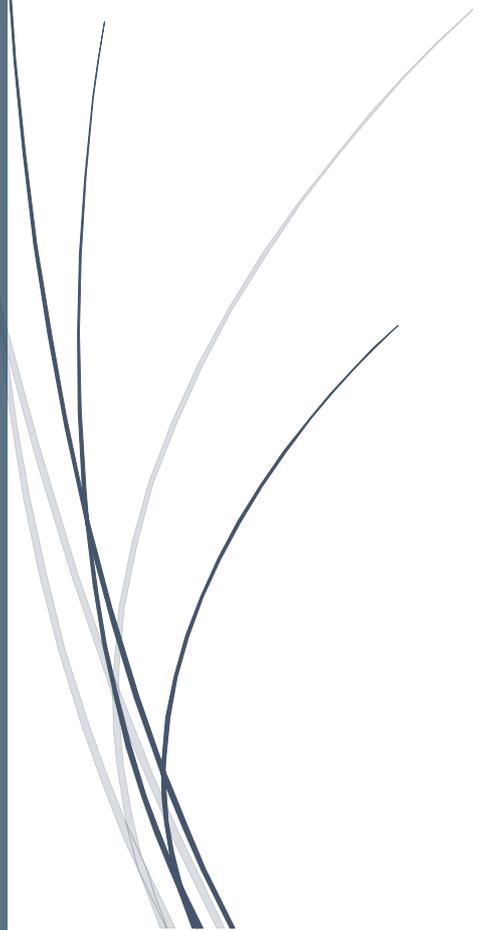


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# The alignment between business departments and the IT by means of processes.

Bachelor Thesis

Industrial Engineering and  
Management



**UNIVERSITY  
OF TWENTE.**

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# The alignment between business departments and the IT by means of processes.

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## Preface

This research is the final result of my Bachelor of Industrial Engineering and Management at the University of Twente. This thesis has been conducted at [HIGH TECH COMPANY] for finalizing my study programme.

I am proud of conducting my research thesis with [HIGH TECH COMPANY], especially being part for such a long period. During my internship, as a preparation for this thesis, and during the time I wrote this thesis, I have learned many skills and got many insights into the work in a professional environment.

I want to thank, therefore, especially [Mister X] for allowing me to join his team and [Mister Y] to join his department. I am honoured to have had the opportunity to write my bachelor thesis within this setting and implement my results. The regular feedback and especially the guidance of my action research at [HIGH TECH COMPANY] was outstanding assistance of [Mister X] where I am incredibly thankful for.

The topic, Business-IT alignment, was new to me before conducting this research. I motivated myself in particular for this topic, thereby initiating personal interest in the case. I am sure I will, at a particular stage, continue in my career on this topic.

Furthermore, I want to also, in particular, thank Dr Lucas Meertens as my supervisor from the University of Twente. His passion and interest in the topic grabbed me and gave me extra motivation. Especially our regular meetings and long conversations about the case brought me “on track” and assisted me in my actions and research. Likewise, I want to also thank Dr Adina Aldea for providing me with feedback on the report and for supporting me by taking over the position of second supervisor. I appreciate her ideas and the inspiration of how to continue after this bachelor.

*Alexander Ortenburg*

Frankfurt, 17<sup>th</sup> of September 2021

## Management Summary

*“When a resource becomes essential to competition but inconsequential to strategy, the risks it creates becomes more important than the advantages it provides.”* (Carr, 2003). These words describe the critical problem many companies face well, missing cooperation of Business and IT departments. They underestimate the business value which is created through IT.

This research identifies firstly through literature and secondly through a case study the business process as the critical success factor of this collaboration. Shared processes provide a starting point and a shared vision of an operation by transferring knowledge in both directions standardised.

The high level of innovation by organizations nowadays is not only applicable to their products or services, but in addition, internally, the enterprises must stay innovative. Many enterprises employ their own IT to deploy new systems and improve existing ones constantly. The collaboration of Business and IT is often not optimal, resulting in inefficient processes for changes or incidents or, more generally, innovation enabled by the IT. In many cases, the operational collaboration is not well organized. Business departments and IT see themselves more as customers and service providers than as one individual part of the same cooperation. This is highlighted in Carr’s quotation: the business sees itself as the only source of value and not accepting IT as an even contributor.

Within enterprise structures, full cooperation between departments is complex. Thus, alignment and collaboration must be solved by initiating a network for active and regular collaboration. The focus of this network is the exchange of knowledge, skills, and processes and providing the underlying infrastructure. This alignment focuses primarily on cross-domain communication and expertise. The aim is to achieve a common understanding of each other’s work, ultimately supporting the organisation’s strategic objectives.

The case study for this research is from [HIGH TECH COMPANY]. [HIGH TECH COMPANY] is known for its high level of innovation, especially when it comes to software solutions and industry 4.0. An alignment between Business and IT is a crucial factor for a successful implementation. [HIGH TECH COMPANY] introduced several strategic alignment models; however, the operational alignment is still not optimal.

These business processes serve as the solution for improving the cooperation of Business and IT, managing and defining IT demands, and implementing new systems. The interaction between Business and IT enables more efficient solutions for future problems. This collaboration and cooperation simplify the suitability of standard software solutions and the necessity of unique customized solutions. The complexity of information systems and their maintenance can hence be improved sustainably.

