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Process Automation with Business Process Management

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We hope that our BPMS Selection Framework will provide guidance for companies in implementing and working with BPM.

Stockholm, January 2012

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Abstract

Title	Process Automation with Business Process Management (BPM)
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Keywords	Business Process Management (BPM), Process Automation, Business Process Management Systems (BPMS), BPMS Selection Framework (BPMS SF).
Background & Problem	Over the last decade, BPM has become a popular term in IT-management and organizational management. There is often a need for automation with BPM but not always a clear demand. The step from understanding the need of BPM and to actually implementing it using process automation can be too great for an organization.
Purpose	The purpose of this thesis is to deliver a framework to be used by IT-consultancy firms or by the IT-department of any organization in clarifying the benefits to be gained from implementing BPMS. This framework identifies what makes a process suitable for automation with BPMS and provides guidance in selecting the solution and the vendor for automation.
Methodology	The methodology used in this thesis is a combination of descriptive and explorative study. The data collection is based on existing literature on BPM combined with interviews with BPM professionals and experts. The research process is divided into two lines, the first identifying what makes a process suitable for BPM and the second to understand the BPM practice and the market for BPMS.
Results	<p>In order to provide guidance in automating processes with BPM four steps should be followed, evaluating process automation potential, determining automation requirements, finding the appropriate BPMS solution and selecting the BPMS vendor.</p> <p>The process potential is evaluated according to three criteria; health, importance and feasibility. This evaluation results in four feasible process groups where each group has a composition of characteristics that indicates their potential for automation with BPM.</p> <p>After the process evaluation, automation requirements are taken into consideration and an additional classification of the processes is done.</p> <p>The feasibility and automation requirements are then combined and for each unique combination a suitable solution is provided together with a vendor recommendation.</p>

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1 INTRODUCTION

This chapter gives the background of the master thesis. The purpose and expected results along with the outline, delimitations and terminology used in the report is presented.

1.1 Problem background

During the past decades process orientation has been an increasing trend in business improvement. Business Process Management (BPM) is a popular way of increasing process orientation in organizations, often with process automation and some kind of IT-system, Business Process Management System (BPMS).

The boost of process orientation and BPM has spread to organizations operating in various industries. Process automation is attractive to organizations since it can save time, money and increase quality. The IT-consultancy industry has experienced an increased demand for information about, and services within BPM.

There is a clear need for BPM among the customers of IT-consultancies today, but there is not a clear demand. Projects that could be suitable for BPM often turn in to other IT-solutions due to the difficulty in getting the customer to see the benefits of BPM. The competencies and resources for BPM are evident and the areas of improvements are in the selling pitch, to clearly show what is in it for the customers. This indicates a need for a framework that facilitates the selection of which processes are suitable for BPMS and guidance in vendor selection. Hence when this can be done in an easier way it will help convincing the customers and organizations that BPM is the best way to automate processes.

This thesis is an initiative from Sigma IT & Management in order to provide BPMS selections guidance for the IT-industry in general.

1.1.1 Problem definition

The problem that this master thesis will solve is defined through the following questions:

- ◆ What kinds of processes are suitable for automation with BPMS?
 - Are there any characteristics that make a process suitable or non-suitable for automation with BPMS?
 - What kind of BPMS should be used to which process?
 - Could this classification of suitable processes and identification of the best BPMS be done in one generic framework?

- ◆ What is essential for a company to succeed with BPM?
 - What are the critical factors for implementation?
 - What does the future look like for BPM services?

1.2 Delimitations

The BPMS Selection Framework (BPMS SF) developed in this thesis is generic. The framework can be used for processes in all kinds of industries, geographic locations regardless of the size of the company or organization. Naturally, some criteria of the BPMS SF will be of greater importance than others depending on the nature of the organization.

Experience from mapping business processes exists within IT-firms and potential customers for the BPM projects in this thesis are considered to currently be process oriented. The framework developed in this thesis will not cover mapping business processes. The framework is to be used on a number of already mapped processes.

The market for BPMS is technology intense, dynamic and can rapidly change. The part evaluating BPMS should therefore be considered a snapshot of the current market situation and how to evaluate BPMS vendors.

1.3 Purpose and deliverable

The purpose of this thesis is to develop a framework to be used in the evaluation of which processes that are suitable for automation with BPM and match the selected processes with the right BPMS. The deliverable is therefore a BPMS SF with clear guidelines of how to evaluate processes and categorize them into groups that can be matched with appropriate BPMS.

1.4 Target audience

The primary target group are employees and managers in the IT-industry where the intention is that the BPMS SF can be used when evaluating processes suitable for BPM and guidance in selecting BPMS vendor.

The secondary target group is students and academia seeking information about automation of processes and when to use BPM in managing business processes. The BPMS SF can be used by students to increase the understanding of how and when BPM can make the greatest impact in an organization, and also give a view of different BPMS on the market, how and when they can be used in order to succeed.

1.5 Report outline

Below a brief summary of each chapter in this thesis is presented.

Chapter 1	In chapter one the problem background of the master thesis is presented. The chapter provides an introduction to the problem background, delimitations and purpose of the thesis.
Chapter 2	In chapter two the methodology and methodological approach of the thesis are described.
Chapter 3	In chapter three the frame of reference is presented. It covers definitions and background of processes and process management. Different views on processes are presented.
Chapter 4	In chapter four the industry perspective of BPM and the fundamentals of BPM practice are described. The chapter presents theory of how a BPM project is managed and presents instructions of how to avoid common pitfalls.
Chapter 5	In chapter five BPMS and the different vendors on the market are described.
Chapter 6	In chapter six it is described how the methodology presented in chapter two resulted in the actual research process. How the research results are utilized in the development of the BPMS SF is presented.
Chapter 7	In chapter seven the BPMS SF developed by the authors is presented. The different characteristics for determining the BPM automation suitability are described, followed by the factors effecting the selection of BPMS solution and vendor.
Chapter 8	In chapter eight the thesis is concluded, presenting fulfillment of purpose and questions.
Chapter 9	In chapter nine the references used in the thesis are presented.

1.6 Abbreviations

BPM	Business Process Management
BPMN	Business Process Management Notation
BPMS	Business Process Management System
BPMS SF	Business Process Management System Selection Framework
BPR	Business Process Reengineering
CEM	Customer Experience Management
CMM	Capability Maturity Model
COTS	Commercial off-the-shelf
EA	Enterprise Architecture
ECM	Enterprise Content Management
KPI	Key Process Indicators
SaaS	Software as a Service
SOA	Service-oriented Architecture

2 METHODOLOGY

In this chapter the research design and working methods of the study are presented as well as a discussion of the credibility of different research methods.

2.1 Research methodology

The amount of existing knowledge within an area is essential when deciding which research methodology to adopt. A study can either be explorative, descriptive or normative. An explorative study is used when there is little knowledge within the field of study and therefore a basic understanding is the aim. However when there is existing knowledge and understanding within the area and the aim is to describe but not explain a descriptive study is appropriate. The third alternative is the normative approach, which is to be used when there exists knowledge and understanding within the field and the objective is to give guidance and present action proposals.¹

2.1.1 Choice of research methodology

This master thesis will start of as an explorative study and as more knowledge is gained it will continue towards a descriptive study. The study will also be normative to some extent, since the model will most certainly not be applicable for all future cases.

2.2 Methodological approach

The view of knowledge depends on personal opinions and will therefore have impact on the aim of the study. Hence there are three methodological approaches; analytical, systems and actors approach.²

The analytical approach requires existing theory. A researcher with an analytical approach strives to explain the reality as unbiased and as thoroughly as possible. The subjective intuition is given no respect and the knowledge is regarded to be independent of the observer. Using the analytical approach the researcher is trying to find a cause and effect relation. The reality is seen as a whole, which can be split up into different smaller parts where the sum of the parts is equal to the whole.³

A researcher with a systems approach like the one with the analytical tries to explain the reality unbiased but does not consider the reality to be the exact sum of

¹ Björklund, M; Paulsson U (2008)

² Arbner I; Bjerke B (1998)

³ Ibid

its parts. Thus it stresses the relation between the different parts as these have positive or negative effect on the sum, also known as synergies. The researcher is aiming to investigate the correlation and relation among the different parts in order to understand the underlying factors for different behaviors.⁴

The actors approach has no interest in explaining but to understand the social context, thus the main emphasis is that the reality is a social construction influenced by with influence on people. The declaration of reality made by the researcher is therefore dependent on the researchers experience and actions.⁵

2.2.1 *Choice of methodological approach*

The systems approach is chosen since the process will be broken down and different characteristics defined which together give a whole picture of how the process is suited for automation with BPMS.

2.3 Scientific research

There are three different research approaches considered when writing this thesis: action research, clinical research and case study.

Action research is an approach used when facing a complex problem or a problem that is dependent on a certain event. In this approach not only the cause of the problem is studied, but also the process in between which makes it easier to understand the interaction between different variables.

However, in a case when an organization needs help with solving an identified problem and turn to a researcher, a clinical research is to be preformed. Comparing this with a consultant's role, a clinical approach is based more on a theoretical framework to find the solution whereas a consultant would use a more practical approach. A characteristic of the clinical approach is the continuous dialogue between the researcher and the studied organization.

A case study can be used when facing a complex problem that needs a thorough analysis in order to be solved or even understood. When making a case study a specific object is analyzed closely.

2.3.1 *Choice of research method*

The action and clinical research are used since they both have a practical approach and are used in improvement projects, which this study is considered to be. The case

⁴ Arbno I; Bjerke B (1998)

⁵ Ibid

study however, is used when a certain situation is studied closely and therefore also considered appropriate for this thesis.⁶ The research method used in this thesis and documentation is described further in chapter six.

2.4 Qualitative and quantitative analysis

Data can be collected and classified as qualitative or quantitative. Which kind of data to be collected hence the purpose of the study, decides which one to chose.

Quantitative studies contain information that can be measured and valued numerically whereas qualitative studies are used to create deeper understanding of a specific subject, commonness or situation. Quantitative studies are limited by the fact that not everything can be measured quantitatively and qualitative studies are not possible to generalize to the same extent as quantitative studies.⁷

Observations and interviews with a relatively few number of persons will be performed in this thesis, why this is a qualitative study. Since the purpose is to understand how processes work and highlight the characteristics that have impact on the potential of automation, interviews with professionals and people working within the topic is considered the best source of information.

The data collected in this thesis is from specific BPM professionals and the questions that answered are regarding view and thoughts about BPM. Since there is a difficulty in finding and connecting with respondents carrying the right knowledge in BPM qualitative data collection is suitable for this thesis.

2.5 Data collection

There are two types of collected data; primary and secondary data. The primary data consist of information that is collected with the specifically aim of the research i.e. through interviews, questionnaires and observations. Secondary data on the other hand is general and public information that can be found in for example literature and journals⁸. In this thesis a combination of these two data types is used. Primary and secondary data is collected from interviews. Further secondary data is also collected from literature and media.

2.5.1 Interviews

In this study several interviews are held. In the beginning descriptive interviews are performed to gain the basic understanding of how BPM works and how it is

⁶ Karlsson, C (2009)

⁷ Björklund, M; Paulsson U (2008)

⁸ Ibid

implemented in organizations. Further on during the data collection deeper interviews are held. Most of these are unstructured. Since the respondents have different knowledge, background and positions, which give them different perspectives, a structured interview makes it hard to ensure that all topics are covered.

2.5.2 *Literature study*

The studied field of BPM is relatively young resulting in a limited amount of literature. However with the increasing interest the past years the research in the field is expanding, but most of the available literature is research papers. Fortunately, there are some literature on the subject and on overall process change which provides a more unbiased theoretical framework and applied solutions. The research process is further described in chapter six.

2.6 **Work process**

The work process follows a so-called “double funnel” but as a bottom up process as illustrated in **Error! Reference source not found.** Since a very broad description of the current situation is given, the first task is to identify the problem. The problem is at first broad but later narrowed down in order to set the background of the study in terms of goals and purpose. This leads into an expansive study within the problem area and a quantitative data collection. This results in an overall knowledge and understanding of the problem area, which helps identifying the foundation of some kind of selection framework. Lastly, in order to narrow down the objective and “sharpen” the framework for selecting processes, further qualitative study is performed.

