic is complex or not well understood, and when the researcher wants to understand the perspectives of the people involved in the process. Creswell (2014) suggests that the qualitative research involves conducting interviews, observations or other data collection methods in the context where the problem occurs. It is a suitable method for this master's thesis because it helps to uncover the underlying processes and perspectives of the people involved in the process.

A literature review is critical to qualitative research as it establishes the context, demonstrates the necessity for the research, and determines the study's significance in relation to existing literature (Merriam & Tisdell 2016). This master's thesis includes a literature review that has multiple functions. Firstly, it establishes the theoretical background of the research by analyzing and discussing the key concepts, theories, and models relevant to business process management and modeling. Secondly, it enables a comparison to be made between the results of this research and those of previous studies, thus highlighting the significance of the research and its contributions to the field. Additionally, the literature review identifies gaps in the existing literature, which assists in developing research questions and objectives.

4.2 Data collection and analysis

The data collection techniques employed in this master's thesis are semi-structured interviews and empirical observations, which are both qualitative data collection methods. A semi-structured interview is a flexible and conversational method of inquiry that combines structured and unstructured approaches and often involves a mix of open-ended and closed-ended questions (Patton 2002). The semi-structured interviews were conducted with employees from the customer organizations and consultants from the case company, to gain insight into the current state of modeling business processes for customer organizations, as well as the key factors, challenges, and opportunities faced by them.

Empirical observations are also gathered from the practical work carried out within the case company. Observation is a research technique that involves closely and methodically observing people or events with the goal of gathering data that can provide deeper insights into the phenomenon being studied (Bryman 2008). This leads to a deeper understanding of the problem and the potential solutions, as well as identify areas for further research or development.

A detailed analysis of the current state of business process modeling for customer organizations of the case company is conducted, including a review of existing tools and ways of working. Additionally, a literature review of best practices in business process modeling will be conducted. The outcome of this research will be a framework for business process modeling that caters to the specific needs of the case company. However, this research will only focus on one customer organization and does not address the implementation and validation of the framework by the case company.

4.3 Validity and reliability

Validity and reliability are important considerations in any research study, including this qualitative investigation of the current state of business process modeling in customer organizations of the case company. Validity refers to the accuracy and truthfulness of the research findings (Messick 1995), while reliability refers to the consistency and stability of the research results (Creswell 2014).

To ensure the validity of this study, the research questions have been thoughtfully designed to ensure that they align with the research objectives and are capable of providing the necessary information to address the main research question. The research design and methods have been chosen to ensure that the data collected is valid and trustworthy. In terms of reliability, the study will employ several measures to ensure that the results are consistent and repeatable. The study will use a standardized data collection approach, including semi-structured interviews and content analysis, to ensure that all data is collected and analyzed in a consistent manner.

It is also worth noting that the research participants include both customer organization employees and case company consultants, including the researcher himself. The researcher will take steps to minimize any biases or preconceptions that may affect the validity of the study, such as maintaining an open mind and using an anonymous interviewing approach, and ensure that both groups are represented fairly and their views are given equal weight in the analysis. This approach provides a comprehensive and a reliable perspective on the current state of business process modeling in customer organizations of the case company.

5 Current state analysis in the case company

In today's rapidly evolving business landscape, companies must constantly evaluate their current state in order to stay competitive and adapt to changing market conditions. According to Podeswa (2009), current state analysis aims to gain a comprehensive understanding of the organization's current state to optimize its operations and achieve its goals. Current state analysis is a vital tool for businesses to identify areas of improvement, identify inefficiencies and streamline processes. In this chapter, we will explore the current state analysis of the case company, a leading IT company. Through a thorough examination of the company's business process modeling practices, a comprehensive overview of the company's current state will be provided. By analyzing the collected data through empirical observation and semi-structured interviews, we aim to provide insights into the company's strengths and areas for improvement regarding business process modeling in customer organizations. Ultimately, the goal of this chapter is to provide input for the next chapter, which proposes a framework for the case company regarding business process modeling for its customers.

5.1 Case company background

The case company selected for this study is a global information technology consulting, systems integration, and outsourcing company that provides business process modeling services to customers in various industries. For confidentiality reasons, the name of the company will not be disclosed in this thesis.

The company was founded several decades ago and has since grown to become one of the largest IT services companies in the world. Its headquarters are located in a major city and it has operations in over 40 countries (see Figure 19), serving clients in industries such as government, healthcare, banking, telecommunications and many more. The company's services include IT consulting, systems integration, outsourcing, and business process modeling among other services. It has a strong focus on digital transformation, helping its clients to leverage emerging technologies to improve their businesses.



Figure 19. Case company operations in different countries

Despite its global reach, the company is committed to providing personalized services to its clients, and it prides itself on its deep industry expertise and its ability to tailor its solutions to meet the unique needs of each client. It has a strong track record of successful projects and a reputation for delivering high-quality services.

This study will focus on developing a framework for the case company to use in its business process modeling services for its customers in Finland. This study is limited to one customer in a specific industry. The framework will draw on best practices from the literature and will be tailored to the unique needs and requirements of the case company and its customer.

5.2 Interview results

This chapter presents an analysis of the conducted semi-structured interviews, which involved employees from the customer organization and consultants from the case company. This study involved a total of 12 semi-structured interviews, with half of the interviewees representing employees from the customer organization and the other half representing employees from the case company.

The results of the interviews are summarized at the end of this chapter and are categorized into four themes: realization of the value of business process management and modeling, exploration of the current way in business process modeling, current challenges in business process modeling, and key factors in successful business process modeling. These themes serve as the basis for the current state analysis conducted in this chapter and for the framework proposed in the subsequent chapter along with the conducted empirical observation and literature review. The text incorporates direct quotes from the interviews.

5.2.1 Realizing the value of BPM and process modeling

The topics that were mainly discussed by the interviewees related to the management and knowledge of business processes and their dependencies, and the ability to measure, improve, optimize, and harmonize the business processes. The value that BPM and process modeling bring to business transformation initiatives, risk management, and training was also brought up in the interviews.

Management and knowledge of business processes and their dependencies

The critical importance of managing and modeling business processes was emphasized by the interviewees. It was also highlighted that BPM and process modeling have an essential role in the overall functioning of the business.

“The business can’t do well if you don’t know your business processes. Quite many times it is so that if you don’t have your own business processes managed and modeled, you don’t understand your own processes. You can’t even describe to anybody else and write down how would you like to work from the business process perspective.”

“Quite difficult to control any business without knowing the processes and manage all of the processes.”

“I would say that business processes are in the heart of every company, because they are describing how the company works and how the business works.”

“Business process should be described and modeled to have the common understanding that this is the way how our company runs and provides value to the customers.”

Additionally, the help BPM and business process modeling provide in understanding the interdependencies between business processes was highlighted.

“You understand what are the connection points to different kinds of departments and how is your work reflecting on other departments and enhance the cross functional cooperation.”