In addition, this link enables the use of processes for the systematic or automated testing of software solutions which is essential when switching complex systems. The documentation of executables, workflows or transactions of IT systems is stored through this link, enabling both sides, the Business, and the IT division, to have a structured overview and access to the project in question.

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## Abbreviations and Definitions

(Azure) DevOps	Software managing the software development and IT operation
AI	Artificial intelligence – the natural intelligence of machines and systems
BPI	Business Process Innovation
BPM	Business Process Management
BPMN	Business Process Modelling Notation, a graphical standard language for modelling processes
BPR	Business Process Reengineering
BU	Business Unit
Change	A request to the IT department to alter or modify something in an existing software / new software
CRM	Customer Relation Manager (Software)
CSF	Critical success factor
EAM	Enterprise Architecture Management
ERP	Enterprise Resource Planning
GDPR	General data protection regulation
Governance	Controlling and management at the highest organizational level
IMS	Integrated Management System
Incident	An event happening, which is reported to the IT department
Industry 4.0	A current trend on intelligent networking, automation and data exchange by using information technology
ISO	International Organization for Standardization
IT	Information Technology
IT man-day	A measure for an entire working day of an IT expert

Jour Fixe	Regular meeting of specific people to talk about a particular topic
MPSM	Managerial Problem-Solving Method, a methodology for problem-solving
QMS	Quality Management System
Requirement (IT definition)	A required feature or function of a software system (technical description)
S4/Hana	A new environment of SAP for an ERP system
SAP	“System Analysis Program Development” is the leading company on the market for ERP systems
SAP Best practise	Standardized processes with transactions already implemented in the standard software version
SITA	Strategic IT alignment
Social Capital	Set of shared values and mutual respect formed by interactions
SolMan	The SAP Solution Manager, a tool to manage the SAP system landscape
Symbio	A BPM platform/manager for managing and modelling processes
Ticket	A request to the IT via a specific communication tool
User Gap Story	Short description of a software requirement outside the standard of a system
User Story	A short description in words of a software requirement

# 1. Introduction to the Case

## 1.1 The Company

The company [HIGH TECH COMPANY] is a software and production company in central Europe. They are known for their innovativeness leading to the long-term success of the company. Within Europe, [HIGH TECH COMPANY] is the leading manufacture in their core competence field. The [HIGH TECH COMPANY] group consists of several product and distribution companies structured into business areas.

[HIGH TECH COMPANY] is active in many countries in the world for production and sales. These production facilities worldwide are forming one of the strategic positions for [HIGH TECH COMPANY] in the global market.

## 1.2 Problem Context

This research is carried out within the headquarter of [HIGH TECH COMPANY], within the strategy and development function. More specific within the Process Management department. These departments are accountable for the [HIGH TECH COMPANY] group. The tasks of these units are to support and develop the entire organization.

Development focuses on transforming the strategy into the practice of every single [HIGH TECH COMPANY] employee and the implementation of new trends or methods leading [HIGH TECH COMPANY] to a stronger market position and brand. This involves product and customer-related transformations as well as internal organizational changes.

Part of this strategy is to move the group closer together, not differentiate between different areas or countries, instead integrating them on an operational level. One practice that supports this strategy is a new rollout of Business Process Management (BPM).

The BPM team is situated within the quality office, majorly since BPM supports different standards, where process modelling is needed. An example is the ISO 9001 standard, a quality management system standard, where one of the fundamental principles modelling processes is.

[HIGH TECH COMPANY] has introduced, to support this new rollout, a new BPM suite called Symbio. The system is different to the previous BPM tool a so-called business manager, integrating BPM, QMS and IMS in one system. Previously only business processes related to quality management were modelled within the BPM tool.

The new tool introduces entirely new features such as interfaces to other software tools implemented at [HIGH TECH COMPANY]. Examples are Microsoft Azure DevOps, the SAP Solution Manager and many more data storages.

Currently, the rollout of Symbio is ongoing, especially for the IMS and QMS parts. Due to the high number of users of this platform and the high amount of business processes within [HIGH TECH COMPANY], this rollout phase will be ongoing for this and the next business year.

Besides the rollout of Symbio, the new BPM tool, several other software rollouts are planned or currently in pilot phases within [HIGH TECH COMPANY]. A massive rollout

for a new software environment of the central ERP system is confirmed. First pilot projects are ongoing already.

The competitive industry requires regularly new software rollouts to support the ongoing trends of Industry 4.0 or potential for improvement due to the usage of IT solutions. IT governance is increasingly getting essential and is nowadays one CSF of a multinational organization.

The bigger the organisation's system landscape and scope are, the greater the need for active complexity management within the business in general and within the IT department. BPM is helping by providing transparency and accessibility for all [HIGH TECH COMPANY] employees on business processes.

### 1.3 Problem Identification

Essential backbones of every company are their operations. These, in turn, are represented within business processes. These business processes are in the entire company present. Everything executed within a company that transforms a specific input into a particular output can be classified as a business process. It is a series of tasks carried out by a person or a system to deliver a specific goal.

The rising topic is the so-called IT process. Many systems rely on these processes, changing from a data-aware system to a process-aware system (Riss et al., 2005). IT processes are simply processes that focus on IT needs and requirements and therefore recognise specific attention. On the one hand, quality- and integrated management systems are interested in those due to norms and for managing the quality of execution. On the other hand, IT is interested in them for IT management. Enterprise Architecture Management integrates these processes for documentation purposes, enabling quicker incident and change management aside from supporting the complexity management.