The illustration of a funnel clearly shows that nothing that is not put in at the top of the funnel can come out at the bottom, meaning, the objective cannot contain any new information but a logical consecution of the earlier reasoning.⁹

⁹ Björklund, M; Paulsson U (2008)

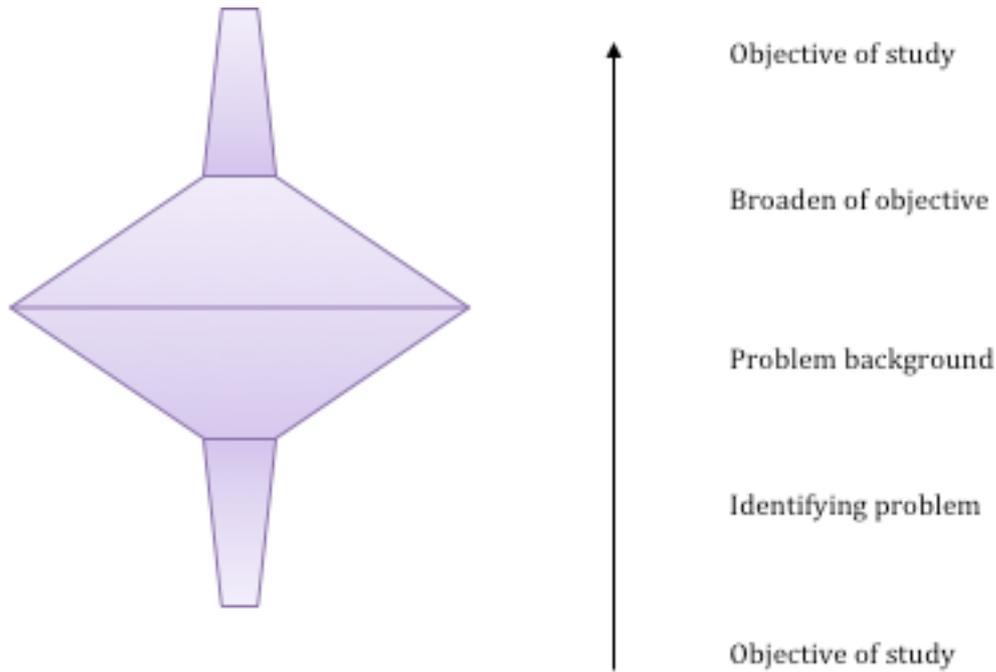


Figure 1: "Double funnel"¹⁰

2.7 Credibility

There are three aspects to consider in order to ensure the credibility of a study: validity, reliability and objectivity.¹¹

2.7.1 Validity

Validity refers to the extent the method measures what it is supposed to measure. In this thesis, validity has to be ensured in the communication with interviewees. The questions have to be asked in a straight manner, easy to understand for the interviewee and the responses have to be validated through follow up questions.

2.7.2 Reliability

Reliability refers to the extent that the results are consistent over time. In this study reliability has to be ensured but since BPM, the current trends and usage of process management is changing it is not certain that the results would be the same if the study was made again in the future. The fact that there are always two persons taking notes and listening to interviews ensures the reliability needed for this thesis. A short summary of the interviewee's responses that can be cleared by them after the interview ensures that they are confident that responses were in line with their constant opinion.

¹⁰ Björklund, M; Paulsson U (2008)

¹¹ Golafshani, N (2003)

2.7.3 Objectivity

Objectivity implies the neutrality of the study, if the study is made and presented in an un-biased way.

One thing that can be bias this thesis is that the writers are working too close with BPM and overestimate the importance of BPM in organizations. The research and information about BPM can also be biased from this. The risk of this can be decreased by discussing the findings with people experienced in business and process management. Difficulties in working with BPM should also be investigated.

3 FRAME OF REFERENCE

The purpose of this chapter is to give the reader knowledge and understanding of relevant theories in process management. The chapter presents the theoretical framework and covers definitions, background and development of process management and BPM.

3.1 Process definition

A process is a set of activities undertaken in response to an event in order to generate an output.

The term process was first described in 1776 when Adam Smith published his thoughts about work division. Today there are many different definitions of business processes to be found in the literature. One definition is used by Davenport who says that a business process is "a set of logically related tasks performed to achieve a defined business outcome for a particular customer or market"¹². Another similar definition of a business process that is used by Ljungberg is "A process is a repetitively used network of orderly linked activities using information and resources for transforming inputs to outputs, extending from the point of identification to that of the satisfaction of the customer needs."¹³

The complexity of a process can vary from very simple to very complex. Business processes can be divided into three categories: main processes, support processes and steering processes.

Main processes, or operational processes are the processes that fulfill the business idea of the organization and create value for the customers. The main processes cut through divisions and functions e.g. purchasing, manufacturing and sales.

The support processes do not directly create value for the customers but are necessary for the main processes to work. Examples of support processes are HR-processes and firm infrastructure.

Steering processes or management processes are the processes that govern the operations of a system, for instance strategic management.¹⁴

¹² Davenport, T; Short, J (1990)

¹³ Ljungberg, A (1998)

¹⁴ Davenport, T; Short, J (1990)

3.2 Process management background

Process management refers to when an organization works with focus on its processes in a structured way. Historically, process management can be viewed on coming from three different branches: business management, quality control and IT-management¹⁵.

3.2.1 The Value Chain

Process management has its roots in the early publications by Adam Smith and Frederick Taylor. In 1911 Frederick Taylor published “Principles of Scientific Management”, where he argued for work simplification, time studies and systems that measured output. In 1985 Michael Porter published his famous best-seller “Competitive Advantage: Creating and Sustaining Superior Performance”, where he introduced The Value Chain. The Value Chain categorizes the generic activities of an organization and is a good tool for strategic planning. The Value Chain divides the activities of an organization into primary activities horizontally and support activities vertically. Defining activities is the foundation of process thinking and help understanding the processes in an organization.¹⁶

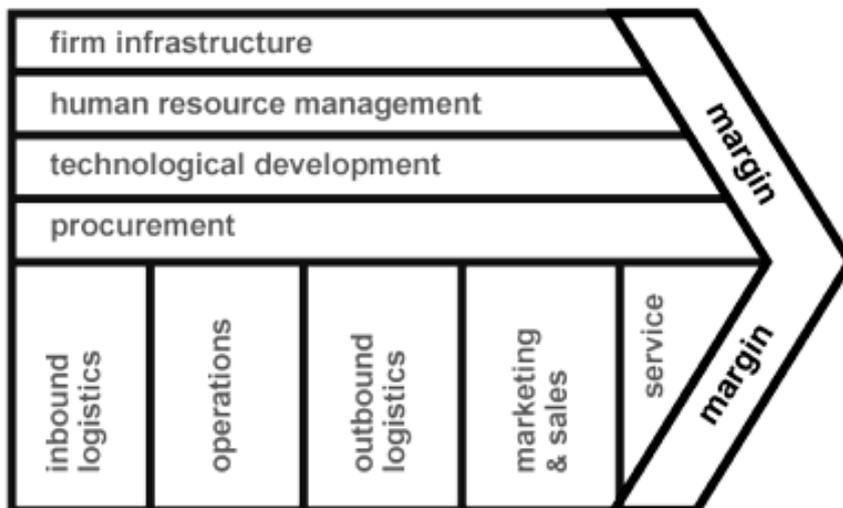


Figure 2: The Value Chain¹⁷

3.2.2 Business Process Reengineering

The trend in process management during the 90's was Business Process Reengineering¹⁸ (BPR). BPR refers to when an organization completely remodel its processes. The founders of the term BPR, management consultants Hammer and

¹⁵ Harmon, P (2010)

¹⁶ Porter, M (1996)

¹⁷ Proven Models

¹⁸ Wallström, M (2010)

Champy founded the process thinking that companies like SAP and Oracle use today. The BPR trend decreased when companies realized that they were facing the risk of accidentally cutting value-creating parts of the organization.¹⁹

During the 1990s the term “process” had a boost when productivity increased in organizations. Instead of looking at functions and procedures, companies started looking at processes. Figure 3 shows what the process trend has looked like the past 20 years and the tools used in the different stages. As can be seen in Figure 3, Porter’s Value Chain is the precursor in process management followed by Six Sigma and Process Reengineering of which Six Sigma has hold on and still have influences on today’s BPM.²⁰

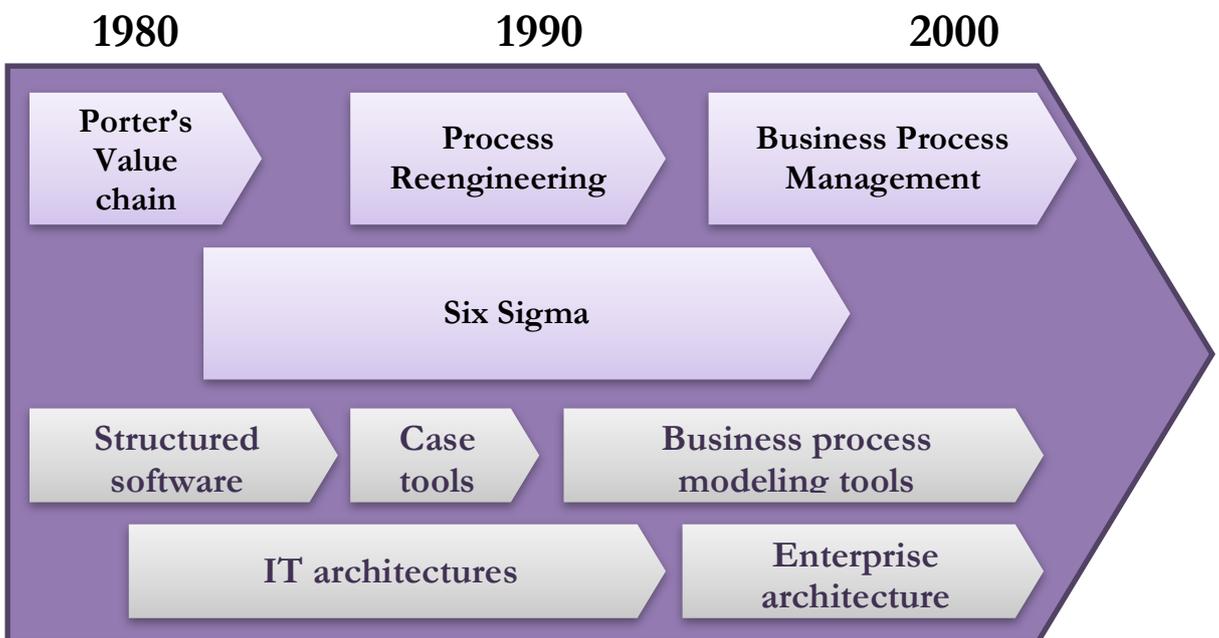


Figure 3: Process Management Development²¹

3.2.3 Six Sigma

In 1986, Six Sigma was introduced by Motorola. Six Sigma started as a quality management strategy, using a set of quality management methods to decrease errors in manufacturing processes, but has come to be applicable to other business processes than manufacturing. Six Sigma is an important branch of the quality control and process orientation that later led to BPM.²²

¹⁹ Harmon, P (2010)

²⁰ Ibid

²¹ Ibid

²² Ibid

3.2.4 *IT tradition*

The IT tradition of process management is process automation using computers and software applications. The IT tradition started with structured software methodologies and IT architecture. Today the Information Technology part of BPM involves Business Process Modeling tools and Enterprise architecture.²³

Enterprise architecture defines how information and technology supports business operations through a descriptive framework including goals, business processes, roles and software applications. Good enterprise architecture enables a company to respond to changing conditions in the environment.²⁴

Before the 1990s, process automation was known as software automation.²⁵

3.3 **Business Process Management**

BPM refers to the management approach or method of aligning business processes in order to improve business effectiveness.²⁶

Six Sigma and BPR are the two primary ancestors to BPM, which with their different strengths and weaknesses put up the foundation for the new process management, BPM. The quality control e.g. Six Sigma, suffered from two limitations, the definition of a business process as any sequence of work activities, which results in an enormous amount of processes within a company. All of these will not have a strategic significance for the company as a whole and will just lead to an unmanageable range of small-scale projects. The second limitation within Six Sigma is the objective to eliminate the variation and the achievement of consistent performance and as consistent not is to be seen as a synonym for good, a process can be defined consistent even though it might not achieve the required level of performance.²⁷

The BPR neither have the dimension of continuous improvement nor a very disciplined approach, which BPM managed to achieve. However, BPR introduced the redefined business process definition: “end-to-end work across an enterprise that creates customer value” which enables the tracking of delays, non value-adding overhead, errors and complexity. The other contribution from BPR is the focus on process design instead of process execution, which means that if the performance

²³ Harmon, P (2010)

²⁴ Enterprise Architecture

²⁵ Harmon, P (2010)

²⁶ Hammer, M (2010)

²⁷ Harmon, P (2010)

requirements outdo the design capability, the design is to be replaced by a new one.²⁸