“People start to understand that there are dependencies and work related. And then communication process starts to be improved.”

“What you have is visibility that you use for communication.”

Ability to measure, improve, optimize and harmonize business processes

The interviewees believe that managing business processes and having accurate business process models is crucial for improving the overall functioning of the business. According to interviewees companies can be helped in the ability to measure, improve, optimize, and harmonize their business processes through BPM and business process modeling.

“I think it's good for developing how you're operating because if you have nothing on paper it's based on opinions and gut feelings. As you have processes documented, it's much easier to start improving things.”

“When you model the processes, you can see some pain points. Through them you could enhance the processes and redefine them.”

“We clearly should be somehow measuring all the key processes by certain KPIs that are in place that we would be systematically following and seeing that what is working, what is not working, and measuring and driving improvements based on those data points.”

“You have your defined processes and for each process then you define the metrics. You define how you measure the process performance and how do

you report on the process incidents and the performance based on the measurements and further analyse the processes.”

“You can optimize performance times for tasks or lead times in the production.”

“Measure the lead times in a process, it helps you for example to price your services or products.”

“The processes should be harmonized. Ways of working should be similar in every place, so there's no deviations on how people do things.”

Business transformation initiatives, risk management and training

During the interviews, the respondents emphasized the critical importance of BPM and the creation of accurate process models in the context of business transformation initiatives. According to their insights, companies undertaking such projects should have a thorough understanding of their current "as-is" processes, which is essential when selecting and implementing new IT solutions, such as an ERP system. By leveraging process models, companies can enhance their decision-making process regarding the selection, configuration, implementation, and training of the new system as well as highlight what is going to be different in the to-be setup from the business process point of view.

“Clearly on the business transformation it will be bringing a lot of value at later stages as it's not only about processes but we will be developing new systems and solutions to support those processes. It will be giving certain kind of backbone for system development on this business transformation program and clearly, we need to somehow test certain processes. It will give a nice structure for test cases. Throughout the business transformation journey it will play critical and fundamental role on whatever we do.”

“Easier to select a new ERP-system or whatever IT tool, define the requirements and configure the system as well.”

“How the standard functionality works in the system and how it fits today.”

“It's important to understand the business processes so we can deploy the system.”

“I think BPM and business process models are also connected with the IT solution work. Describing this change that if we have this as-is and then this to-be process descriptions, I can easily point out those changes and use that as a tool to communicate.”

“When you start to connect technology and processes, there should be some guidance how the logic is going through. It helps to understand what you should build, how systems can support it and do this matching. System also can affect the business processes.”

“It helps you to build enterprise architecture view, how the data is flowing through the processes and which applications are involved to different steps of the processes.”

“Easy to explain that how we are working and which are the roles or parties somehow participating on that flow. Explain the ways of working for training purposes.”

Additionally, the respondents highlighted that having a clear and shared understanding of the organization's business process models can mitigate the risk of knowledge loss in case of employee turnover in the organization.

“There can be quite high dependence on people everywhere. Process models help you to minimize your risks and keep knowledge in your company.”

“Minimize the risk if people go away. We have a guidance, we have instructions how to work, how to perform.”

5.2.2 Exploring the current way to model business processes

During the interviews with the participants, the current overall approach that is used to create business process models was inquired about. The process modeling primarily involved

conducting individual interviews and workshops with leaders of various streams and key stakeholders as well as analyzing the existing as-is process models.

“Identify and gather information in interviews, analyzing documents that they have right now.”

“When defining the processes, you can define either as-is processes or to-be processes and in this program, we didn't pay that much attention on defining those as-is processes. We jumped pretty much to like defining only to-be processes. But at the same time, we focused on identifying gaps and challenges in our current way of working on current processes.”

“Made some flowcharts, some process flow diagrams where for example the roles and some kind of functions in organizations are and added some tasks and activities there and just the overall flow has been modeled.”

Throughout the course of the interviews, a recurring topic was the absence of a standardized methodology for modeling business processes, which was frequently cited by the interviewees.

“There was not any standardized way of working, maybe the customer said what does he or she wanted. Mostly I think that we just did what customer wanted and that's not the best way of doing.”

“You need to have controlled way of doing it, step by step.”

“There should've been predefined decision on how to do the modeling and not changing that during the drawing process.”

The method of defining the process architecture and hierarchy involved utilizing process taxonomies, which were validated through the involvement of large cross-functional groups. During the interviews, it was also found that a process hierarchy is typically constructed by starting with broad, high-level concepts and gradually delving into more specific details.

“First step is always that you are trying to understand that what is the current way of working. you can use taxonomy - you can have different building blocks on different levels, but you need to start the hierarchy from very high level. You define what's the company strategy, what are the KPIs, and based

on those you can start the workshops to define what are the different building blocks in order to make the taxonomy.”

“I think a company typically should not invent the wheel from scratch and that's what we wanted to avoid as well. When we start this business process modeling, as a starting point, it's good to utilize some kind of taxonomy process framework. We have different kinds of industry best practices like APQC. I personally like that we have certain structure in place and that is important because that way you are making sure that you are holistically considering relevant processes and you have the levels right. ...You get a kind of nice hierarchy and coverage.”

“First we need to decide the higher level of processes and agree on higher level, how the to-be should look like, and then we need to go deeper if we want to do it systematically.”

“At first, we described process taxonomy. We basically listed all different process areas and what kind of processes we can see that we have from end to end perspective, and then we started to define different levels of processes.”

“When you have clarified and understood what kind of building blocks they have, start building the processes around it. Which building blocks are connected to each other, and then going to the detailed level. Not jumping from the highest level to the detailed level at once.”

“I think a good practice would be that first you create the as is processes.”

Upon completion and validation of the highest Level 1 (L1) and Level 2 (L2) processes represented by the process taxonomies, the next steps involved defining Level 3 (L3) and Level 4 (L4) processes. The validation of these processes was carried out using business use cases and involved the participation of large cross-functional and multinational teams.

“There were separate streams for all process areas. But in the end when we had those processes described, we had this work through together and we had end to end business cases and we used them for those walkthroughs. We made sure that these processes were working from different perspectives as well, so we started from a real case and walked through the whole process together with all the process areas.”

“Eventually when you go for different kinds of validations you validate with different teams and different parties who are somehow impacted by the process. And eventually I think it's good that when you create these processes that you also get the management committed.”

“Basically, we used pretty much the same use cases in L3 levels, but of course we had to prepare them in more detailed way for these L4 walk throughs.”

Furthermore, the various tools and techniques utilized in this process were described by interviewees. The tool of choice for modeling business processes was Microsoft Visio. In addition, Microsoft PowerPoint and Excel were utilized to provide support for the business process models. Specifically, PowerPoint was used to create taxonomies, while Excel was used to generate process descriptions and the process catalogue.

“In this program we have used this Microsoft Visio.”

“The current way it's created is that the main diagrams we have in Visio, but explanations we have in separate Excel.”