Currently, those two groups of interest are performing individual actions on those processes. Most IT processes are presently not modelled within a core platform or a standard. Instead, they are modelled everywhere, often not in a documented way. They are modelled on specific requests in tools such as Microsoft PowerPoint and Microsoft Visio.

Several problems around processes are observable. In Figure 1-1 – Problem cluster these problems and their relationship are modelled. It is observable that all problems lead back to one general problem, the missing alignment between business and IT. The consequences or effects this missing alignment is having are displayed in the succeeding problems.

### 1.4 Core Problem

All identified problems lead to the core problem, no operational alignment between the business departments and IT. Currently, those departments communicate for projects, changes, incidents, and regular maintenance. However, there is no general collaboration between the departments. By analysing what connects those departments, the BPM department is coming into action.

The BPM office is opening an opportunity; the new BPM manager is a platform that can serve several different needs from all over the organization. The interfaces of

Symbio allow various possibilities, from an integration of the management for the European GDPR to the test-, project-, incident- and change documentation and control for the IT.

The most important connection between the business departments and the IT is about business processes, whether supported by systems or automated. The Business is exchanging with the IT for all incidents, changes, and optimization projects or transformations of these business processes. A process model is often, besides a written description, the input for the IT.

Processes are often not modelled at all or are modelled without a standard for the [HIGH TECH COMPANY] group. Every department is modelling them differently, making it hard for IT to interpret them correctly. In most cases, processes are not modelled at all. The IT is documenting those implemented processes without a flow and diagram for their purposes.

Not modelled process flows leads to ineffective communication between those departments. The complexity is rising, resulting in inefficiency. Process documentation of the IT is stored at many different locations and are not up to date in many cases. In those cases, the IT is the so-called process owner and not the business department executing and setting up the process. Those processes are then becoming the so-called "IT processes" simply because the IT is handling them.

The central research question for this research is investigating the collaboration between the business departments and the IT by researching:

*"How can Business process management contribute to the operational alignment between the business departments and IT?"*

The research aims to investigate this collaboration and find out how to design it for maximising the efficiency of the IT department and the business department. Business processes are in focus. Generally, they reflect an organization entire operation, where both the Business and the IT are working with and on.