Referring to this, BPM is seen as the third wave within business processes with its aim to emerge the work towards more effective processes, with a decent level of standardization without cutting the value creating parts of the processes. The aim of BPM is to make the processes support the business and in order to manage this, a BPM project must be on two legs, IT and business.²⁹ The IT leg is the Business Process Management System (BPMS), which refers to the software enabling BPM through facilitation of process design, workflow, applications, integrations and monitoring.³⁰

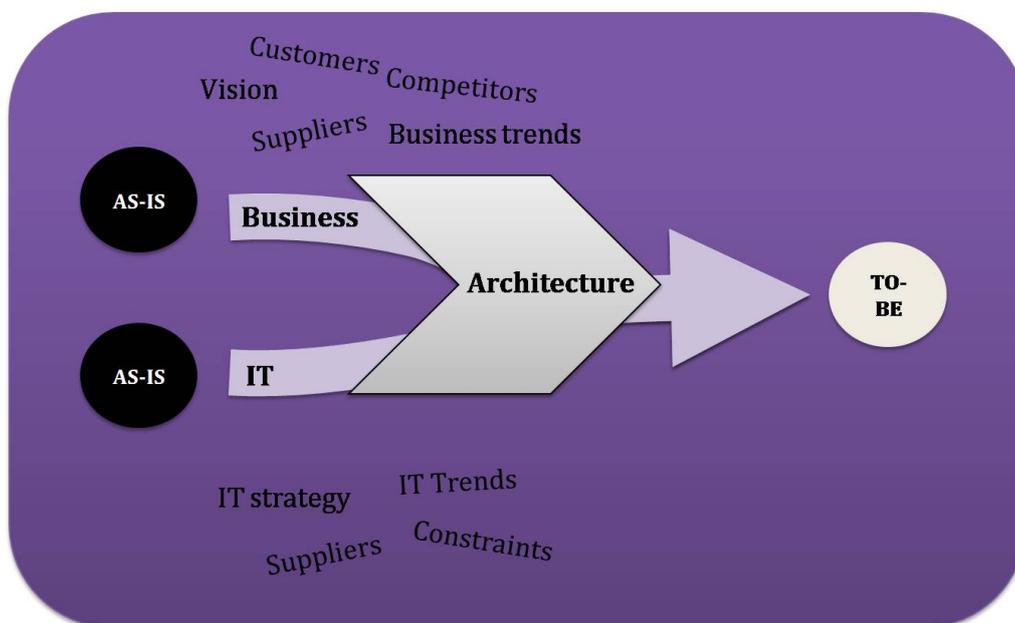


Figure 4: Architecture aligning IT and Business³¹

Through architecture the business goals and the IT-goals can be aligned in order to reach a common goal, the To-Be state.

3.3.1 Approaches to BPM³²

Since BPM is a widely used term, several approaches to BPM exist. Different BPMS vendors tend to use different terms but generally, three different approaches can be identified:

²⁸ Hammer, M (2010)

²⁹ Wallström, M (2010)

³⁰ Brännström, K-O (2011)

³¹ Berneskog, J (2011)

³² Littorin, L (2011)

1. Content centric – Content centric BPM has its main focus on the content. Generally, it deals with a simple process structure and a large extent of unstructured data, where the workflow is often related to document processes.
2. Human centric – Human centric BPM is also called case management approach. Human centric BPM is desirable when the data to a large extent is formal, and process flexibility is requested. Human centric BPM preferably deals with unstructured information.
3. Process centric - Process centric BPM refers to an approach where the focus lies on the actual processes, instead of people or documents. In process centric BPM, full automation with no human interaction is desired. The Process centric approach is also known as orchestration, which refers to the automated arrangement of software systems.

3.3.2 Service-oriented Architecture and BPM³³

Service-oriented Architecture (SOA) is based on the principle of developing reusable business services instead of building monolithic applications in silos. SOA creates business components, which hold business data and can be accessed through interfaces.

In order to make the most of a SOA, a BPM infrastructure is desirable. Business processes are modeled as processing tasks and each task is implemented as a service. BPM helps in creating process models, which is process automation in the form of invoking services. In other words, SOA exposes services and BPM uses these services when creating the process flow. Implementing BPM without services is complex since the process layer enables access to the underlying business applications. SOA is a good foundation of BPM since it supports a quick assembly and orchestration of process services into end-to-end processes.

SOA supports agility in an organization through its services that can be put together to satisfy current demand.

BPM is a top-down process approach and SOA is a bottom-up architectural approach. In an organization with SOA but no BPM, reliable and reusable services can be created, but the services will not be continuously improved. In an organization with BPM but no SOA, the application will not be as agile as in an organization with the two combined.

³³ Krishna Behara, G (2006)

3.3.3 Reference architecture

In order to realize how standard applications, services and process automation relate, the Sigma Target Architecture™ Reference Architecture shown in Figure 5 can be used. Reference architecture can be shared between enterprise architecture, solution architecture and software architecture. The reference architecture is a generic map to illustrate which IT-services are commonly used.

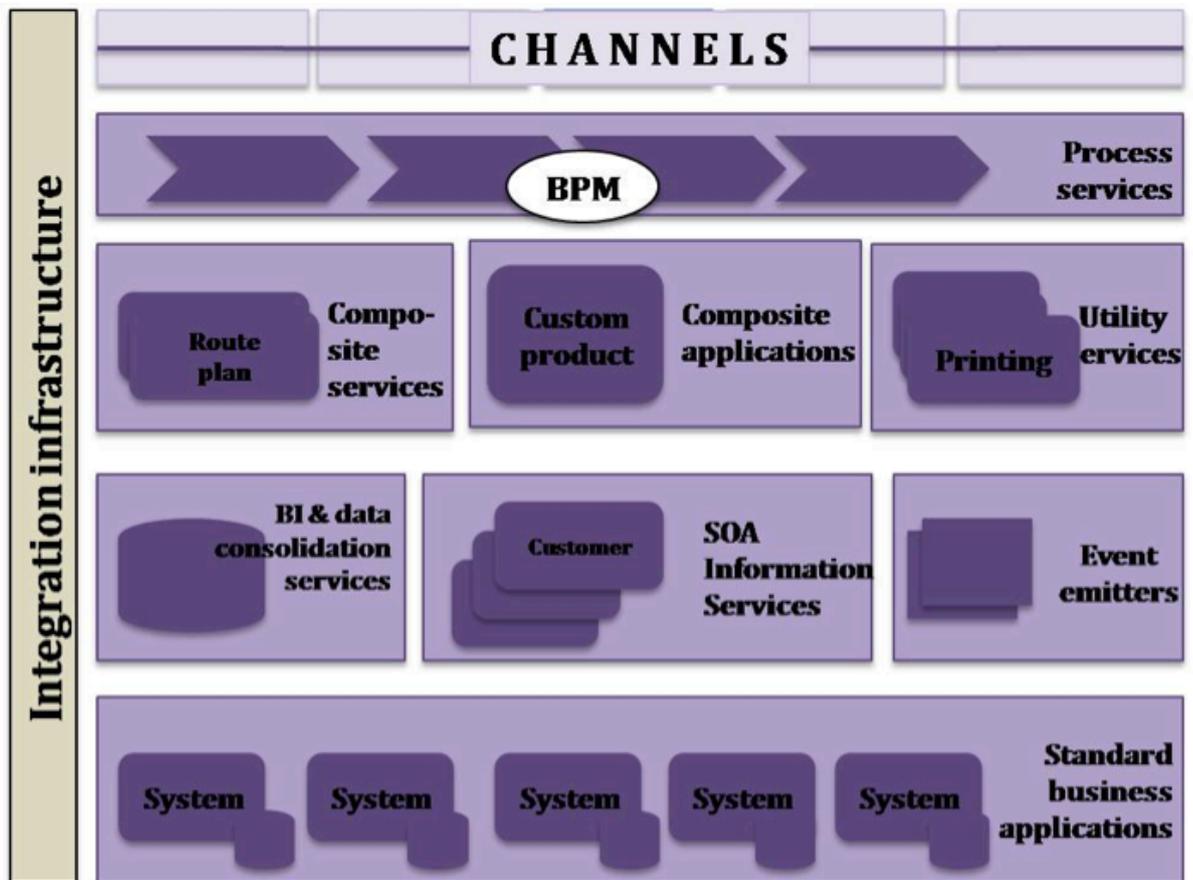


Figure 5: Sigma Target Architecture™ Reference Architecture³⁴

3.3.4 Customer demands on BPM

Findings from a survey done by Gartner in September 2007, show that about 60 percent of North American and European organizations already work with BPM and are using BPMS. In addition, another 19 percent plan to start in the next 12 months. These numbers indicate a growing demand for BPM solutions and the organizations are getting more convinced that the best way to improve operational performance is through the development of cross-functional processes.³⁵ Moreover, organizations realize a need for BPM in order to keep processes in pace with a constantly changing economic environment. Unfortunately, midmarket organizations have had some inabilities in

³⁴ Hallberg, J (2011)

³⁵ Henschen, D (2008)

gaining the full advantage of BPM efforts in the improvements of both top and bottom line performance. The inabilities can be consequences of resource and time constraints. To overcome these constraints and reach their objectives the customers will have a need for consulting and training services around BPM.³⁶

³⁶ Ketabchi, M (2010)

4 BPM PRACTICE

This chapter brings up the industry view of BPM and presents the theory of how to evaluate an organisation, its processes and change capabilities. A method of working with BPM projects is illustrated and finally a highlight of benefits and common pitfalls when implementing BPM.

BPM can help a company to move from component oriented to process oriented solutions. BPM configures architecture and brings a company to a higher level of abstraction.³⁷

However BPM can also be a way or approach of leading organizations to a process perspective with system thinking and with a focus on customer satisfaction. The result achieved by the customer, plays the central role and the aim is to define processes and all work according to this. One purpose of BPM is also to find ways of measuring processes, which in turns will enable improvement. The main focus of working with BPM should not be the automation. The automation should only be seen as a part of making the effectiveness and cost reduction possible. The focus is instead on the result for the customer and with the automation as the way of accomplishing this in an efficient way.³⁸ In order to work and manage BPM within a company an understanding of the organization and its processes are needed. This can be done by defining the maturity with help of the Capability Maturity Model.³⁹

4.1 Capability Maturity Model⁴⁰

The Capability Maturity Model is a 5-leveled organizational model that defines at what level or stage of maturity an organization is managing their processes. The level indicates how well a company can absorb and carry its software applications. The model also gives the actions and activities needed for an organization to ascend from one level to the next.

³⁷ Hunold, J-M (2011)

³⁸ Beck-Friis, M (2011)

³⁹ 12Manage

⁴⁰ Ibid

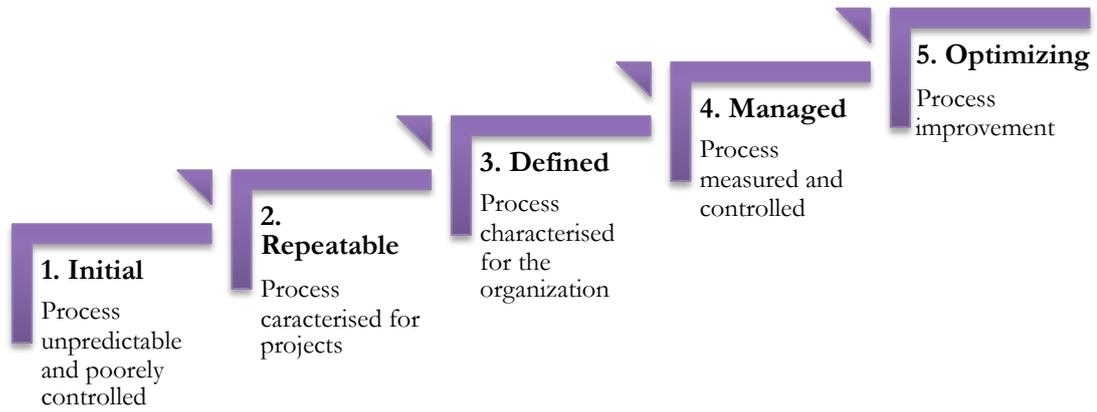


Figure 6: Steps of Capability Maturity⁴¹

4.1.1 *Initial*

Processes at this level are often undocumented and undefined and in a state of dynamic change. They tend to be driven in an ad hoc, uncontrolled and reactive manner, which results in a chaotic unstable environment for the processes.

4.1.2 *Repeatable*

Characteristics at this level are repetitive and standardized processes. Process discipline is rarely rigorous but to the existing extent it is to maintain the current processes during times of stress.