“Visio and PowerPoint and maybe Excel or piece of paper in practice are the tools I've been using. Those are kind of easy to use and easy to update and easy to understand, so it has certain benefits. But of course, they are not maybe the most advanced tools.”

“We have these Visio flowcharts that are really good when we want to model business processes.”

However, due to the lack of licensing, the ability to edit models was limited for many individuals. There was also some criticism regarding the selected tools.

“We have done most of the process modeling to Microsoft Visio, and actually none of my team business developers, process developers have a license to edit those Visio documents. That's why when we have been throwing something by ourselves we have been using mostly like PowerPoint to draw the flow charts and process charts.”

“For some very detailed and low-level processes I think Excel and PowerPoint are very useful, easy to prepare and commonly used so to say, because this Visio we don't actually have it licensed for all of our team members. So that's why we have selected to use this excel, and it's kind of easily available. That is the main reason I would say.”

“There was a decision to use Visio for creating diagrams and unfortunately there were some limitations.”

“PowerPoint, yes. But I don't see that that is very efficient way because that requires a lot of time.”

“In this Excel where was descriptions about what one process part is doing and why it's done, I think that kind of working is not good because you don't get the overall picture of what you are looking at, because they are just Excel lines and it's quite difficult to follow.”

Although several additional methods, tools, and techniques were brought up in the interviews, they were not implemented in the project related to the specific case company and customer organization being discussed.

5.2.3 Current challenges in business process modeling

The interviewees were queried on the difficulties and challenges encountered while engaging in business process modeling. The responses primarily centered around issues such as inadequate knowledge, lack of ownership, insufficient stakeholder engagement, lack of cross-functional collaboration, ineffective utilization and maintenance of process models, as well as misalignment across different process levels. These recurring themes were raised by nearly all the participants, while additional challenges were also identified and highlighted.

Lack of knowledge, ownership and engagement

Throughout the interviews, these recurring themes emerged as interviewees highlighted various challenges in business process management and modeling. These challenges included lack of engagement and ownership from process owners, lack of understanding of

business processes, incomplete knowledge of process owners, and difficulty in understanding customer's business.

“I would say one of the biggest challenges is really to have the engagement and the ownership of the processes especially in situations where the process owners are doing something else as their main job.”

“The biggest challenging thing is when the customer who you work for or the company you're working in have no clue what is the definition of business process or business process management or modeling. And that was our case as we started.”

“Maybe the biggest challenge I faced would be that the process owners themselves don't know all of the details of the processes. They have some gaps in their knowledge, so it's really tricky to model processes that are not clear even to the process owners.”

“Me and my understanding of what the customer is actually telling me. It takes a lot of effort to actually understand the customer's business if you haven't worked in the same line of business before. Sometimes the customer's business is very easy and straightforward and although you haven't worked in that industry it's easy to understand. But typically, I would say that it's quite hard to understand the customer's businesses in industries you haven't worked in.”

Other challenges that were highlighted by the interviewees include lack of accountability and resource allocation. Overall the interviewees understood that successful business process management and modeling requires effective communication, engagement, and understanding among stakeholders.

“Resource allocation is critical thing in these kinds of projects. We should be able to get the right people to the discussions who understand the existing way of working, and also have people that are out-of-the box minded.”

“Lack of taking responsibility from the client's side. The lack of accountability, I think that's also a huge challenge when they don't give it 100%.”

“The first challenge is the customer engagement of course. If the customer doesn't want to give you information, it's really hard to describe their business processes.”

Lack of cross-functional collaboration

The interviewees are collectively highlighting the common challenges that organizations face in terms of cross-functional collaboration and process integration. One interviewee emphasizes the negative impact of siloed thinking and lack of consideration for how one's work affects other areas of the organization.

“Lack of cross-functional work. Everybody focuses on their silos on these processes, but nobody thinks what happens then you are only interested of your own. That's one thing.”

Another interviewee is concerned with how to balance the need for a big picture view of the overall process with the specific requirements of different functional areas, while also supporting innovation and development.

“One thing is that when you want to make sure that everything is integrated in a way and work together. How do you make sure that at the same time you focus on having the big picture, but also you are able to pay attention at least a bit to function specific special requirements? It may be that in supply chain management or procurement area you have some other specialities. So how do you create that kind of process model which basically innovates and supports all other elements and this overall process model, but at the same time also supports developing that operating area?”

The third interviewee notes the difficulty of achieving an end-to-end perspective and cooperation due to siloed thinking and differences in process areas.

“I would say that the biggest challenge is that we can't really understand the end to end perspective because that has been our way of working previously that we have those silos and we are kind of only developing our own processes in silos. And this end to end, the cooperation, it's not that easy. And then how to really explain if in my area we have to make some extra steps and still kind of communicate and keep this understanding that this is still like the most efficient way of working because somewhere else we might save a lot of process steps and time. It's easy to develop my own area and communicate because we have a common language, but then in some other process areas they might think totally differently.”

All three interviewees stress the importance of adopting a more holistic approach to process management, breaking down silos, and improving communication and collaboration across functional areas in order to improve efficiency and achieve organizational goals.

Lack of utilization and maintenance

The importance of maintaining process models and keeping them up to date is emphasized by the interviewees to ensure they are useful in everyday work. It is suggested that a common way to document and govern these processes is necessary, as well as defining roles and responsibilities for maintaining them.

“Number one is definitely that if you start modeling the processes without thinking that how are you going to utilize those models and process descriptions in the future in very practical level. How do we keep them up to date? Who should be using them in every day work? Whose tools are they? Who should keep them up to date? Who is the person who has resources to keep them up to date? I think it's the key point to understand that why and how and then define that also. It should be all based on business needs and find the continuity for the work.”

“What is also important now is to not just create processes, it's that they will be also kept up to date afterwards. So, when you have actually created something, it's really important that you also agree that how to maintain and where to maintain those because if you just create something and then forgot them for three years, they will not be useful any more. As part of the exercise, one should also agree that what are the roles and responsibilities to maintain those process documents. So, you need to have a common way where those processes are documented and maybe you even have some type of governance model in place. And let's say when you update them after they are approved, there's some kind of process in place for that as well.”

Caution is advised against investing in the process models without considering who will maintain them, as it could result in the models becoming useless after a few years. Overall, it is suggested that making process models accessible and useful to everyone is important for successful implementation.

“That you do this big exercise, invest a lot of money and then after a couple of years nobody maintained the process models and it's deteriorated and then when you have the next big program, you need to start from the scratch again.”

“We need make sure that people have access, can actually utilize the material, that they are not hidden under a stone, that we really make them public and useful, that they are kind of a central piece of material that everybody can access.”

Lack of alignment in process levels

The interviewees discussed the importance of maintaining consistency in the level of detail when modeling processes across different levels. They highlighted the need for clear guidelines to determine the appropriate level of detail and avoid getting stuck in endless process work. Additionally, they emphasized the importance of establishing a common understanding with the customer regarding the desired level of detail.