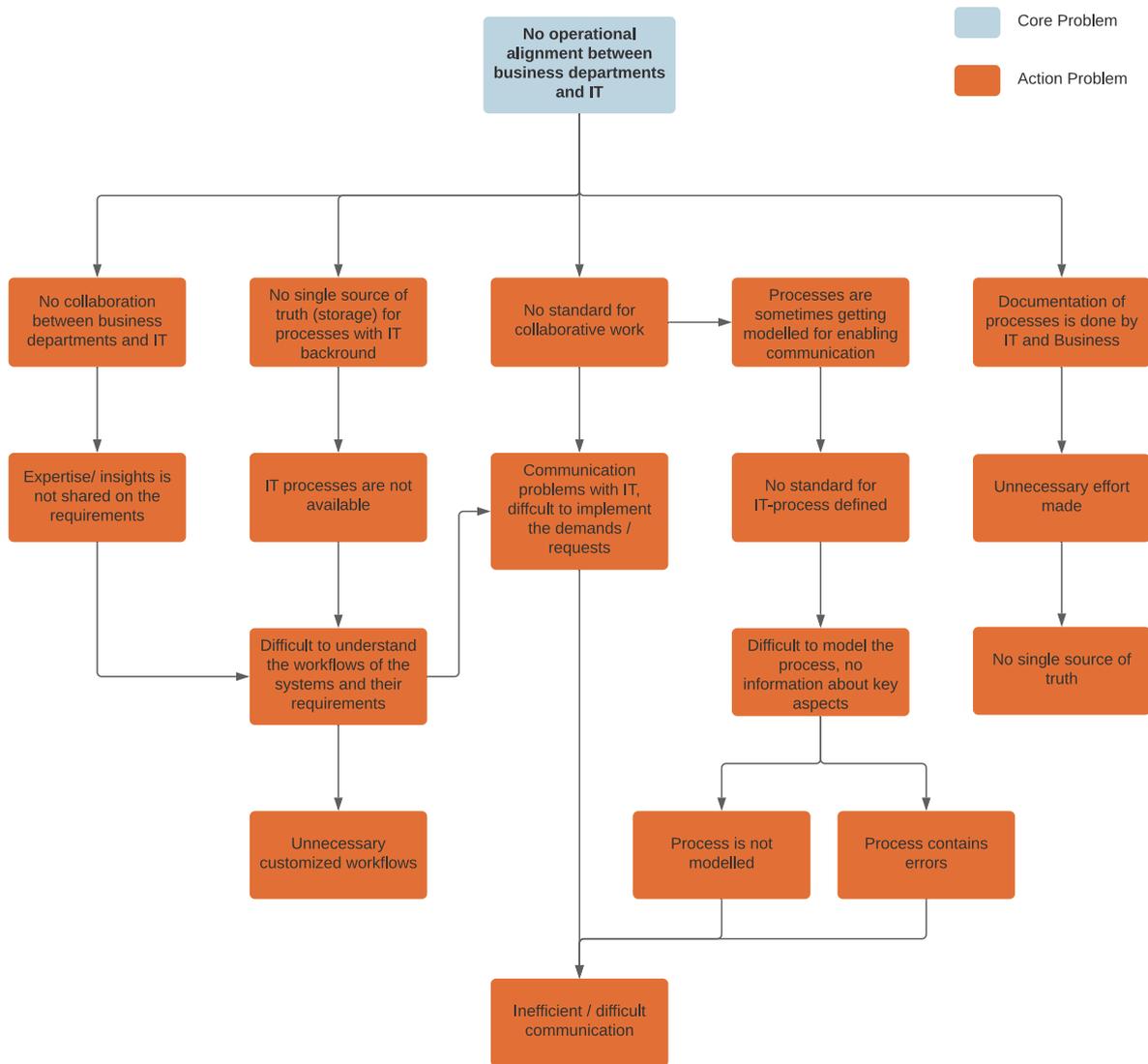


Figure 1-1 – Problem cluster

## 1.5 Out of Scope

The core problem described above has been identified by different parties all over the IT industry. Modelling processes and communicating between the business departments and IT are critical success factors for implementations.

Several big IT industry leaders have therefore implemented so-called model companies and their best practices. These best practices form business processes after a model company of a particular industry.

Standard processes and their associated workflows or transactions are included in these software systems. They have been modelled in the form of a process flow to enable customization, in the general implementation of a new or changed process, as efficiently as possible. These best practices are excluded from this research.

This research mainly investigates how a possible alignment between the business and IT departments can be designed, optimized, and harmonized. The focus is on the business process itself; this is the critical element within this collaboration.

Exchanging this process with an already existing one is simplifying this collaboration extensively. However, only general standard processes such as inbound warehouse processing or standard accounts payable methods are available. The partnership is essential between the departments when those standard processes cannot be used and a customized process within a system is implemented. Staying innovative means, especially for software developing something unique, competitive advantage is not achieved by adopting these best practices' industry standards. Therefore, this research will only focus on processes that do not build upon best practice examples or similar existing process models that systems provide.

## 1.6 Problem-Solving Approach

The Managerial Problem-Solving Method (MPSM) will be applied in an iterative approach to solve the problem and perform this research structured.

The research around BPM and the IT environment needs non-linear analysis, meaning due to a high number of specialists, a straight linear approach will not perform well. Different insights into the concepts and methods can be noticed and implemented within this research project independently of time. The MPSM as a systematic research approach provides the necessary structure to this research. Due to the size of the organization and complexity around BPM, a systematic design is needed.

The MPSM is a methodology developed explicitly for solving problems within organizations. It guides the researcher until the implementation of the technical solution, followed by the last phase, the evaluation (Heerkens & van Winden, 2017).

The different phases of the method are divided into seven steps as follows: First, the definition of the problem, second by the formulation of an approach, third analysing the problem, fourth following formulating solutions, fifth choosing a solution, sixth implementing a solution and finally evaluating a solution (See Figure 1-2 – MPSM cycle). Each phase may call up so-called knowledge problems, solved within a research cycle, an additional part of the MPSM which solves the knowledge discrepancy one might have (Heerkens & van Winden, 2017).

## Managerial problem solving method (MPSM) by Hans Heerkens & Arnold van Winden

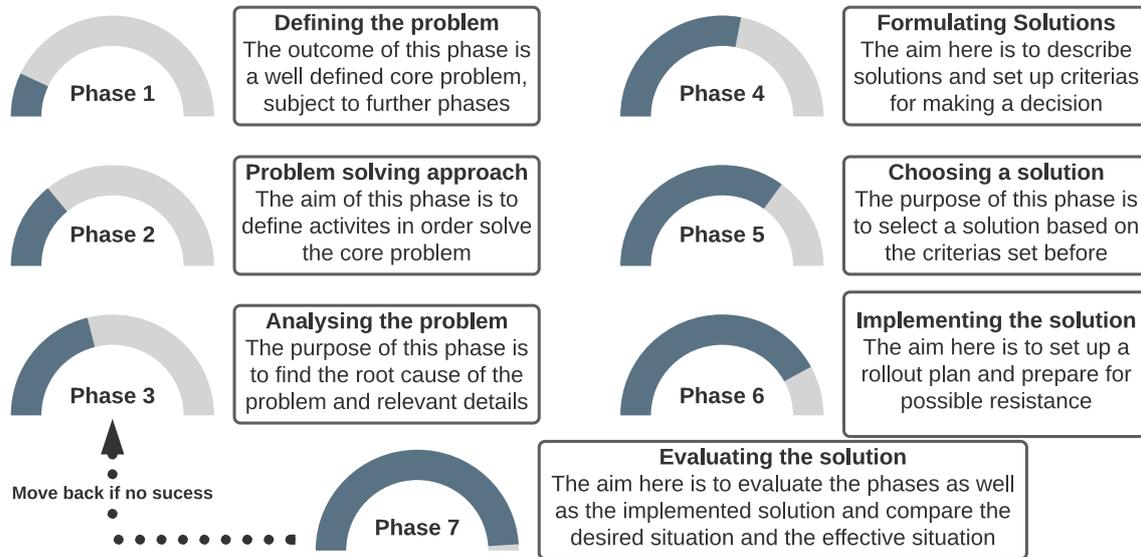


Figure 1-2 – MPSM cycle adapted from (Heerkens & van Winden, 2017)

Within this research, the phases of the problem-solving method will be as follows:

### Phase 1 – Defining the problem

This step is already carried out successfully within the introduction (See Problem Identification ff.). Defining the problem is an important step. Without a clearly defined problem, setting up and deciding on a suitable solution can be difficult. This research aims to answer the research question to contribute to further knowledge on the cooperation of IT and business departments. A problem cluster is mapping known problems and displays the relations between them.