4.1.3 *Defined*

Processes at this level are defined and documented standard processes that are integrated with each other. They are established and subjected to some degree of improvement over time. The processes are As-Is processes and used to create consistency of process performance across the organization.

4.1.4 *Managed*

At this level the management uses process metrics to enable effective control of As-Is processes such as software development. This enables identification of ways to adjust and adopt the processes to the specific projects without measurable losses of quality or deviations from specifications. In this level process capability is established.

4.1.5 *Optimizing*

The focus at this highest maturity level is on continually improvements of process performance through both incremental and innovative technological changes and improvements. The areas of improvement are detected by quantitative feedback.

⁴¹ 12Manage

4.2 Change management and implementation

While BPM offers great possibilities for organizational improvement there are a number of critical issues that need to be properly addressed and checked before an organization starts to implement a BPM strategy.

A BPM-project means a great change and in order for a project to be successful, the organization has to be ready for and dedicated to the organizational change. When implementing BPM into an organization, mandates for decisions are needed. The management has to be committed to the project and understand the possible benefits of BPM in order to make the necessary decisions on time.⁴²

4.2.1 *The 8 steps change model*

There are many theories of how to manage with change amongst which “The 8 steps change model” by John Kotter is considered the origin. Kotter has identified a process outline for organizations to follow in order to avoid failure and adapt to change. Kotter means that organizations increase their chances of success both today and in the future by improving their ability to change.⁴³

The first step in Kotter’s model is to establish urgency around the need for change. Ways of doing this can be SWOT-analysis or scenario planning.

The second step is to create the guiding coalition since a change requires a strong leadership and support from key people within the organization. The guiding coalition should have enough power to lead the change effort and encouragement to work as a strong team that in turn will generate energy and put the sense of urgency in relation to the need for change.

The third step in the model is to develop a vision and strategy since a drive for change without a clear focus will often fail or rapidly dissolve. The task is here to create a clear vision that helps direct the change effort and then developing strategies for achieving this vision.

The fourth step is to communicate the vision and strategies. It is therefore important that all members of the coalition are confident in this vision. Moreover, this is to be more than just special announcement meetings; it is about face-to-face contact, openness and honesty in addressing the emotional dimensions of people’s fears and concerns.

⁴² Beck-Friis, M (2011)

⁴³ Kotter, J (1996)

The fifth step for successful change is to enable action and removing obstacles by changing systems or structures that seriously undermine the vision. People should be empowered and encouraged to take risks in pursuit of the vision.

The sixth step stresses that success breeds success and therefore it is important to plan for visible performance improvements and give the people a taste of victory by recognizing and rewarding those in the change process.

The seventh step implies consolidation and never to give up, since many change initiatives fail because victory is confirmed too soon. Failure is avoided by continuous improvement, increase of activity and reinvigorating the process with new projects, themes and change agents.

The eighth step for the changes to be sustained is to anchor them in the culture and embed them in the behavior of the organization. A coalition team member ought to tell and spread success stories about the change process and the leader needs to ensure that the change is seen in every part of the organization.⁴⁴

4.3 BPM project development

The BPM practice follows the path as of a regular development project, where the project should be organized in clear and defined steps as illustrated in Figure 7 below.



Figure 7: BPM project development⁴⁵

4.3.1 *Business process mapping*

In order to control an organization, an understanding about the processes is vital. The customer and their needs and expectations have to be defined.⁴⁶ This step therefore involves business process mapping, where the current state is understood. Business process mapping refers to gathering extensive information about the current processes in an organization, which often is to be done by either the business management or the IT-department. The information should include description of the

⁴⁴ Kotter, J (1996)

⁴⁵ Whalström, M (2010)

⁴⁶ Towers, S (2009)

different parts of the processes, the process flows, exactly what the processes do, who is in charge, the competence needed and how the process should be performed.⁴⁷

The information of the current state can also be called the As-Is. The As-Is can be defined performing a process diagnosis. The Customer Experience Management (CEM) suggests three indicators for this: moments of truth, break points and business rules.⁴⁸

Moments of truth refers to the relations with customers, i.e. all customer interactions. This helps to state the complexity of the process as the number of customer interactions and the interface in-between defines the level of complexity, since every interaction leads to work inside the organization. This work due to customer interaction is the indicator of break points. One customer interaction can correspond to one or several internal break points.⁴⁹

The break points in turn bring us to the third indicator, business rules. A business rule is a point that involves any kind of decision or choice to be done in order for the process to proceed and is therefore often associated with a time gap in the process. Worth to mention is that break points can depend on culture and determine the actual behavior in the process.⁵⁰

Business process modeling

Business process modeling is the practice of representing business processes graphically, using the gathered information from the process mapping. Business processes can be modeled with BPM tools and languages. The most widely used language for BPM modeling is called Business Process Modeling Notation (BPMN).⁵¹

BPMN is a flow-chart based notation for defining business processes. The biggest advantage of using BPMN is that the language has been agreed on between several vendors in order to benefit the end-user.

⁴⁷ Whalström, M (2010)

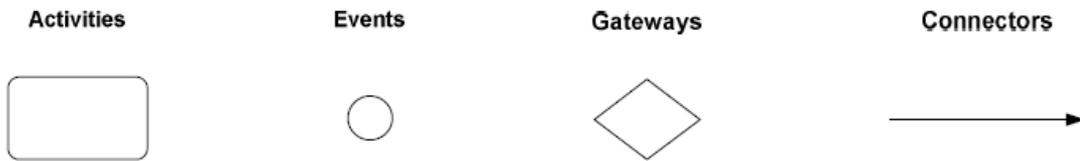
⁴⁸ Beck-Friis, M (2011)

⁴⁹ Ibid

⁵⁰ Ibid

⁵¹ Business Process Modeling Forum

Below an example of BPMN elements are shown.



4.3.2 Process classification

A well-performed mapping of an organization's processes is a prerequisite for the next step of classifying the processes. Here the process changing projects are assigned a priority according to their need of improvement.⁵² The definition of how important or how great the need of improvement is can be set by dividing the business process change efforts into different layers. To illustrate this the Business Process trends pyramid in Figure 8 is used.⁵³

The processes are examined closely to define what has to be done in the different parts of the process, whom internally to involve in this and whether suppliers, customers or partners should be involved.

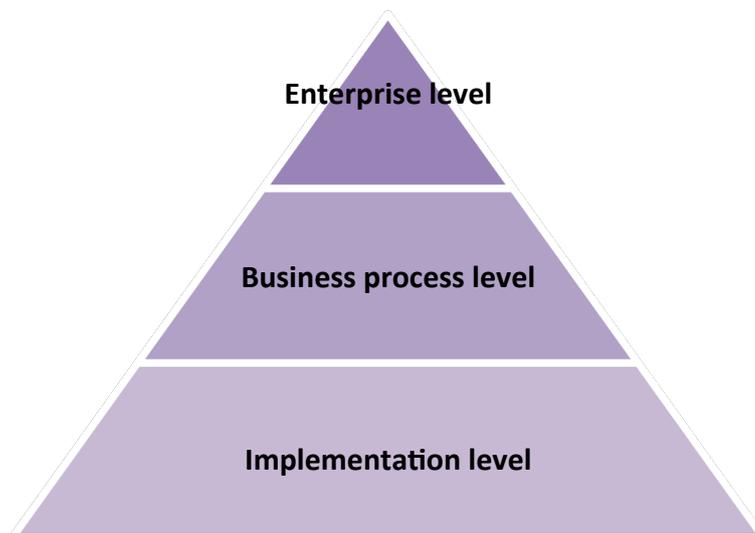


Figure 8: Business Process Trends Pyramid⁵⁴

When looking at business process change it is good to have model. This model divides the corporate business process change efforts in different layers. Some organizations

⁵² Wallström, M (2010)

⁵³ Harmon, P (2010)

⁵⁴ Ibid

that are less mature only focus on one layer, but as an organization becomes more mature in managing their processes they work on all levels at the same time.⁵⁵

At the top layer, the enterprise level, organizations work at organizing their processes across the whole enterprise and at aligning the processes with the strategy as well as defining measurement systems and process governance. Hence the initiatives at this level are focused on strategy, architecture, process governance and process measurement systems.⁵⁶

Organizations working at the business process level search for new approaches to process analysis and redesign. Therefore projects at this level aim at creating, redesigning and improving specific business processes. Here, companies have an interest in tools and methodologies that can be used to undertake business change projects.⁵⁷

At last, the implementation level where the aim is to develop new technologies and methodologies to solve business process problems. When a process is changed at this level it often requires software development or change. After determining the view and work with processes within the company, a process can also be divided into different levels of sub processes, called process hierarchy. The largest process that is normally discussed is the Value Chain. The Value Chain can be divided into business processes, which can be divided into processes and then sub-processes.⁵⁸

4.3.3 Performance measurement

The third step in the project model is measurement. Here, the processes are evaluated and measured either through key indicators in an eventual existing BPMS and if no tool is present external measurements have to be run. The aim of this step is to find the processes with the greatest potential for improvements. The importance is to analyze what can be removed or changed without negative consequences for the company or the customers.⁵⁹ The process mapping is of great help here. By closely studying the business rules, the prior break points and customer interactions, valuable information of how to decrease these interactions and how to make decisions faster can be found which in turns will shorten the lead

⁵⁵ Harmon, P (2010)

⁵⁶ Ibid

⁵⁷ Ibid

⁵⁸ Ibid

⁵⁹ Wallström, M (2010)

time of the process. These measurements and information are the foundation of the next step, creating a To-Be process.⁶⁰

4.3.4 *Process architecture*

In the last step the process architecture or To-Be process is built. It should include a well-defined action plan that has to be approved by the customer. A clear instruction of how this is to be implemented is also vital. Moreover, it should define ways of how the process should be measured. It is not until this step that a specification of the IT-support and its clear linkage to the processes, business models and the company's strategy can be presented.⁶¹ This step also implies the assignation of a process owner.⁶²

The processes need a process owner who can coordinate activities and the development of the processes. The person chosen as process owner should have good knowledge in the organization, its processes and preferably experience from process management and process thinking.⁶³

4.4 **BPM project pitfalls**

It is important that the requirements are properly set, understood by the people working with the BPM project and those affected by the changes in the organization.⁶⁴

- **Supplier focus** - In some cases, organizations use the BPMS vendor portfolio as a starting-point. The vendor presents its existing solutions, which may not necessarily be compatible or the most effective way to deal with the company's processes and to fulfill their business goals. Relying on existing solutions, carries less of a risk but might not give the best pay off in the long run.⁶⁵
- **Redundant processes** - Sometimes organizations start off a BPM project by automating the processes they find suitable for automation without taking into consideration if the processes are necessary and create value for the customer. A process' existence should always be evaluated before automation, never be taken for granted.⁶⁶

60 Beck-Friis, M (2011)

61 Ibid

62 Wallström, M (2010)

63 Harrington, J (1991)

64 Davis, R (200)

65 Information Management

66 Ibid

- **Broken processes** - BPM can be used to automate a process that has not been investigated and evaluated in detail. Automating a process that in some way is already broken will lead to errors being generated at a faster speed than before.⁶⁷
- **Standardized mapping** - It is important that the people mapping the processes use the same language and that there is a standard set so that different people model in the same way. If this is done correctly, it will be possible to deduce which processes that are the same or similar and can be handled in a common way.⁶⁸
- **Right Key Performance Indicators** - In order to measure the pay off from improving the processes and implementing BPMS it is essential to measure the right things. The Key Performance Indicators (KPI) that are chosen has to be in line with business goals and processes. Both internal and external metrics has to be taken into account when evaluating the performance. The processes should be measured continuously.⁶⁹
- **Mapping scenarios** - A common mistake while mapping for BPM is to forget to map the process the unsuccessful scenarios. It is important to map any outcome and cover all possible scenarios in a process. An example of this would be when mapping processes in a bank where one activity is to check customer credit. It is important to map the scenario that the customer has bad credit, and how to handle this.⁷⁰

67 Information Management

68 Davis, R (2008)

69 Fitz-Gibbon, C (1990)

70 Davis, R (2008)

5 BPMS

In this chapter BPMS are further explained. The market for BPMS is described and a selection of solutions are presented.

BPMS is the software enabling BPM through facilitation of process design, workflow, applications, integrations and monitoring.⁷¹ It is the collection of integrated tools supporting the entire process life cycle from modeling and execution to measurement and optimization. BPMS enable organizations to make more out of what they already own by coordination of tasks and human process activities and synchronization of data across the existing systems. Moreover, it facilitates streamlining of tasks, triggers and timelines that are associated to a business process and that these are completed according to the definition of the process model.⁷² Implementing a BPMS can lead to shorter lead times, cost reductions and business optimization in general.