“Let's say when we are modeling those different levels that we have, level 1 process is more high level, then there is level 2 and Level 3 and 4 etc. How to make sure that when we are describing processes that they are kept on the same level that we are not really detailing out something with process A and keeping it much more high level in process B? How do you have the of balance balance that?”

“You can do this kind of process work forever if you want to, so there's a need of some kind of guidelines that clear out what is L1, L2, L3 and L4?”

“Customer wants to go in deep details all the times so need to have a common understanding that what is the target level of this work.”

Other challenges

These comments highlight three different challenges that organizations may face when it comes to business process management and modeling: cultural differences, diverging opinions on processes, and the potential challenge of introducing new tools to users who may be resistant to change.

The first comment points out that business processes can vary significantly across different cultures and countries, which can pose challenges when trying to standardize processes across a global organization.

“The understanding of the business processes itself is really different depending on which culture and country you’re speaking about.”

The second comment underscores the fact that even within a single organization, different individuals and departments may have different perspectives on how processes should be designed and implemented.

“There are always different opinions for the same process.”

Finally, the third comment raises the issue of tool adoption, suggesting that even if a new tool is more advanced or efficient, it may be met with resistance from some users who may find it too complex or intimidating.

“Also, the tool aspect might be a challenge if we have a really fancy tool. The fancy tool might be too scary for certain people, and we still want people to kind of have access to those.”

5.2.4 Key factors in successful business process modeling

In order to shed light on the key factors that contribute to successful business process modeling, interviews were conducted with several individuals who have experience in this area. The insights gained from these interviews were grouped into five main themes: simplicity and scalability, stakeholder involvement, end-to-end perspective, standardization, and business ownership.

Importance of simplicity and scalability

Several interviewees mentioned the importance of making the process models simple and easy to understand for everyone involved. The need for scalability was also highlighted so that changes can be made easily when required.

“The process models should be simple so everyone understands it. It should also be scalable so you can make changes easily when it’s required.”

“It doesn't have to be one person, it can be a team, but you should have some kind of idea that how do we convert our vision to into the processes”

Involvement of stakeholders

Several interviewees emphasized that the involvement of stakeholders is crucial, and not only top management but also those who actually do the everyday business should be involved. This includes subject matter experts, process owners, and users.

“Find the correct experts from customer’s side, so not only top management. It’s important to involve those people who actually do the everyday business.”

“It's about stakeholder collaboration, identified process owners, subject matter experts and users. This collaboration between them also helps us to ensure that all relevant perspectives are taken into account and the model becomes accurate and complete.”

“When we are drawing these processes, same people should be from the beginning till the end because otherwise there’s a need to start explaining things again and again.”

“That there are people in addition to individual process owners, who have the bigger picture in mind who are monitoring the work and checking constantly that are we on the same level, or if we are trying to jump to deep details in some of the areas. Kind of like to bring the discussions on the correct level, otherwise it's quite hard to monitor that the different areas are staying on the same level.”

End-to-end perspective

Several comments also stressed the importance of considering the end-to-end process and ensuring that all processes that have been modeled are connected with each other. The defining of start and end points and what the process covers is also mentioned.

“Going through this end to end processes and start to validate and test them.”

“It's important to consider the end to end process, that all the processes that have been modelled are connected with each other.”

“The defining of start and end points and what does the process cover.”

“I feel that one of the pitfalls was that if you don't have some framework, this Level 3 means something for that person and something totally different for other person when trying to keep it on the same level across all the different processes.”

Standardization

It was emphasized that a standardized way of working is important when documenting processes. This includes doing it in a standard way and having a common template that should be used. Clear ownership and responsibility on the processes was also highlighted.

“Key factor that we have standardized way of working, and we have clear ownership and responsibility on the processes.”

“Overall that when we are documenting the processes, we are doing it in a standard way. Some standard way to kind of document the steps that it would be easier to understand.”

“I really see the value that the tool is helping you in order to get the processes modelled in the same way, or you have a common template that you should use.”

Business ownership

The key factor that the business takes ownership and maintains their own processes up to level 4 was discussed. It was also mentioned that it is important for the business team to be sufficiently trained and willing to do that job, with consultants guiding and steering in the design thinking of the processes.

“The key factor is that the business takes ownership and that they maintain their own processes up to level 4. That's really a key. Of course, we can help them with the consultants, but then the business never owns their processes and they always can complain that something is missing or wrong. They know their own use cases, they know their processes, so I think the key would be that the business team is sufficiently trained and then also willing to do that job.

That the consultants can really guide and steer in the design thinking of the processes.”

5.2.5 Summary of interview results

Interviewees understood that business process modeling and management are crucial for organizations seeking to optimize and harmonize their processes. Table 4 below summarizes the interviews and captures the main points.

Table 4. Main points from the interview

Topic	Main Points
Realizing the value	<ul style="list-style-type: none"> • Important for managing and modeling business processes • Brings value to business transformation initiatives, risk management, and training • Accurate process models help communicate changes and ensure a common understanding of the organization's ways of working
Current way of working	<ul style="list-style-type: none"> • Interviews and workshops with leaders and key stakeholders are conducted to create business process models • No standardized methodology for modeling business processes • Microsoft Visio is the tool of choice for modeling business processes
Current challenges	<ul style="list-style-type: none"> • Inadequate knowledge, lack of ownership, insufficient stakeholder engagement, lack of cross-functional collaboration, ineffective utilization and maintenance of process models, and misalignment across different process levels • Lack of engagement and ownership from process owners, lack of understanding of business processes, incomplete knowledge of process owners, and difficulty in understanding the customer's business
Key factors	<ul style="list-style-type: none"> • Simplicity and scalability, stakeholder involvement, end-to-end perspective, standardization, and business ownership • Making process models simple and easy to understand, involving stakeholders at all levels, considering the end-to-end process, standardizing the way of working, and having clear ownership and responsibility for the processes

Interviewees stressed the importance of understanding dependencies, measuring, improving, and modeling business processes using BPM, and creating accurate process models to communicate changes and ensure a common understanding of the organization's ways of working. BPM and process modeling can also enhance decision-making, mitigate the risk of knowledge loss, and support business transformation initiatives and risk management.

However, interviews also revealed several challenges in business process modeling. These include inadequate knowledge, lack of ownership, insufficient stakeholder engagement, ineffective utilization and maintenance of process models, as well as misalignment across different process levels. Lack of engagement and ownership from process owners, incomplete knowledge of process owners, and difficulty understanding the customer's business were recurring themes. The importance of maintaining process models and keeping them up-to-date was emphasized to ensure they are useful in everyday work.

Interviewees reported no standardized methodology for modeling business processes. The approach used involved conducting individual interviews and workshops with leaders and key stakeholders, analyzing existing as-is process models, and identifying gaps and challenges in different streams. Process taxonomies were used to define the process architecture and hierarchy. Microsoft Visio was the tool of choice for modeling business processes, while Microsoft PowerPoint and Excel were used to provide support for the business process models. The validation of the processes involved the participation of large cross-functional and multinational teams and was carried out using business use cases.