### Phase 2 – Problem-solving approach

In this phase, the focus is on setting up activities and research to understand the problem environment further. This step is a rather strategic step for the subsequent phases. The approach chosen will first assess the current situation, especially understand why and how the current situation at hand is. Next, searching for possible solutions will be split up. Due to the nature of this research, action research, it is crucial to solve the problem in a workable setting as recorded in the previous step at a company. Therefore, this step will be researched at the company, including desk and action research involving key stakeholders.

On the other hand, the topic around BPM is highly discussed in the literature. Literature research will help to combine practice and theory to develop the best solution to the issue. A so-called iterative analysis will be followed for selection, validation, and later implementation within the last steps. This iterative method will be used to test and improve the solution even further.

### Phase 3 – Analysing the problem

Within this phase, the analysis of the problem is in focus. The current process, including direct and indirect involved stakeholders, and the relations to other issues are analysed. Causes and effects will be recorded and analysed. The problem analysis will be first examined by literature. Systematic literature and a selection of peer-reviewed articles will be discussed. The goal is to understand frameworks that could be possibly implemented. Furthermore, within a case study, the [HIGH TECH COMPANY] will be analysed for understanding the current situation and working routines. Observations and interviews will do this.

### Phase 4 and 5 – Formulating solutions and choosing a solution

Phases 4 and 5 argue how the solution is designed to align the business departments with the IT on the operational level. Possible options gathered from the analysis will be presented. The aim is to create a better collaboration by using business processes. The solution chosen is given for the case study of [HIGH TECH COMPANY].

### Phase 6 – Implementing the solution

This phase will be carried out in a particular validation project at [HIGH TECH COMPANY]. The example of Print registration documents has been identified as a qualified project. One of the sales logistics departments is implementing a new process in automated form within the ERP system. The relevance to the alignment of the IT and business departments is highly given. Close collaboration is with this demand needed. The process is somewhat complex and, without pre-knowledge, not easy to understand. The iterative approach will be used again. If the solution is not fitting or additional comments arise, the answer will be changed accordingly and tested again.

### Phase 7 – Evaluating the solution

The last phase of the MPSM plays mainly due to the chosen iterative sub methodology a unique role. Major stakeholders will be interviewed on the proposed solution and the fitment. A back cycle will be opened if critical remarks are identified. The answer should be an excellent fit for the desired situation. A SWOT analysis of the interview responses will be carried out and presented.

## 1.7 Research Questions

The research questions or knowledge problems will guide the research. Within this section, these questions are stated and within their context explained.

The central research question expressed to work out a solution to the core problem is defined as follows:

*“How can Business process management contribute to the operational alignment between the business departments and IT.”*

This research question is setting up a general guideline of the research goal. Several sub-questions have been identified to support this central knowledge problem as well as steer the research further. These research questions are vital to the third and fourth phases of the MPSM (See Figure 1-2 – MPSM cycle).

#### 1. Sub research question

*“What frameworks exist in the literature for a Business-IT alignment?”*

Alignment between two departments always means some human interaction, in the form of communication or else. It is vital to have a framework that is usable and convincing. The research question will be answered using a systematic literature review. The literature can provide insides into case studies and theory that is introducing these frameworks.

#### 2. Sub research question

*“How can the Business-IT alignment lead to a competitive advantage for the organization?”*

An organization always has an eye on the financial perspective and on achieving a competitive advantage. A successful competitive advantage could make a possible implementation quicker and lead to more support of the internal organization for this still an unknown topic. A systematic literature review will be conducted to investigate this research question.

#### 3. Sub research question

*“How are processes used within the business departments, and for what purposes?”*

Processes within a company can be used on several occasions leading to different intentions or aims. Understanding how they are supporting or being part of the daily life at a business department is a crucial foundation to align the IT and the business departments. Several papers combined in a literature analysis will be reviewed to overview the usages across industries. Within [HIGH TECH COMPANY], several observations have been made for understanding their usage of processes.

#### 4. Sub Research question

*“How do processes support the IT in executing their tasks?”*

The goal of this research is to align the IT and the business departments. A vital step for a healthy and sustainable alignment is to analyse the needs of this interface. This will display the value of this alignment for the future organization. Understanding how IT uses processes in general and help them execute their tasks quicker and more efficiently builds a foundation for the interface. Relevant papers found in the literature will be discussed, besides conducting observations within [HIGH TECH COMPANY] for understanding the current support processes provided.

The sub research questions investigate the general uses of processes within the departments and explore existing solutions. Each research question represents a section in chapter two. This leads to the current state analysis in chapter three and defines a solution in chapter four. Table 1-1 provides an overview of the sub research questions, their research methods, and this report's section.