One way that many consultancy firms offering BPM and BPMS work today is through partnerships, where the consultants do the pre-work meaning the project and then their partner stand for the licenses and development of BPMS. This results in a tendency of less focus on the tools where the work is concentrated on the project phase. All the work before is what creates value; the tool is just the last solution to what have been identified.⁷³

However, if there is no partner, understanding and selecting the right BPMS is of great importance. In order to enable what have been identified in earlier stages and to implement BPMS in an organization, the right solution is vital. The tendency is that firms either enter partnership or even offer the whole service from project to the developing and owning their own licensed solutions.⁷⁴

First and foremost when looking at the BPMS market it needs to be kept in mind that each market analyst has a unique and slightly different definition of the market and every BPM project therefore needs its individual supplier short-list. However, an overall picture can be given to illustrate the general characteristics and size of the vendors.

⁷¹ Brännström, K-O (2011)

⁷² BEA Systems

⁷³ Beck-Fris, M (2011)

⁷⁴ Brännström, K-O (2011)

The BPMS on the market today ranges from unsophisticated tools that record a process in a simple format to tools that are extremely sophisticated, linking processes, sub-processes, high level value chains and re-use sub-processes.⁷⁵

The deployed software market segment is relatively large with a range from hundreds of million dollars on the low to several billions on the high end. The market is growing fast, about 30-80 percent annually during year 2007 through 2011 and is according to Maureen Fleming at the International Data Corporation, described as “fastest growing segment of application deployment software”. The market sees a consolidating trend and shows that big vendors recently have entered the market through acquisition of smaller BPM vendors to cover a larger spectrum of products.⁷⁶

These acquisitions by larger companies have a great impact on the BPMS market, just in the year of 2010, IBM acquired Lombardi and Progress acquired Savvion.^{77,78} Earlier in 2008, also BEA Systems was acquired by Oracle.⁷⁹ This eases Lombardi, Savvion and BEA’s way into the larger customers who today rely on their major vendors instead of looking into smaller companies. Moreover, these changes mean that there are three vendors less on the market that now instead will be influenced by philosophies from IBM, Progress and Oracle.⁸⁰

When looking closer into the BPMS market, the different solutions offered today will be sorted in three groups. BPMS COTS, BPMS Cloud and BPMS Development. Furthermore, the word tenants will be used when referring to client organizations.

5.1 BPMS COTS

BPMS COTS implies all the vendors offering BMPS today but with the distinction to solutions where every tenant runs the applications on its own server and can be accessed through a web browser.

The market of BPMS vendors is fairly fragmented, with several specialists among the leading vendors and it is a competitive and dynamic environment.⁸¹

There are several larger research companies that continuously perform supplier evaluations and Gartner is one of these. Every year, they release a Magic Quadrant

⁷⁵ Cummins, F (2008)

⁷⁶ BEA Systems

⁷⁷ IBM

⁷⁸ Progress Software

⁷⁹ Oracle

⁸⁰ Bouncing thoughts

⁸¹ Ovum (2010)

where they evaluate the top 25 vendors based on four usage scenarios for BPMS.

These scenarios are:

1. Support for a continuous process improvement program.
2. Implementation of an industry-specific or company-specific process solution.
3. Support for a business transformation initiative.
4. Support for a process-based, Service-oriented Architecture (SOA) design.

This assessment resulted in 2010's quadrant looking as follows.⁸²

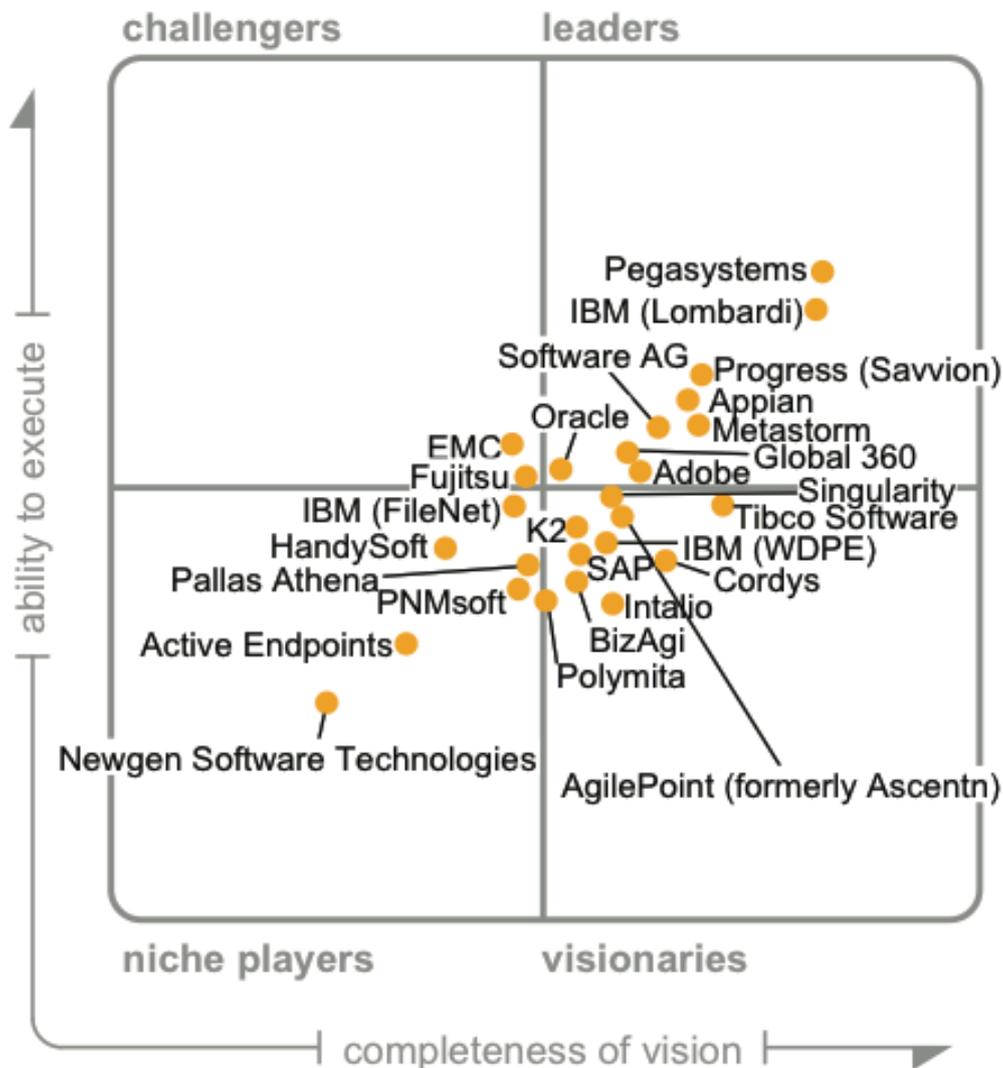


Figure 9: Gartner's Magic Quadrant BPMS 2010⁸³

One way to enable a closer evaluation of all these vendors which will give a general picture is by dividing them into "Pure players" and "Stack vendors". By doing this

⁸² Gartner (2010)

⁸³ Ibid

categorization, a comparison of the two kinds can be done instead of breaking down the market and looking at every specific vendor.⁸⁴

Pure players share the Human centric approach as well as the Content centric. And this group can in turn be divided into the Pure players, just referring to the workflow management of Human centric approach and leaving out the Content centric BPM. However, several acquisitions across these two approaches (OpenText acquiring both Metastorm and Global 360) have led to that many players now cover the whole spectra hence one group is more representative. The Pure players from now on are therefore referred to as both Human centric and Content centric. Working with both workflow management and Enterprise Content Management (ECM) they offer a simple process structure with a case management approach where the workflows often are related to document processes and with a Content centric collaboration.⁸⁵

The second group is the Stack vendors such as, IBM, Progress and Oracle who in turn also have acquired Pure players. These Stack vendors have gained an ability to manage workflows, which enables more flexibility. The Stack vendors working with orchestration are mainly based on integration platforms but as mentioned there are exceptions where they have gained knowledge through acquisitions and therefore also have platforms based on workflow foundation. For a Stack vendor the ideal state is full automation with no human interaction in the processes and with a development based on orchestration engines. In the orchestration of the software services SOA is commonly used, hence it is preferable if the tenant already uses SOA.⁸⁶

All BPMS COTS implies a great investment cost but comparing the two kinds, the Stack vendors who offer integrated overall solutions, a customer choosing this type of vendor will benefit from integration costs that will be spread over hundreds of customers. In general the Stack vendors deliver a strong support for the entire life cycle process improvement.⁸⁷ Moreover, they mostly have greater financial potential in comparison to the Pure players. An advantage for a customer, looking to have the solution implemented by a software vendor is the consulting staff, which often is a bit larger when offered by a Stack vendor.⁸⁸

The reason for choosing a Pure player instead would be their focus hence these vendors tend to be more specialized within their BPM area. The Pure players often

⁸⁴ Francis, S a) (2010)

⁸⁵ Francis, S a) (2010)

⁸⁶ Littorin, L (2011)

⁸⁷ Gartner (2010)

⁸⁸ Francis, S a) (2010)

posses a deeper expertise on one specific BPMS solution and since every product has its own strengths and weaknesses they will be aware of these and use the tool in its best way. Moreover, employees at Pure play companies are moving from BPM project to BPM project instead of working in the whole scope from BPM projects to integration projects to database architecture projects. A Pure player is often more interested in long-term relationships with focus on experience and quality instead of volume which often is an aim for the Stack vendors. Either BPMS COTS that is to be chosen will offer solutions that are proven to work but when it comes to configurability it is limited.⁸⁹

The data security is strongly dependent on the level of security of the local servers and the existing backup system.⁹⁰

Scalability is one of the great challenges for BPMS COTS. It is not about developing a widely deployed, business critical application but instead an entire system supporting a huge user base needs to be built.⁹¹

Looking at the scalability from an economic view, it is relatively low since the big money is in the initial investment and once the system is purchased, the cost is constant and relatively low independently of number of users.⁹²

The dependability is high since the big players often assure a certain percentage of process dependability. The time it takes to implement a solution from a big player can depend from situation to situation.⁹³

5.2 BPMS Cloud

Cloud computing refers to using virtual servers available over the Internet.⁹⁴ This means that one can run applications through a web browser. Cloud-based services can include everything from complex applications, to storage and spam filtering.⁹⁵

The definition of BPMS Cloud differs from BPMS COTS in that the computing resources and application code from more than one tenant is stored on external servers.⁹⁶

However, the BPMS COTS also offer BPMS Cloud but with a different focus, to win business and retain clients that want to be free from operations.⁹⁷ Hence the solutions

⁸⁹ Francis, S b) (2010)

⁹⁰ Dortch, M (2007)

⁹¹ Francis, S b) (2010)

⁹² Francis, S a) (2010)

⁹³ Ibid

⁹⁴ Knorr, E; Gruman, G (2009)

⁹⁵ Cloud Computing Defined

⁹⁶ Chong, F; et al. (2006)

⁹⁷ Gartner (2010)

offered by BPMS COTS that do not imply that applications are run on the tenants own server fall into this group and are seen as BPMS Cloud.

Moreover, when considering BPMS Cloud only public cloud computing is considered meaning a shared cloud where services are provided over the internet with little or no control over the underlying technology infrastructure.⁹⁸ Public clouds are owned and operated by the service provider and the tenant does not need to provide anything but the subscription fee.

The assumption that every tenant has its own database is also made to enable general assumptions.

BPMS Cloud are so-called Software as a Service (SaaS) applications that are distinguished by three qualities: scalability, configurability and multi-tenant efficiency.⁹⁹

The configurability is important when it comes to BPMS Cloud, hence it enables the users to adjust the way the application appears and behaves without the need for a separate application instance for each tenant.