The key factors for successful business process modeling were grouped into five main themes: simplicity and scalability, stakeholder involvement, end-to-end perspective, standardization, and business ownership. Interviewees emphasized the importance of making process models simple and easy to understand, scalable, and involving stakeholders at all levels. It was also stressed that considering the end-to-end process and ensuring that all processes are connected with each other is important. Standardization and a standardized way of working were emphasized, as was the need for clear ownership and responsibility for the processes. Finally, the key factor of business ownership and the maintenance of processes up to level 4 by the business team was discussed, with consultants guiding and steering in the design thinking of the processes.

5.3 Current state analysis

This chapter presents a thorough analysis of the current state of the case company's business process modeling in the customer organization. The analysis is based on the findings obtained from semi-structured interviews with various stakeholders and empirical observations of the process modeling practices. The aim of this current state analysis is to provide a comprehensive understanding of the existing approach to business process modeling, including the challenges faced in the process. The current state analysis is divided into six topics, which are the approach to creating business process models, process architecture and hierarchy, validation of processes and taxonomies, tools for modeling business processes, people and process modeling, and maintaining process models. At the end of the chapter, a summary of the findings is provided, which serves as a basis for subsequent discussions on proposed improvements to the process modeling approach and framework development.

Approach to creating business process models

The interviews with participants revealed that the current approach to creating business process models involved conducting individual interviews and workshops with leaders of various streams and key stakeholders to create the to-be processes, as well as analyzing existing as-is process models. The participants primarily focused on identifying gaps and challenges in the current processes, rather than defining as-is processes. Through empirical observation, it was deduced that the customer's as-is models were found to be outdated and difficult to comprehend, and the workshops were conducted separately for each stream such as sales, customer service, operations, warehouse, and finance. The absence of a standardized methodology for modeling business processes was a recurring topic among the interviewees, who felt that a controlled way of working was necessary to ensure consistency and efficiency in the process.

It was also found through observation that cross-functional processes that were identified were modeled in larger cross-functional groups, although some of them were challenging to identify and model due to a lack of clarity on the vision of the to-be processes. A key challenge identified was the lack of cross-functional collaboration. Interviewees stressed the

importance of adopting a more holistic approach to process management, breaking down silos, and improving communication and collaboration across functional areas in order to improve efficiency and achieve organizational goals.

Process architecture and hierarchy

The method of defining the process architecture and hierarchy involved utilizing process taxonomies. Based on empirical observation, it was found that the initial process taxonomy was created by defining high-level process groups without including any industry-specific details. However, later on, the taxonomy was customized and made more specific to the customer's industry and operations. It was also found through observation that the hierarchy was constantly adjusted to incorporate new subprocesses or remove unnecessary ones as the flowchart modeling progressed even though they were validated on high-level.

Through observation, it was found that the process owners were identified for each stream based on these utilized process taxonomies. One recurring challenge identified by the interviewees was a lack of engagement and ownership from process owners. Interviewees reported that process owners often had other responsibilities and did not prioritize process modeling, which hindered progress on projects. Additionally, interviewees noted that it was often difficult to gain a complete understanding of business processes, as process owners themselves did not always possess all the necessary knowledge.

After validating the highest L1 and L2 processes represented by the process taxonomies, the next steps involved defining L3 and L4 processes. It was found in observation that L3 and L4 processes were identified and modeled in taxonomies as well. Once the L3 and L4 processes had been identified and modeled, the next step was to create process flowcharts for the L3 processes and process flow diagrams for the L4 processes. Essentially, the L3 processes were a more detailed version of the L2 processes, while the L4 processes provided a more comprehensive and elaborate description of the process flows, outlining the specific roles and functions in separate swim lanes.

The interviewees highlighted the challenge of ensuring that the level of detail remains consistent when modeling processes across different levels which is important in avoiding discrepancies in the level of detail between different processes. The interviewees also

emphasized the importance of establishing a common understanding with the customer regarding the desired level of detail and the need for clear guidelines to determine the appropriate level of details. This would help in maintaining a balance between providing sufficient detail without overcomplicating the process as well as to avoid getting stuck in endless process work. Empirical observations revealed that there was a lack of common understanding between the consultants and customers regarding the appropriate level of detail, which could potentially hinder the effectiveness of the project.

Validation of processes and taxonomies

During the interviews, it became clear that the validation of processes and taxonomies involved a large cross-functional and multinational group. Empirical observations also revealed that a large validation session was necessary to gain stakeholder commitment, given that the customer operates in multiple countries and continents. The session involved business use cases created by process owners in collaboration, which covered end-to-end processes and real-life scenarios.

However, the multinational and cross-functional validation group posed a challenge, as the customer aimed to incorporate everyone's perspectives to enhance stakeholder engagement. Based on the observations, it was found that going through large amounts of detailed process models and in validation sessions was time-consuming. Additionally, it led to an almost unmanageable backlog of feedbacks and development ideas.

Tools for modeling business processes

According to the interviewees, Microsoft Visio was the tool of choice for modeling business processes, while Microsoft PowerPoint and Excel were utilized to provide support for the models. It was observed that PowerPoint slides were used to visualize ideas and process flows, while Excel sheets were used to provide a more detailed description of the tasks and activities involved in the business process models.

However, due to the lack of licensing, the ability to edit models was limited for many individuals, and some criticism was raised regarding the selected tools. Empirical observation revealed that certain streams utilized different tools for modeling the L3 and L4

processes at the beginning of the modeling process. For instance, the sales stream used a tool called Mural for process flow modeling, whereas the other streams opted for Microsoft Visio. In order to ensure coherence in the process models, the tool was eventually switched to the same one employed by the other streams. Based on the empirical observations, it was evident that different streams operated in different ways, which reinforced stakeholders' concerns regarding the absence of a standardized approach to work.

People and process modeling

The conducted empirical observation also revealed that due to the diversity and complexity of the business streams, many consultants were tasked with modeling the L4 processes across all streams while fewer consultants were needed in higher levels. These consultants were assigned based on their knowledge, expertise, and experience. It should be emphasized that many of the consultants modeling the L4 processes were not involved in modeling higher level processes such as L1, L2 and L3 processes.

Furthermore, there were instances where consultants working on a specific stream were replaced in the middle of the modeling process. When new consultants were brought in to replace existing ones who had been working on a specific part of the modeling process, they needed to be given a thorough briefing on the customer's business, project scope, and modeling guidelines, as well as other important details. This meant that the modeling process became slower and less efficient, and sometimes it had to be delayed due to the time required for the new consultants to get up to speed.