Table 1-1 Overview Sub Research Questions

<b>Research question</b>	<b>Research method</b>	<b>Within section</b>
<i>“What frameworks exist in the literature for a Business-IT alignment?”</i>	Systematic literature review	2.3 Existing Frameworks for Business-IT Alignment Existing Frameworks for Business-IT Alignment
<i>“How can the Business-IT alignment lead to a competitive advantage for the organization?”</i>	Systematic literature review	2.3 Existing Frameworks for Business-IT Alignment
<i>“How are processes used within the business departments, and for what purposes?”</i>	<i>Literature review; Observations</i>	2.4 The usage of processes within business departments 3. Current Collaboration of Business and IT
<i>“How do processes support the IT in executing their tasks?”</i>	<i>Literature review; Observations;</i>	2.5 Usage of Processes within the IT Department 3. Current Collaboration of Business and IT

## 2. Theoretical Framework on Alignment

The concept of business processes is rather old. They are used in several instances. Within IT, these processes grow in importance. Robust strategic IT solutions such as an ERP system are recently re-engineered and transformed. The following chapter elaborates on this to understand this background; besides the tasks the business and IT are carrying out. A systematic literature review is conducted to investigate existing frameworks and to answer the sub research questions. In addition, an analysis of selected papers is executed for further insights and knowledge.

### 2.1 BPM as an Internal Management Tool

According to the Cambridge dictionary definition, BPM is “the development and control of processes used in a company, department, project, etc. to make sure they are effective” (*Business Process Management Cambridge English Dictionary*, 2021). This definition is similar to the one from Gartner, a leading global advisory and research company. They state that BPM is instead a discipline than a method. In addition, they see BPM as a strategy enabler, a coordinator of people, systems, information and things to support the business outcome (*Definition of Business Process Management (BPM) - IT Glossary | Gartner*, 2021).

BPM is the management around processes that are building on the observation that every product or service of a company is the outcome of systematically followed activities, where each action consists of several business processes (Weske, 2007). BPM is an approach that works differently from the hierarchal organization. Instead, BPM is integrating these several processes into the so-called End-To-End processes (E2E). These E2E processes integrate several activities, modelling them from start to end. The end describes the product or outcome of the process. Many companies use those E2E processes to improve their customer-centric approach. An E2E process is always customer-oriented and often directly involves serving his demand or need (Hammer, 2015).

Business process management is used in many organizations differently. Majorly two domains are active in using and practising BPM, on the one hand, the business administrative domain, and on the other hand, the IT domain (Weske, 2007). A different mindset on BPM exists in these domains.

Within the business domain, cost reduction, organizational management and customer centred mindsets are dominant. The process is the enabler and facilitator for this. In contrast, the IT domain site focuses on the processes straight. Processes are building the foundation for the complex IT-system landscape. In addition, these processes are often a technological requirement for the systems. (Weske, 2007)

Business processes are a vital part of every single company. They rely upon several things necessary for execution. Hammer argues that the most crucial process enablers are the process design, the process metrics, process performers, process infrastructure and the process owner. (Hammer, 2015)

Arising topics, such as process mining, the stronger focus on IT in general and the automation of processes require an affinity of the IT and BPM, which is getting more critical for a modern organization. (zu Ortenburg, 2021)

Within many organisations, enterprise architecture management (EAM) is used as an equivalent term to BPM. Mainly EAM is used in the responsibility of the IT departments in the form of documentation of processes supported with the proper infrastructure. The growing complexity of organizations, encouraged by trends such as Industry 4.0 and AI, the documentation of implementations and processes gets especially for the IT a vital need. As Hammer states, integrating the process owners into this collaboration is one of the most critical process enablers. (Hammer, 2015) (zu Ortenburg, 2021)

## 2.2 Information Technology Systems and the Enterprise

IT is, nowadays, for an organization, an essential department. In nearly every industry, IT plays a key role, and as Carr et al. state, "Hardly a dollar or a euro changes hands anymore without the aid of computer systems." (Carr, 2003)

These IT systems are becoming within a company in recent years increasingly important. The competitive advantage, as well as the overall turnover, highly depends on these systems. A company's agility nowadays relies on its central IT systems. (Lu & Ramamurthy, 2011)

Modern IT systems for an entire organization, such as an ERP system, come with standard packages. Due to the wide variety between organizations, these standard software packages can be enriched with so-called transactions or workflows.

These workflows are customized by the company or purchased in a predefined workflow set. The variety is mainly dominated by the defined business processes of the organization itself (Caverlee et al., 2007). Workflows can be found in many different IT systems of an organization. Mainly the task of the IT for implementing them is to redefine the standard workflows or implement entirely new workflows to achieve a suitable fit to the business processes.

As stated before, IT is increasingly getting important within a modern organization. The management and maintenance of these systems are relatively expensive, mainly due to the speed of outdated investments. The high velocity of these systems and the low velocity of a company to adapt to these raises the importance to manage new implementations and analyses before investing. Regular maintenance and testing on its function become vital after implementing these (Carr, 2003). As Carr et al. state, the greater the company's expenditure is on IT, the less it possibly gains better financial results. He states that the opposite is true (Carr, 2003). IT governance is, therefore, a rising topic for organizations.

## 2.3 Existing Frameworks for Business-IT Alignment

### 2.3.1 Motivation for Choosing a Systematic Literature Review

The alignment of the business departments and IT is a widely discussed topic within organizations and the literature. The research goal of this report is to find out how to align the business departments and the IT. The business process is centric on the operational level, while the governance is more investigated on the strategic level.

A literature review can give insights on the general alignment and answer the research question:

*“What frameworks exist in the literature for a Business-IT alignment?”*

Additionally, this literature review can give insights into several other aspects of interest, especially into the research question:

*“How can the Business-IT alignment lead to a competitive advantage for the organization?”*

Both research questions can be answered by one literature review because of the deep connection. The main difference regards the concept of the “competitive advantage”.

Within a “beneficial framework” for a business, financial aspects and economic factors have been considered and realised. Therefore, the competitive advantage is often part of it.