Scalability is extremely important when it comes to the cloud and SaaS applications because the data belonging to all customers has to be supported. This can also have an impact on the cost being kept low since the scalability allows to pay as you go.¹⁰⁰

Multitenancy is one of the essential attributes when it comes to cloud computing and by this means the principle that a single instance of software runs on a server and serving multiple client organizations, referred to as tenants. This enables a software application that is designed to virtually partition its data and configuration and where each tenant works with a customized virtual application instance.¹⁰¹

The solutions are packaged and standardized and therefore often hard to customize.¹⁰²

Tenants have their own database where their set of data remains isolated from the rest. Thanks to that every database is associated with the right tenant the security is kept high and the risk of accessing someone else's data is eliminated. The individual databases also

⁹⁸ Pay Per Cloud

⁹⁹ Chong, F; et al. (2006)

¹⁰⁰ Hesselroth, O (2011)

¹⁰¹ Chong, F; et al. (2006)

¹⁰² BPMS Watch

enable flexibility and the fulfillment of each tenant's needs. Moreover it gains the security since it facilitates the restoring and backup in any event of failure.¹⁰³

Two BPMS Cloud vendors today are RunMyProcess and Cordys.¹⁰⁴ RunMyProcess is a cloud solution provider that offers a pay-per-use model. RunMyProcess offers a wide range of services, including a BPM modeling tool.¹⁰⁵ Cordys call their BPM service "Cordys BPM Benefits for Business". They market their service as flexible, scalable, secure and easy to develop.¹⁰⁶

5.3 BPMS Development

The definition of a BPMS Development solution is wide since automating processes with untraditional BPMS fall under this definition. The types of solutions that fall under this category ranges from developing own code, expanding usage of existing business system or web portals. This solution is either supported by an existing software framework such as .NET Framework, which is software that enables integration of information, people, systems and functions or if no supporting framework is present today this solution will imply a development of this.¹⁰⁷

¹⁰³ Chong, F; et al. (2006)

¹⁰⁴ Hesselroth, O (2011)

¹⁰⁵ RunMyProcess

¹⁰⁶ Cordys

¹⁰⁷ Hussfelt Netware

6 RESEARCH PROCESS

This chapter describes the research process of this thesis, how the empirical research resulted in conclusions enabling the authors to develop the BPMS selection framework.

During this thesis the authors' research process followed two lines. The first line is the research process of identifying process characteristics and indicators of processes suitable for automation with BPM. The second line is the research process for understanding BPM practice and the market for BPMS. Both lines start with literature studies in order to understand the subjects followed by validation and complementary data collection through interviews.

The conclusions from each research process are the foundation from which the BPMS SF has been developed. The research process is presented in Figure 10.

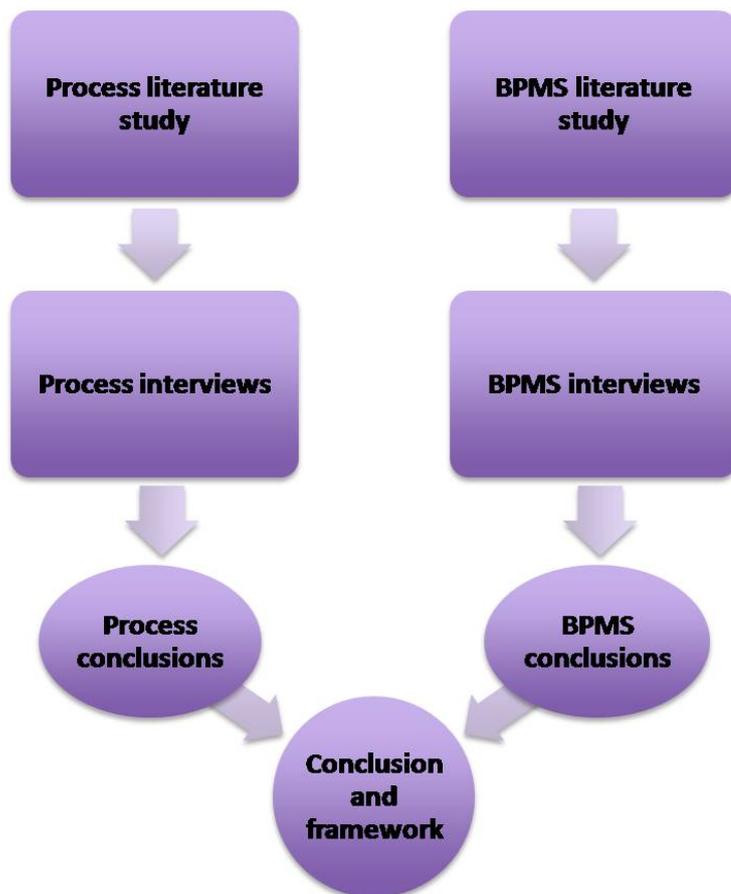


Figure 10: The Research Process

6.1 Process research

In order to evaluate business processes, characteristics and indications of a good BPM project, an extensive understanding of processes is crucial. A theoretical study of processes was therefore needed.

6.1.1 *Process literature study*

The process research started with literature studies. Different views on and definitions of processes were examined. Process management background was studied in order to identify and understand important authors and researchers within the area.

In order to identify which processes to focus on in a BPM project, the thoughts of Hammer and Davenport were found especially interesting by the authors. Both suggest three initial indicators to look at when evaluating process suitability for BPM. Hammer suggests that processes that the company already knows does not work can be a good choice for BPM or automation with BPMS. Processes that are known to be important for the company and processes that carry characteristics that make them easy to automate are also things to look at.¹⁰⁸

6.1.2 *Process interviews*

During the interviews with BPM professionals, additional information and different views on processes were gathered. The respondents shared their view on BPM and which processes to choose in a BPM project. The authors of this thesis experienced that the BPM professionals interviewed all suggested indicators of processes suitable for BPM that responded well to the three key indicators Hammer suggested. Through this, the conclusions from the findings from the process literature study were validated.

6.1.3 *Process conclusion*

In order to be able to define and apply the three key indicators to an actual process, the authors gathered information from literature and interviews and set up a number of questions that should be used for defining whether or not a process falls under one of the three key indicators.

6.2 BPMS research

In order to correctly give guidance in the choice of BPMS, a theoretical study of BPMS was done.

¹⁰⁸ Hammer, M (2010)

6.2.1 *BPMS literature study*

The literature study of BPMS was mainly done with material available online, since little has been published in the field. In order to maintain an unbiased approach, information was gathered from sources with different perspectives and approaches to the BPMS market, research companies, vendors and others.

6.2.2 *BPMS interviews*

Through interviews with BPMS vendors, the information and conclusions from the BPMS literature study were discussed. Different views on how the market could be divided was consolidated with the requests and view from BPM professionals.

6.2.3 *BPMS conclusion*

With information about BPMS from research organizations and BPMS vendors, conclusions about the market could be made. As a way of making three groups of BPMS on the market, Sigma requested BPMS COTS, BPMS Cloud and BPMS Development as it covers the existing BPMS market. As for approaches to BPM, Content centric and Human centric BPM are two recognized approaches to BPM with different focus. In evaluating processes and BPMS, Sigma requested this division combined with a third approach, Process centric.

6.3 Framework development and final conclusion

After researching processes and BPMS, conclusions were merged in order to develop a framework useful both for process evaluation and BPMS selection. The logical approach should be following the chronological order in a BPM project, which meant that the framework should start with evaluating processes. In order to visually explain this, a flow chart inspired outline was appropriate which is presented in

Figure 11 in chapter 7.4.1.

In order to determine the order of the key indicators process health, importance and feasibility, health was the easiest to identify as well as the most urgent. Starting with health was therefore considered a good choice. In order to avoid the occurrence of trying to find signs of unhealthiness or importance in feasible processes, feasibility was located as the last key indicator in the framework.

Out of the three key indicators, eight process groups could be formed where four process groups are categorized as feasible in

Figure 11. To progress with further recommendations the BPM approach for the process' organization is established. This is done by answering nine questions resulting in a classification into groups named by a letter A-C, in Figure 12 found in chapter 7. When

the process characteristics and the approach with its automation requirements are defined, nine different combinations are formed; by the number given in the first flow chart and the letter from the requirement questions. Each of these nine groups can then be given a guidance for which kind of BPMS solution to use and which specific vendor that is the most beneficial recommendation.

7 BPMS SELECTION FRAMEWORK

This chapter presents the BPMS Selection Framework developed in this thesis. As an introduction the importance of the organizational status is highlighted. This followed by process characteristics detection. After that critical factors and automation requirements are merged and concluded in BPMS vendor recommendation.

The BPMS Selection Framework is a tool developed by the authors for evaluating selected processes and determining their suitability for automation with BPMS. The framework comes in after a number of key processes have been identified.

The selection of BPMS is done in a four-step selection framework. The first part determines the process automation potential and if the process is defined to be suitable for automation it will move on to the next step in the framework which is the stating of the process automation requirements. This step then sets the foundation for which kind of BPMS solution to consider and the third step will result in a guidance of the BPMS solution. In the last and fourth step a more precise recommendation of the one BPMS vendor to select is given.

7.1 Organizational status

Before entering a BPM project it is important to understand the organization's conditions in order to achieve the best results with the project. A good start is to determine the change management, how capable the organization is in handling changes. Affecting the change management can be cultural barriers, the communication system and empowerment in the organization. A way to realize this is to evaluate earlier changes and implementations in order to perform internal benchmarking to see the strengths and weaknesses that the organization had at that time.

The organization's size does also have an impact of how changes and improvements are enabled. A larger organization often has more interest in economies of scale and also has a greater potential to manage a big initial investment that the BPMS can imply.

The way the services and activities are structured within the company today is also having an effect of how well BPM thinking can be adopted. The BPM requires system thinking and therefore companies that lack communication between functions within the organization will have harder to implement a BPM solution. They need to break free from organizational silos in order to detect and improve processes with BPM.

Moreover, the organizations maturity, according to CMM has an influence of how change is handled. The higher up the company is situated the more familiar they are with their current IT through continuous measurements and a constant adaption of new technologies. A less mature organization needs to bare this in mind when entering a BPM project since this will mean a much greater challenge for them.

The last thing to behold is in what kind of industry the organization is acting. Is it a dynamic environment or not, are there often industry changes that will effect the way an organization should handle their change. It can also be worth to perform a competitor analysis to understand the organization's position in the market.

7.2 Process characteristics

In order to be able to categorize business processes and their suitability for automation with BPM the three main features should be evaluated; process health, strategic importance and process feasibility. To ease this a number of questions for each characteristic have been developed. It is the set of questions for each feature and not one question alone that are to be seen as an indication of weather the process holds the characteristic or not.

7.2.1 Process health

The health of a process is defined by how well the process is performing both internally and externally.

Effectiveness of a process is a good indicator of health, and not just looking at the overall quality but also at the sub processes and the key activities within the processes. Some signs of a non-effective process are; high warranty costs, decreased market share, backlog, customer complaints and rejected incomplete or late output.

Another indicator to evaluate is the process efficiency which can be defined as the output per unit of input and typically characteristics to measure are; cycle time per unit transaction, resources per unit of output, true-value-added cost percentage of total process cost and wait time per unit or transaction. At last processes also tend to be unhealthy if they cross many functions and involve many narrowly defined jobs or lack a clear owner or customer.

Criteria:	Question to be asked:
Effectiveness	Are the warranty costs relatively high?
	High warranty costs are a sign of an ineffective process hence this indicates an inadequate product quality.
	Is there a decrease in market share?
	Loss of market shares can be the result of a non-effective process. Reasons for this might be that the company is not doing the right things to keep up with competitors and satisfy customers' demands.
Efficiency	Is there an evident backlog?
	An accumulation of jobs that are not done or materials that have not been possessed but are yet to be dealt with shows bad effectiveness. An increasing order stock is also a result of late output.
	Are there customer complaints?
Listen to the customers, if they are unsatisfied they will be clear about that, hence complaints are clear indications of an unhealthy process, rejected output is also a sort of complaints. Important is to listen to customers and use their complaints as indicators of where the process is failing.	
Efficiency	How much resources are needed per unit of output?
	This level should be kept as low as possible hence a high level here indicates that the process is not efficient today, or at least savings can be done.
Cycle time	What is the true-value-added cost percentage of total process cost?
	An efficient process is value-adding meaning that this percentage would be high, hence a low score here means that the process is costing more than it is bringing to the end-value.
Cycle time	Does the process have a long cycle-time?
	The process cycle time is considered to be an efficiency measurement but worth a closer look since it has a big impact on customers through delivery and costs. Cycle time is the total time that it takes to perform the work as well as the time spent on moving documents, waiting, storing,

reviewing and reworking. Long cycle time indicates bad health and leads to over use of resources, high costs and low quality of output.

Distinctiveness

Is the process cross-functional?

A cross-functional process often involve many narrowly defined jobs and an indication of this is if no one gets upset if the product is late or over budget. This in turns is a clear indication of that the process is in need of improvement.

Is there a lack of a clear owner or customer?

A healthy process should have a clear owner otherwise there is a lack of guidance of whom to call when deficiencies are noted in the process. The absence of a clear customer will additionally aggravate the quality and value of the process and therefore there is no well-defined specifications of the outcome.

7.2.2 *Strategic importance*

The primary approach to finding the processes that are the most important is to look at the processes most central in accomplishing the organization's strategy, given that the company has a well-defined strategy. A process should also be considered important if it adds considerable value to the product or output and to the end customer.