Maintaining process models

The importance of maintaining process models and keeping them up to date was also emphasized by interviewees. It was suggested that a common way to document and govern these processes is necessary, as well as defining roles and responsibilities for maintaining them. Empirical observation revealed that the customer organization had established a new position, the head of business process architecture, whose main responsibility was to manage and maintain the business processes models among other tasks. However, it was also observed that there was a risk of the models lacking in scalability and adaptability due to

inconsistencies in their design and lack of standardization in the way of modeling. Specifically, it was noted that there was no standardized notation used in the flowchart modeling, with only BPMN symbols that were not utilized in standard way. The lack of using standardized modeling languages such as BPMN result to allowing room for too many interpretations regarding the business process models. As a result, the risk of models lacking in scalability and adaptability was increased, which in turn increases the risk of mismanagement of models.

Summary

In summary, the current approach to creating business process models in the case company primarily involves conducting individual interviews and workshops with leaders of various streams and key stakeholders to create "to-be" processes, as well as analyzing existing "as-is" process models. However, a recurring challenge has been the lack of a standardized approach, cross-functional collaboration, and difficulty in understanding outdated "as-is" models. Table 5 summarizes the main topics, approaches and challenges highlighted in the interviews.

To define the process architecture and hierarchy, process taxonomies were utilized specifically for identifying and modeling L1, L2, L3, and L4 processes at a high level. L3 processes were modeled using a flowchart technique, while L4 processes were modeled using a process flow diagram technique based on the created process taxonomies. The biggest challenge faced in process architecture and hierarchy was the inconsistency in the level of detail.

Validation of the taxonomies and process models involved using business use cases created by process owners in collaboration. These use cases covered end-to-end processes and real-life scenarios and were validated in a large multinational and cross-functional group to engage stakeholders further. The biggest challenge in this approach was the overwhelming amount of feedback and development ideas that resulted in an almost unmanageable backlog.

Table 5. Summarized current state analysis

Topic	Approach	Challenges
Approach to Creating Business Process Models	<ul style="list-style-type: none"> -Individual interviews -Workshops -Create to-be processes -Analyze as-is processes -Identify gaps and challenges in current processes 	<ul style="list-style-type: none"> -Lack of standardized approach -Outdated and difficult to comprehend as-is models -Cross-functional collaboration
Process Architecture and Hierarchy	<ul style="list-style-type: none"> -Create standard high-level process groups -Model and identify industry and customer specific L1, L2, L3 and L4 processes in taxonomies -L3 processes modelled in flowcharts -L4 processes modelled in process flow diagrams 	<ul style="list-style-type: none"> -Inconsistency in the level of detail
Validation of Processes and Taxonomies	<ul style="list-style-type: none"> -Create business use cases in collaboration -Large multinational and cross-functional validation session -Stakeholder engagement efforts 	<ul style="list-style-type: none"> -Time consuming to go through all the process models in large group -Overwhelming amount of feedback and development ideas -Almost an unmanageable backlog
Tools for Modeling Business Processes	<ul style="list-style-type: none"> -Create process models with Microsoft Visio -Some deviations on tools in different streams (e.g. Mural) -Utilize Microsoft PowerPoint and Excel as a support tools -Not using standardized modeling notation -Using BPMN symbols in non-standardized manner 	<ul style="list-style-type: none"> -Limited licensing -Lack of coherence in process models -Risk of allowing room for too many interpretations
People and Process Modeling	<ul style="list-style-type: none"> -Consultants tasked with modeling based on their knowledge, expertise and experience -A few consultants modeling L1 and L2 -A few more consultants modeling L3 -Many consultants modeling L4 -Only process owners and leaders in high level process modeling -Bigger groups in modeling L4 processes 	<ul style="list-style-type: none"> -Consultant turnover -Bringing new consultants up to speed -Lack of understanding the way of working -Reduced productivity -Deviation from schedule -Establishing a common understanding about the desired level -Lack of understanding customer's business -Lack of ownership of process owners -Lack of stakeholder engagement
Maintaining Process Models	<ul style="list-style-type: none"> -Governance of maintaining models and versions -Defining roles and responsibilities in maintenance -New role for managing and maintaining business process models 	<ul style="list-style-type: none"> -Risk of models lacking in scalability and adaptability -Risk of mismanagement of models

There were a few consultants identifying and modeling taxonomies and L3 processes, while many more consultants were involved in modeling the more detailed L4 processes. This led to a lack of common understanding regarding the appropriate level of detail, and consultant turnovers resulted in deviations from the schedule and reduced productivity. Other challenges related to stakeholder engagement and ownership from process owners.

To model business processes, Microsoft Visio was the tool of choice, while Microsoft PowerPoint and Excel were utilized for support. Licensing and lack of coherence in business models posed significant challenges, as did the risk of allowing room for too many interpretations. The importance of maintaining process models and keeping them up to date was emphasized, along with the risks associated with modeling processes without agreeing on standardized notation and methods.

6 Framework proposal for the case company

The purpose of this framework proposal chapter is to outline a systematic approach for successful business process modeling in customer organizations. Business process modeling is a critical component of business analysis, as it enables organizations to identify inefficiencies, reduce costs, and improve overall performance. The proposed framework provides a structured methodology for analyzing, designing, and implementing the customers' business processes, based on theoretical best practices and the conducted current state analysis.