### 2.3.2 Discussion of the Different Frameworks for Business-IT Alignment

In modern organizations, the topic of alignment is heavily discussed. Many different approaches and strategies exist to execute those concepts within an organization. To do so majorly, the supporting and underlying framework matters.

Within the literature, majorly two concepts are present. On the one hand, the strategic business and IT alignment and on the other hand the operational alignment. Many of the existing frameworks are building upon the strategic alignment model of Henderson et al.. (Henderson & Venkatraman, 1993)

The significance of this model is still up to date. IT is in many organizations still seen as a supporter and service unit of business activities and tasks (Henderson & Venkatraman, 1993). The first papers discuss the obsolescence of the widely accepted model of the year 1993 (Smaczny, 2001). Claims for seeing the paradigm not appropriate anymore rely on the motivation of developing this model. IT is expanding and moving faster than the organization behind them, leading to IT systems not supporting its strategy (Smaczny, 2001). Nowadays, this still applies, though not as noteworthy as it was back then.

The strategic alignment model is introducing a framework that is for coming to this issue. Because of the wide acceptance of the model in literature, it will also be relevant to answer the research question subject to this literature review.

IT is often facing the problem of quick investments which can support the business. However, due to usually broad and complex transactions, they must be appropriately integrated into the business. The literature calls this “...the inability to realize value from IT...”(Henderson & Venkatraman, 1993). Henderson and Venkatraman have argued that this is partly due to the organizational position of IT. Often the back-office view is to observe. Therefore they see the missing cooperation and acceptance of knowledge transfer as one of the reasons for the inability to generate value from IT. (Henderson & Venkatraman, 1993)

Business and IT alignment is a two-folded approach, combining the strategic fit and the functional integration. Like other strategic paradigms, the theory relies on a continuous integration rather than a process, which is once performed.

The model builds upon four dimensions, the strategic and functional fit, besides the cross-functional fit, which integrates all dimensions. The strategic fit, one of the two axes of the model, is combining the infrastructure and strategy of the internal organization with the external organization. This integration results in the internal and external environment, clarifying where the company is positioned within a market, where it competes (external) and which administrative structures support this (internal).

On the other axis of the model, the functional integration is displayed. The functional fit focuses on integrating the skills, processes, and structures, significantly shaping and supporting each other's activities and processes. (Henderson & Venkatraman, 1993)

This functional view is a high-level operational alignment. The model (see Figure 2-1 - Strategic alignment model (Henderson & Venkatraman, 1993)) is building upon the principle that competitive advantage through IT is only achieved by a fully aligned interface towards the organization, especially if the IT is outsourced.

The model is a guiding framework. A suitable integration varies per company. Henderson and Venkatraman claim that a strategy cannot be uniform for every company; subsequently, it would conflict with the original strategy definition. Companies must adapt to it. A strategy is a framework that must be redefined uniquely per organization. (Henderson & Venkatraman, 1993)

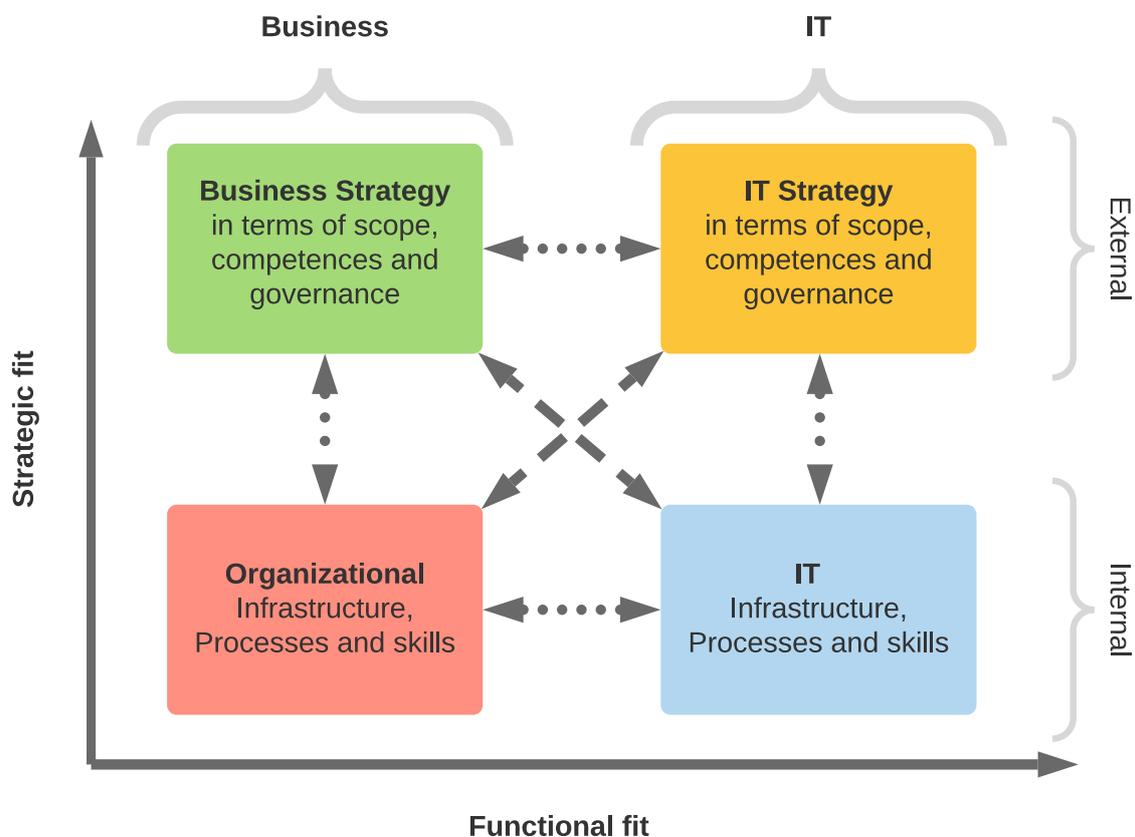


Figure 2-1 - Strategic alignment model (Henderson & Venkatraman, 1993)