Some processes might still fall under the definition of important without clearly fulfilling the criteria mentioned above. Therefore processes can be divided into three categories; main processes, steering processes and support processes. A main process falls under the obvious determination of how well it is in line with the strategy and the value added to the end customer. Support processes on the other hand can be processes within human resources and are considered important when it is vital for another main process to run. The same goes for steering processes which ought not to be value adding but is a foundation for another value adding or strategic process to be performed or run correctly.

Criteria: **Question to be asked:**

Strategic **Is the process in line with the over all strategy?**

For processes that are considered to be main processes this is an indication that makes them important in the organization. It is harder to see the strategic reliance for support and steering processes hence here the processes that these serve should be considered.

Value-adding **Is the process directly or indirectly value-adding?**

Either of these kinds of processes should be considered important. By value-adding is meant a set of quality control activities, which transform an input into an output that is valuable to internal or external customers.

7.2.3 *Process feasibility*

To assess the feasibility of a process to be automated with BPM there are a number of criteria that can, and should be considered. A process' feasibility for automation depends on a number of factors listed below. When assessing the feasibility, the type of input in the process should be evaluated, what kind of data is the process handling and to which extent does the input vary? Does the process demand human interaction with tacit knowledge, decision points in order to follow current regulations? At last, the ability to measure the output of the process should be evaluated in order to determine the extent to which the process can be improved.

Criteria:	Question to be asked:
Variety of input	To what extent does the input of the process vary? A process with low variety of input is generally easier to define and therefore easier to automate.
Type of data	What type of data is involved in the process? Data that can be encoded makes a process easier to automate. This means that data that is already encoded makes a process easier to automate. Data that is vague makes a process harder to automate.
Iterations	Is the process often repeated? In order for a process to be suitable for the extensive work effort automation takes, a higher priority should be given to processes that are often executed. Many repetitions indicate a defined process and possible cost or work effort reductions.
Regulations	Are there regulations surrounding the process? A process can be regulated by law, organizational rules and cultural behavior. A process with many rules can be automated as long as it is possible to define and do not include too many exceptions.
Human interaction	To what extent does the process include or demand human interaction?

Processes with high human interaction indicate possible cost reductions and lead time reductions through automation. Some processes demand high human interaction due to high complexity, many exceptions and vague definitions.

Tacit knowledge **Is there tacit knowledge involved in the process?**

Tacit knowledge is knowledge that is hard to transfer from one person to another. Processes with a high amount of tacit knowledge are primarily not suited for BPM since the process is hard to encode and automate.

Decision points **Does the process include decision points?**

A decision point is often an early target when looking at parts of a process to automate since a decision point is often followed by a waiting time, which can lead to costs. A process with many or important decision points indicates complexity and can be hard to automate.

Measurable results **Is it possible to measure the output and improvements of the process?**

In order for a BPM-project to be successful, some kind of measurement of process output and improvement is useful. Examples of indicators of process improvement that can be measured are decreased lead-time, cut costs or increased process reliability.

7.2.4 Process automation potential

Each process is evaluated, according to the process characteristics presented earlier in this chapter, starting with the evaluation of the current process health. The process is then evaluated as important or not important. In the last step, the process is evaluated as feasible or non-feasible. Due to the three evaluations, eight process groups are formed of which the four categorized as feasible for BPM will be further examined in order to suggest a solution. If the selected process falls in between “Yes” or “No” for a process characteristic in the framework, it can be followed two times, matching the process in between two process groups.

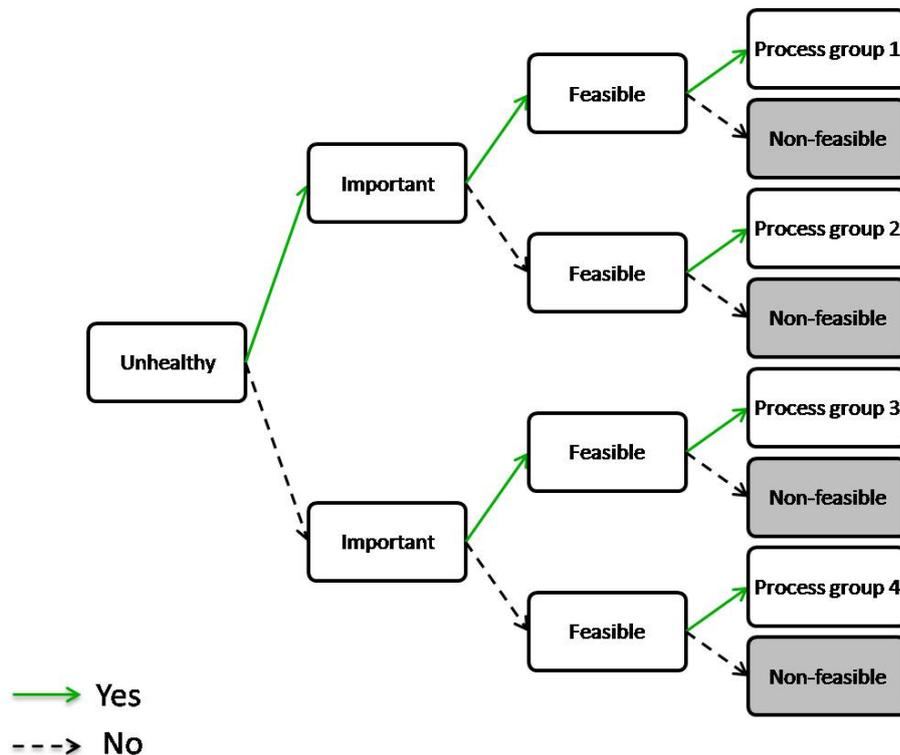


Figure 11: Process automation potential

7.2.4.1 Process group 1 – Organizational improvement

Processes in this category possess all three main characteristics for a high-priority process for automation with BPMS. Processes in this category are currently not working which is a strong indication of that organizational improvement can be made by automation. The high importance of the process increases the incentives to start with processes in this category. The fact that the process is feasible makes the processes the first choice of implementation.

7.2.4.2 Process group 2 – Cost sensitive

These processes are unhealthy but since they lack importance the need for improvement is not urgent. However, the fact that they are feasible for automation with BPMS makes

them a strong candidate for automation as long as they can be automated to a relatively low cost.

7.2.4.3 Process group 3 – Cost-saving potential

In this category processes are running, but since they are important and feasible they are candidates for automation with BPMS. The combination of feasibility and importance, meaning high impact of end-value implies cost- and time-saving potential. The fact that the processes are currently working indicates low automation priority and therefore time- and cost-saving potential should be evaluated in order to determine final priority.

7.2.4.4 Process group 4 – Time-saving potential

Processes in this category are running smoothly and are not of great importance in the organization. However, they are feasible for automation with BPMS which makes the processes in this category worth considering if automation can be done at low cost. Even if there are no identified defects today, there might be time-savings potential. Since the processes are classified as unimportant they add little or no value to the process output. Hence cost-savings are not as likely. Automation of these processes is not urgent due to their current well functioning.

7.3 Factors influencing choice of BPMS

When deciding which BPMS to choose in order to optimize the implementation there are a number of factors that have to be considered. The importance of each factor depends on the organization that is looking at investing in a BPMS but each factor is worth an evaluation before making a final decision to invest. The factors to consider are presented in the following sections.

7.3.1 Initial investment

Implementing a BPMS requires capital and initial investment. For a small or medium sized company, the size of the initial investment can be very important in order to enable financing of the solution. Generally, BPMS COTS come with a greater initial investment than BPMS Cloud. BPMS Development can not be labeled as high or low as it depends on the current state of the systems in the organizations and how easy they are to adapt.

7.3.2 Running cost

The running cost of a solution is the costs that follow after the initial investment. In general, the running costs of a well functioning BPMS COTS solution are lower than BPMS Cloud. BPMS Development do not have any significant running costs due to that the competence can be found in-house and therefore enables to keep costs down.

7.3.3 Flexibility

Looking at different BPMS, the flexibility of the solutions is one factor that has to be evaluated. Flexibility becomes more vital if the processes are poorly defined and no clear match is found than if the case is the opposite. Flexibility is also needed when the processes in the organization are dynamic and likely to change over time. BPMS COTS are flexible in the way that after the platform is purchased, changes can be easily made. BPMS Cloud solutions are flexible since the solution that a company chooses to buy can change from one day to another. BPMS Development is generally the most flexible alternative since the solution is developed by the organization and can probably easily be managed to adjust to changes.

7.3.4 Mobility

Mobility is whether the system is available outside the office building or if it only is to be reached on location. In organizations where people are working from home or other locations, systems that are able to reach online are more suitable. BPMS from BPMS COTS or BPMS Development is not available outside the office walls unlike BPMS Cloud which is a more mobile solution and available in the cloud, meaning everywhere.

7.3.5 Configurability

The configurability enables users to adjust the way the application appears and behaves without the need for separate application instance for each client organization. This can result in both cost and time-savings, as no specific application needs to be designed every time. If processes are not well defined in the organization and the presence of an immediate match between the services offered by BPMS vendors and the processes in the organization, configuration becomes important so that the solution can be changed to the specific needs. BPMS Cloud solutions are packaged and standardized and therefore not very configurable. The configurability of BPMS COTS is limited whereas for BPMS Development the level of configurability is higher since the solution is made by the organization itself.

7.3.6 Scalability

The scalability of the BPMS is important hence large-scale enterprise software is intended to be used by many users simultaneously. The ability of creating a scalable architecture is vital for cloud services as SaaS applications, for COTS vendors however it is more of a challenge to bring on or not. Where instead of a widely deployed, business critical application an entire Internet-scale system supporting a huge user base needs to be built. The case can also be that a company offers a new service where the number of users is unknown. Scalability means the ability of the BPMS to adapt to a changing

number of users, both when it comes to cost and execution. As described in chapter five, scalability is one of the success factors of Cloud services. When it comes to BPMS Development the capacity of the organization is the limiting factor.

7.3.7 Security

Different BPMS include different degree and kind of risks. The security of the BPMS is for instance the data security. The security of BPMS COTS depends on several factors, as the kind of servers used in the organization. The same goes for BPMS Cloud, many factors influence the data security. As for BPMS Development the security is set by the organization and varies depending on resources and competence.

7.3.8 Dependability

Dependability refers to the extent to which the solution is dependable, up and running. BPMS COTS offer guarantees on their solutions. Some BPMS COTS and all BPMS Cloud are dependent of a working Internet connection. The dependability of BPMS Development is fully determined by the conditions in the organization concerned.

7.3.9 Time

The amount of time used to execute the implementation of the BPMS is associated with the cost of the BPM project. An implementation that requires a lot of time is often more expensive and if the processes in the organization is very dynamic the implementation can become hard. In most cases, BPMS Cloud carry less development time than BPMS COTS or BPMS Development.

7.4 Process Automation Requirements

The processes that are feasible for automation with BPMS are now detected, but in order to succeed the requirements of the automation from the organization need to be further examined in order to recommend a solution. By looking at the three approaches, Human, Content and Process centric, an organization's process can be placed into one of these three groups depending on certain requirements on the automation and BPMS. By answering the following nine questions the process can be defined by a letter A, B or C. The process is considered to belong to a group if the answer is yes to two or more questions within the group. If the process belongs to more than one group, all these should be further evaluated.

Group A - Human centric

Is the process knowledge-intensive meaning it desires much human judgement at decisions?

Is the execution of the process steps changing based on the particular circumstances?

Is the data mostly formal and unstructured?

Group B - Content centric

Is the process' focus on the content, as in documents?

Is there a simple process structure?

Is the data to a large extent unstructured?

Group C - Process centric

Is the process mainly focusing on the actual process and not people and documents?

Is there little or no human interaction present in the execution of the process steps?

Is the data mostly structured?

The Process automation requirements triangle shown in Figure 12 maps the three groups with their corresponding letter to each representing a third of the triangle. This is simply because later on the BPMS solutions will be drawn onto the triangle illustrating the areas that they cover. Hence it is important to now identify where in the triangle the process belongs.