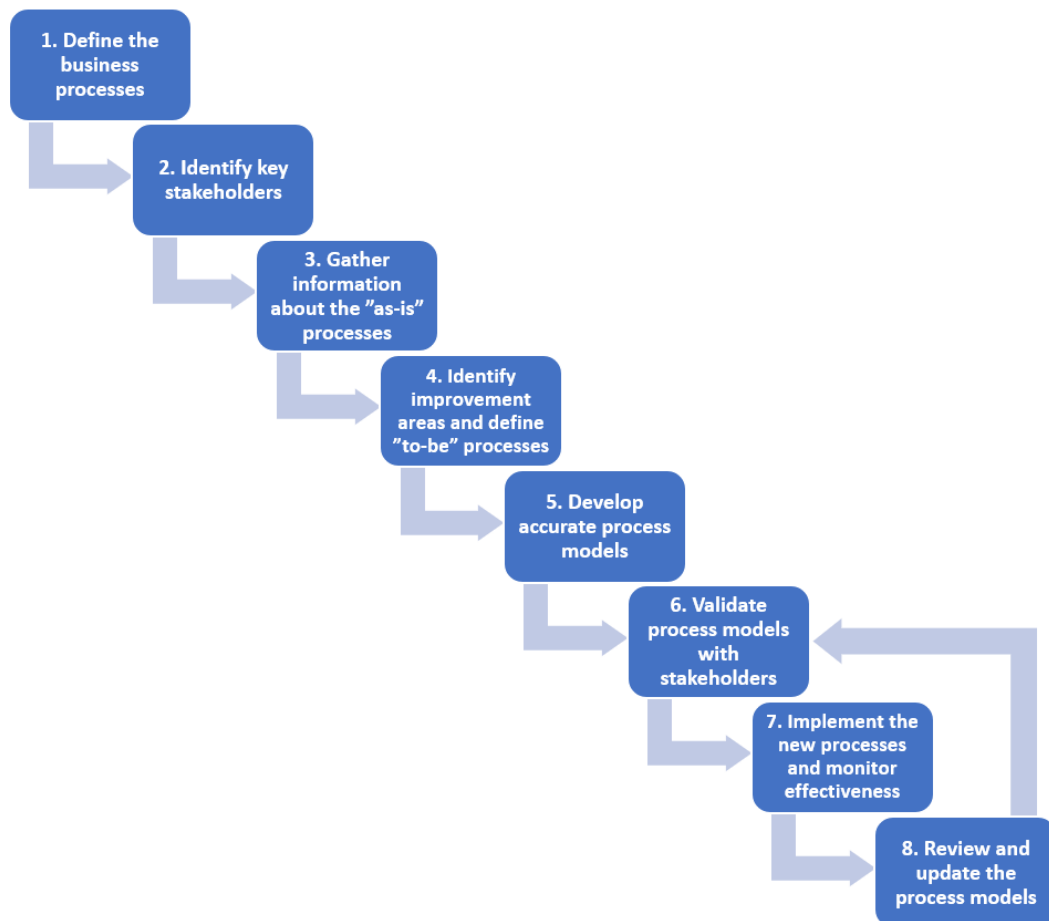


Figure 20. Framework for successful business process modeling in customer organizations

The framework for successful business process modeling consists of eight key steps which can be seen in Figure 20. It is recommended to proceed through the framework sequentially, however, steps 6-8 form a circular pattern.

1. Define the business processes

The first step in the framework is to define the business processes that need to be analyzed and improved, which involves clearly defining the scope and objectives. The scope and objectives of the process should align with the overall strategic goals of the organization. Best practices recommend that this step should involve collaboration with key stakeholders, including process owners and individuals who have direct experience and knowledge of the business processes.

This step helps organizations to clarify their business processes, identify the most important processes, and ensure that there is a shared understanding of how the processes work. Additionally, it is important to clearly define the boundaries of the processes and the end-to-end aspect, as it helps the customer organizations gain understanding of how each process fits into the larger picture. By defining the end-to-end process, the organization can gain a clear understanding of how each process fits into the larger picture, which is critical for developing accurate process models.

2. Identify the key stakeholders

The second step is to identify the key stakeholders who will be impacted by the process changes. Engaging stakeholders is critical for ensuring that the process models accurately reflect the needs and requirements of the customer organizations. This step involves identifying the individuals or groups that have a vested interest in the processes being analyzed, and understanding their needs and expectations.

To effectively engage stakeholders, it is important to define their roles and responsibilities, and establish effective communication channels. By doing so, stakeholders can be informed about the progress of the modeling process and their expectations can be managed. In cross-functional processes, other streams process owners and other individuals who have direct experience and knowledge of the business process should also be involved.

Engaging with stakeholders is a best practice recommended during this step to gain their input and perspective, and to ensure that their needs and expectations are considered during the modeling process. By involving stakeholders in the modeling process from the beginning, their input and feedback can be incorporated throughout the process to help ensure that the models are realistic, relevant, and acceptable to all stakeholders.

3. Gather information about the “as-is” processes

The third step in business process modeling involves conducting a detailed analysis of the existing business processes, often referred to as the “as-is” processes, to gain a comprehensive understanding of how they work, where the inefficiencies and bottlenecks are, and how they impact stakeholders. This step involves documenting the current processes and understanding how they work, including the inputs, outputs, and activities involved, and should involve using a variety of data collection methods, such as process maps, interviews, surveys, and observations, to gain a comprehensive understanding of the current state. This information will serve as the baseline for designing the “to-be” processes.

Best practices recommend that process analysis should involve multiple perspectives, such as those of process owners and individuals who have direct experience and knowledge of the business processes. Mapping out the current process flow, identifying inefficiencies and bottlenecks, and understanding how the process works end-to-end are crucial in this step. It helps organizations to gain a comprehensive understanding of their current processes and ensures that the “to-be” processes are designed with specific improvements in mind, considering the current strengths, weaknesses, and areas for improvement.

4. Identify improvement areas and define “to-be” processes

Based on the analysis conducted in step three, the fourth step involves identifying improvement opportunities and defining the desired “to-be” processes. This step involves analyzing the current processes to identify areas where improvements can be made, and developing a vision for the future state of the processes. Best practices recommend using a structured approach, such as gap analysis or benchmarking, to identify improvement opportunities and develop a clear vision for the desired state. The “to-be” processes should

focus on adding value to the customer, reducing waste and inefficiency, and increasing overall process effectiveness. They should be designed to meet the needs and expectations of all stakeholders and align with the strategic goals of the organization. By considering the entire end-to-end process, the organization can identify opportunities for improvement and design a process that is streamlined and effective.

5. Develop accurate process models

The fifth step involves using process modeling techniques and tools to create a visual representation of the “as-is” and “to-be” processes. The purpose of this step is to develop accurate process models that capture the key elements of the processes being analyzed. This includes process flowcharts, diagrams, and taxonomies in different levels. The models should document the processes and ensure that all activities, decision points, inputs, and outputs are captured. The resulting process models should be clear, concise, easy to understand, and not allowing room for too many interpretations. Best practices suggest that standardized modeling techniques and appropriate tools, such as BPMN and Microsoft Visio. Additionally, it is critical to keep the level of details consistent throughout the modeling process. This step helps organizations to document their processes in a clear and consistent manner, ensuring that all stakeholders have a shared understanding of how the processes work end-to-end.

6. Validate the models with stakeholders

This step involves reviewing the process models with stakeholders to ensure that they accurately reflect the requirements and objectives of the customer organization, and making any necessary adjustments based on feedback. Best practices suggest that process validation should involve a cross-functional team of stakeholders and should focus on ensuring that the models are both accurate and complete. This step should also involve testing the model under various business use cases to ensure that it is robust and can handle different scenarios.

The sixth step in business process modeling involves validating the process models with stakeholders to ensure that they accurately reflect the “as-is” and the “to-be” processes. This step involves engaging with stakeholders to review and test the models, and to gather

feedback and input. Best practices recommend that this step should involve using a variety of validation techniques, such as walkthroughs, simulations, and pilot testing, to ensure that the models are accurate and useful.

This step involves reviewing the process models with stakeholders to ensure that they accurately reflect the requirements and objectives of the customer organization, and making any necessary adjustments based on feedback. Best practices suggest that process validation should involve a cross-functional team of stakeholders and should focus on ensuring that the models are both accurate and complete from the end-to-end perspective. This step should also involve testing the model under various business use cases to ensure that it is robust and can handle different scenarios. By validating the process models with stakeholders, organizations can ensure that their process models accurately reflect the “as-is” processes, and that the “to-be” is realistic and achievable.

7. Implement the new processes and monitor effectiveness

The seventh step in business process modeling involves implementing and monitoring the effectiveness of the newly designed processes. This step requires a structured approach to change management, including training, communication, and stakeholder engagement. It is important to establish a plan for monitoring and measuring the performance of the new processes, and to identify potential risks and opportunities for improvement.

To implement the new processes, organizations need to design and implement changes to the processes while monitoring their impact on the organization. Best practices recommend using a structured approach to change management, such as the Plan-Do-Check-Act (PDCA) cycle. This approach ensures that the changes are implemented effectively, and their impact is monitored and evaluated over time.

In addition to implementing the redesigned process flow, monitoring its effectiveness is also crucial. This monitoring involves tracking the process end-to-end, identifying any areas that are still inefficient or ineffective and making further improvements. By doing this, organizations can continue to design and implement changes to their processes, monitor the impact of these changes on the organization, and its stakeholders, and identify opportunities for further improvement.

8. Review and update the process models

The final step of the business process modeling framework involves reviewing and updating the process models on a regular basis, to ensure that they remain accurate and up-to-date with any changes in the business environment. This continuous process of review and update is essential to ensure that the organization's processes remain aligned with its goals and stakeholder needs. Regular feedback from the stakeholders and review sessions are recommended as best practices to keep the process models relevant. It is also recommended for the organization to designate an individual who can take on the responsibility of maintaining the process models and gathering the feedback.

By continuously updating the process models, organizations can identify new improvement areas and refine their processes further. This step helps organizations to ensure that their process models remain up-to-date and relevant, and that they continue to accurately reflect the organization's processes over time. Therefore, the validation of process models, which forms a cycle with steps 6-8, is crucial in ensuring the effectiveness and efficiency of the processes.

Responsibility guidelines

The level of responsibility in business process modeling between the case company and the customer organizations may vary depending on the specific project, contract and the expertise of each party. However, Table 6 presents guidelines of primary and secondary responsibilities between the case company and its customer organizations. Primary responsibility is the most important duty that one is primarily accountable for, while secondary responsibility is a supporting role that assists the primary responsibility holder in achieving the goal.

The primary responsibility for steps 1, 2, 7 and 8 lie with the customer organizations. They should provide the necessary information and guidance to help the consulting team from the case company understand the scope and objectives of the business processes to be modeled as well as identify the key stakeholders and ensure their participation in the modeling process. Customer organizations should also implement the new processes and monitor their

performance over time, making any necessary adjustments to ensure continuous improvement. Furthermore, the customer organizations should regularly review and update the process models to reflect changes in the business environment, such as changes in technology, regulations, or customer needs, and ensure that the processes remain aligned with organizational goals and stakeholder needs. However, the case company should also provide guidance on industry best practices and help the customer organizations to ensure that the scope and objectives of the processes align with the overall strategic goals of the customer organization. Additionally, they should guide the customer organizations on stakeholder engagement, communication best practices and support in the development of a comprehensive implementation plan.

Table 6. Guidelines for responsibilities in business process modeling

Step	Case company	Customer organizations
1. Define the business processes	Secondary	Primary
2. Identify key stakeholders	Secondary	Primary
3. Gather information about the "as-is" processes	Primary	Secondary
4. Identify improvement areas and define "to-be" processes	Primary	Secondary
5. Develop accurate process models	Primary	Secondary
6. Validate process models with stakeholders	Primary	Secondary
7. Implement the new processes and monitor effectiveness	Secondary	Primary
8. Review and update the process models	Secondary	Primary

The primary responsibility for steps 3, 4, 5 and 6 lie with the consulting team from the case company. They should conduct a detailed analysis of the existing business processes involving multiple perspectives, such as those of process owners and individuals who have direct experience and knowledge of the business processes. The consulting team from the

case company should also use the information gathered in step 3 to identify opportunities for process improvement and define the future state of the processes as well as use process modeling techniques and tools to create a visual representation of the “as-is” and “to-be” processes. Additionally, they should review the process models with stakeholders to ensure that they accurately reflect the requirements and objectives of the customer organizations, and make any necessary adjustments based on feedback. However, the customer organizations should be involved in providing feedback and insights to ensure that the “to-be” processes align with their needs and objectives, and that the process model accurately reflects their requirements.

7 Conclusions

The main objective of this thesis was to develop a comprehensive framework for the case company to model business processes for its customer organizations. The research focused on identifying the best practices for business process modeling in customer organizations. This involved analyzing the current way of modeling customers' business processes, including the related challenges, utilized tools, techniques, and key factors in successful business process modeling. A qualitative research approach was employed using empirical observation and semi-structured interviews. Furthermore, the data collected from the interviews were analyzed using content analysis to identify patterns and themes related to the research questions.

The findings of the study revealed that the current approach to creating business process models in the case company primarily involves analyzing existing "as-is" process models, conducting interviews and workshops with key stakeholders to create "to-be" processes using tools such as Microsoft Visio, and utilizing high-level process taxonomies. Finally, the process models were validated in a large multinational and cross-functional group. However, several challenges were identified, including a lack of standardized approach, cross-functional collaboration, understanding of outdated "as-is" models, consistency in level of detail, coherent process models, and stakeholder engagement.

Based on theoretical best practices and the conducted current state analysis, the proposed framework provides a structured method for analyzing, designing, and implementing the customers' business processes in a systematic manner. The framework consists of eight key steps: define the business processes, identify key stakeholders, gather information about the "as-is" processes, identify improvement areas and define "to-be" processes, develop accurate process models, validate process models with stakeholders, implement the new processes and monitor effectiveness, and review and update the process models. The guidelines of primary and secondary responsibilities between the case company and its customer organizations concerning the framework are also provided.

Future research could investigate how the case company can implement the framework and its effectiveness. Further research could also be conducted on how the findings of this research could be applied to other industries and organizations since only one specific

customer organization was studied. Overall, this research contributes to the literature on business process modeling and emphasizes the importance of standardizing approaches to create coherent and accurate process models.

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Appendix 1. Interview questions

General

1. Can you describe your current role and responsibilities within your organization?
 - a. How does your role relate to business process management and modeling?

Business Process Management

2. Could you please explain to me your understanding of business process management and how it relates to overall business performance?
3. What methods do you use to identify different processes (e.g. core and support processes) within an organization?
 - a. What criteria do you use to make this determination?
 - b. How do you determine their interdependencies?

Business process modeling

4. What are some common applications of business process models, and how have you used them in your work?
5. Could you describe the process for business process modeling in your organization? What tools, techniques, or methodologies do you typically use?
6. What types of process models have you used in the past (e.g. flowcharts, BPMN diagrams, process flow diagrams)? Which do you prefer and why?
7. When modeling business processes, what are the key factors that should be considered to ensure accuracy and completeness?
8. How do you ensure that a process model is scalable and adaptable to changes in the business environment?
9. How do you ensure the buy-in of stakeholders during the process modeling phase?

Final question

What are some of the biggest challenges you have encountered in your experience with business process management and modeling? How have you addressed these challenges?