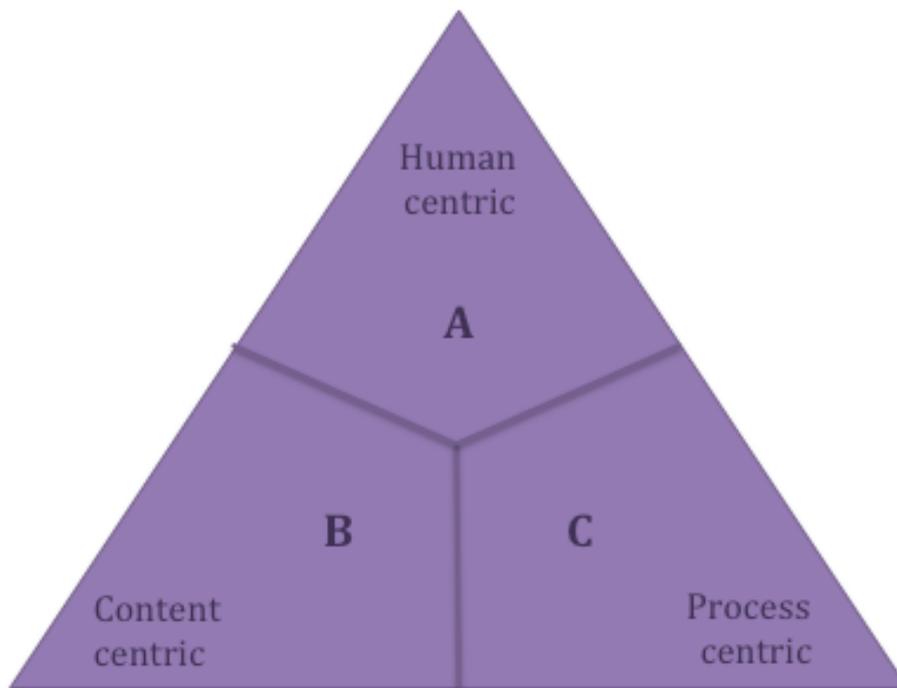


Figure 12: Process automation requirements triangle

7.5 BPMS Solution Guidance and BPMS vendor recommendation

Putting together the process group number given in

Figure 11 and the automation requirements defined by a letter in the Process Automation Requirements Triangle, Figure 12, twelve unique combinations, process groups are formed. (1A-4C)

In this last part of the framework guidance for suitable BPMS solution and vendor selection for each of these twelve combinations are given with the factors presented in chapter 7.3 taken into consideration. The three different choices are the ones mentioned before; BPMS COTS, BPMS Cloud and BPMS Development. The BPMS COTS are further divided into Pure players and Stack vendors. Figure 13 shows the areas covered by these different solutions and by using this information the recommendations for each of the twelve process groups can be determined.

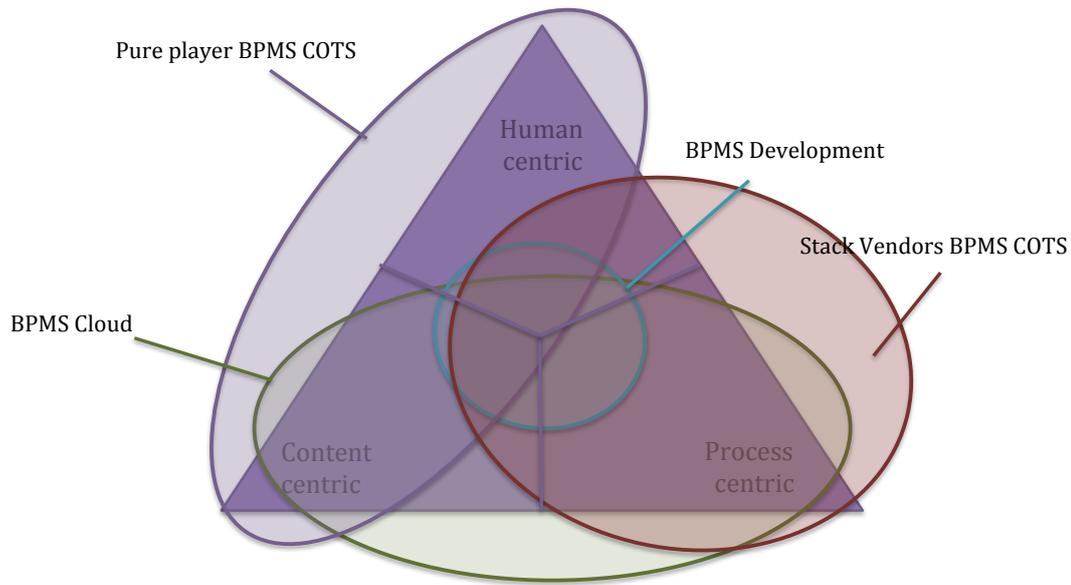


Figure 13: BPMS solution triangle

Below follows recommendations and suggested solutions for the twelve process groups out of the four kinds shown in Figure 13.

Process 1A

Process 1A requires human interaction and flexibility. The alternatives for this are BPMS COTS and BPMS Cloud. As seen in the solution triangle pure player BPMS COTS best covers the Human content processes. Here we have for example Pega System, which also offers Cloud solutions.

Process 1B

Process 1B is content centric and in this area BPMS are offered by all solutions hence any choice will satisfy the needs. If the process involves any human interaction the Pure player BPMS COTS or BPMS Cloud is the best alternative. Moreover if the company is relatively small the initial investment can be avoided by using BPMS Cloud. In the case of no human interaction a Stack vendor is the choice. The best recommendation is therefore to choose a supplier that can operate in all these areas, OpenText Metastorm is therefore an alternative and which also have BPMS Cloud solution.

Process 1C

Process automation is here aiming at full automation without human interaction and the process is also considered highly feasibly for full automation. The advice is to look into the BPMS COTS solutions. The specific recommendation for a 1C process is therefore Stack vendors such as IBM, Oracle or Progress.

Process 2A

The combination of required human interaction and automation at low cost makes BPMS Cloud an option, but since BPMS Cloud is limited within Human centric processes BPMS Development might be the best recommendation to keep costs down.

Process 2B

This process focuses on content and therefore BPMS Cloud is a suitable alternative since initial investment is low and can make automation a good move even if the process is not value creating. Suppliers to evaluate here are RunMyProcess and Cordys.

Process 2C

Here full automation is the aim but still at the lowest cost possible hence a BPMS Cloud solution is the advice. Either a pure BPMS Cloud vendor can be considered as RunMyProcess or Cordys but since orchestration is demanded a BPMS COTS Stack vendor such as IBM and Oracle which both also offer cloud solutions might have more to offer for this process.

Process 3A

Processes are Human centric and the greatest benefit from automation is time and cost savings. The alternatives here are therefore BPMS COTS Pure players or BPMS Development. A Pure player such as Pega Systems is recommended but if a framework (e.g. .NET) or necessary development skills is available within the organization the alternative offering the lowest cost and therefore the highest cost savings on the short run will be the BPMS Development where existing competences can be used.

Process 3B

These processes have great time and cost savings potential. The simple process structure often present in this case makes BPMS Development a beneficial option even if the software framework for this has to be developed. The other alternative is BPMS Cloud such as RunMyProcess or Cordys.

Process 3C

When full automation is the aim the greatest savings in both cost and time will be offered by a BPMS COTS Stack vendor. However if the initial investments is desired to be kept lowest possible BPMS Cloud is to be chosen. Moreover if a framework (e.g. .NET) or necessary development skills is available within the organization BPMS Development is also to be considered. The recommendation of a Stack vendor is Oracle or IBM which both also offer BPMS Cloud solutions that could be an alternative.

Process 4A

Processes involve human interaction and the greatest benefit of automation is time savings and a low cost is demanded. The alternatives here are therefore BPMS COTS Pure players or BPMS Development. A Pure player such as Pega Systems is recommended if they can offer a low cost solution. The alternative offering the lowest cost will however be BPMS Development where competence from inside your organization can be used.

Process 4B

The greatest potential for a 4B process is the time savings and the interest in low cost automation is dominating the choice. The initial investment can therefore be kept low using BPMS Cloud or BPMS Development. As BPMS Cloud the recommendation is RunMyProcess or Cordys.

Process 4C

When full automation is the aim the greatest time savings will be through a BPMS COTS Stack vendor. However initial investment is larger than if BPMS Cloud is chosen but if the process is facing a far future it is still an option. If a framework (e.g. .NET) or necessary development skills is available within the organization BPMS Development is also to be strongly considered. The recommendation for a Stack vendor is Oracle, IBM or Microsoft.

8 CONCLUSION

This chapter concludes this thesis, presenting fulfillment of purpose and answering questions asked in the introduction. The credibility of the thesis is discussed and further recommendations are made.

In order to successfully implement BPMS in an organization, it is important to identify processes suitable for BPM, choose the processes with the best potential and match them with a suitable BPMS with requirements and important factors taken into consideration. It is important to have the understanding of the current state of process orientation in the organization, in order to prepare for organizational change.

8.1 Fulfillment of purpose and questions

The purpose of this thesis has been to develop a framework for selecting processes suitable for automation with BPM and selecting BPMS solution and vendor for the process. The framework should be a useful tool when offering services within BPM. The project has resulted in a framework doing this, dividing processes into twelve groups, making recommendations for each process group with automation requirements in mind.

The main question was “What kind of processes are suitable for automation with BPMS?” which is answered by the first three sets of questions in the framework, called “Process health”, “Strategic importance” and “Process feasibility”. The sub question “What kind of BPMS should be used to which process?” is answered in the BPMS vendor recommendation, evaluating each process groups’ suitability for automation with BPMS and the following discussion of which BPMS that should be used.

The question “What is essential for a company to succeed with BPM?” and “What are the critical factors for implementation?” are answered in chapter 4 in “Change management and implementation” and “Project pitfalls”.

The future trends in BPM and how services can be adapted to these are presented in this chapter.

8.2 BPMS Selection Framework

The framework that has been developed is generic and can be used by all kinds of organizations and for all kind of processes. The question under each set, however, can be customized in order to better fit a specific organization and the answers should be evaluated in order to secure the right process categorization.

8.2.1 *The gap filled by the framework*

The framework that has been developed combines process theories found in literature with the current market for BPMS solutions and vendors. The framework goes all the way from process evaluation to recommendation of suitable BPMS solution and vendor.

8.2.2 *Making the most of the framework*

The framework used for process automation potential is a static tool for evaluating processes. Since the business processes and organizations are dynamic the framework should be used regularly. After the initial evaluation and implementation, the framework should be used again. In case the initial BPMS implementation resulted in the expected process improvement, other processes could be identified with relatively long lead time or high costs. In case a selected process is hard to define as a “Yes” or “No” in the process automation potential framework, one process can be matched with two or more process groups. In case a process falls between two groups, the two process groups should be read in order to determine where the process should fall. In case a process is hard to define as a “Yes” or “No” in more than one of the three characteristics health, importance and feasibility, one process group can be matched with more than two groups. The more process groups a process is matched with, the less the framework can say about the process. Conclusions about these processes should be made with caution.

The automation potential framework is static but the market for BPMS vendors are rapidly changing. These recommendations should therefore be considered as guidance in BPMS selection. Before the actual purchase decision is made, the current market situation for BPMS vendors should be re-evaluated.

8.3 Contribution to academia

Several publications regarding process orientation and BPM have been made during the last decades but the recommendations made are vague. Research companies like Gartner publish evaluations of the BPMS market annually but the information in the evaluations has been complicated to link with an organization’s state and needs. In order to succeed with process automation with BPM an organization has to choose processes and a BPMS to work with. Previously there was no framework combining the part evaluating processes with a recommendation of BPMS vendor. The framework developed contributes to BPM theory by creating a clear path between realizing the benefits of BPM and implementation.

8.4 Credibility analysis

BPM being a rather new term, the theory used in this thesis is to some extent constituted by whitepapers and contemporary research papers.

The interviews that have been held during this thesis have been with BPM professionals, naturally influenced by the organization they are working for and their relation to BPM. In order to maintain a correct picture, interviews with people from different organizations and with different roles have been held.

Combining empirical research with theory, the results of this thesis should be reliable to a certain extent. Since the BPMS selection framework has not been evaluated in a field study, actual reliability can not be verified to a greater extent than that Sigma intends to use the framework as a basis for potential BPM-projects. Even if BPM is a constantly changing field, the process evaluation should be useful despite changes in the industry. The BPMS solutions, however, has to be kept updated over time since the vendors change their products and offerings.

8.5 Future trends

A growing trend within BPM is the increased customer orientation. In this approach a customer can be both internal and external and states that the critical point for each process is the output, in other words what the customer receives.¹⁰⁹

Another trend in BPM is offering an integrated overall solution, where the lead time from process modelling to execution can be eliminated. This is enabled by making it possible for business leaders to model the processes that can be executed instantly.¹¹⁰ In addition to the minimized time consumed by the BPM project, processes can easily be remodelled, making the organization agile and adapted to changing conditions and a developed environment.

¹⁰⁹ Beck-Friis, M (2011)

¹¹⁰ Brännström, K-O (2011)

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