The importance of IT nowadays within an organization is noticeable. Nearly every process or business activity is supported or carried out by or with the help of IT (Van Der Zee & De Jong, 1999). Therefore, the alignment between the business organization and IT has been on the agenda of executive officers of global and small organizations for a long time. It affects the performance of the business. (Sabherwal & Chan, 2001)

The alignment of business and IT involves value in the form of monetary success and non-financial success. Examples are more effective business solutions by harmonized and shared concepts. (Van Der Zee & De Jong, 1999)

The alignment has received increased significance for businesses. The high innovativeness in IT and the growing value IT can bring to a business result in a competitive advantage, especially in diverse and fast-changing industries. The business view of IT is consequently overhauled, from expenditure to a driver of business value. (J. Luftman & Brier, 1999)

Companies question themselves increasingly how to stay agile and flexible. Many models and theories exist which introduce different strategies. Literature in strategic alignment frequently claims that this cooperation supports growth in profits and sales and internal growth in productivity, efficiency, and innovativeness. (Chan et al., 1997) (Paul P. Tallon & Pinsonneault, 2011)

The agility of an organization is instead additionally increasing the company's performance. Tallon et al. are finding a significant linkage between the agility of an organization and an alignment of the IT and business. (Paul P. Tallon & Pinsonneault, 2011)

This competitive advantage, enabled by business-IT alignment, affects a company's future performance by increased performance for a change. Aligning these two business divisions should focus more on shifting the strategy and changes in the future market than on the current state for enabling a true competitive advantage. Alignment is defending the competitive edge and supports improving it. (Paul P. Tallon & Pinsonneault, 2011)

The alignment after Henderson et al. got adapted and discussed by Luftman and Brier in the year 1999. They describe the Strategic alignment model (Figure 2-1) in more detail, introducing twelve alignment components.

These twelve components are constantly changing, especially their interrelationship within an organization. Luftman and Brier are claiming "...their interrelationships are as unique as the companies that follow them..." (J. Luftman & Brier, 1999). Key enablers must be identified; they remain the constant parameter in the alignment. Research and experience suggest introducing a steering committee to handle these dynamic alignment components. (J. Luftman & Brier, 1999)

These adapted components are scope, competencies, and governance for the strategic elements of the model. Within the business strategy, the market, the organisation's location, the critical success factors, and the competitive edge of the business strategy are determined. The governance is defined, meaning how the internal organization is structured and organized in terms of alliances and relationships. (J. Luftman & Brier, 1999) (J. N. Luftman, 2003)

The IT strategy consists out of the same components, however differently interpreted. The scope refers to the information about the IT systems and technologies. Competencies refer to capabilities of the IT service and the IT governance, how projects are selected and prioritised aside from the management in general. (J. Luftman & Brier, 1999) (J. N. Luftman, 2003)

Within the two other dimensions of the Strategic alignment model, the infrastructure and processes, the gap between IT and business is minor, and the cooperation is taking place. The Strategic Alignment model defines the structure for business or architecture for IT, processes, and skills.

Luftman and Brier define the business' structure as the internal administrative organization, the processes as the business activities or operations and the skills as the considerations of human resource management. Within the IT domain of the model, the architecture refers, according to Luftman et al., to the technology priorities, policies and choices allowing to integrate into a platform. The processes of how operations are developed, managed and carried out plus finally skills, equal to business, how the considerations of human resource management are addressed. (J. Luftman & Brier, 1999)(J. N. Luftman, 2003)

Overall, the alignment is influenced by four main factors, shared domain knowledge, IT implementation success, communication between business and IT executives and the linkage between the business and IT planning processes. (Reich & Benbasat, 2000)

According to Taylor-Cummings, the focus on shared domain knowledge obviates the cultural gap between the business and the IT, who claims that this "cultural gap" is a significant issue for system development failure. (Taylor-Cummings, 1998) (Reich & Benbasat, 2000)

In global organizations, the IT department has been improving in recent years, especially with the communications and the bureaucratic cost of organizing several business units or sub-companies by innovative solutions. The introduction and innovation of IT organizations can be more efficient and productive due to IT systems that support the data transfer, collaboration, and communication, with internal and external partners or customers. (J. N. Luftman, 2003)

This internal interaction among stakeholders in an organization is defined as alignment - a complex interaction in a continuous approach, where the organizational factors must address these. A mature alignment consists of several parameters, significantly how IT can leverage value toward the business. The business and IT must work closely together to identify these improvements.

Competitive advantage can be achieved not solely by the IT or solely the business, but by applying the business's knowledge to the IT (J. N. Luftman, 2003). This knowledge creates social capital among the people. Social capital creates one of the foundations for the alignment of business and IT.

A vital issue of the overall alignment is the operational alignment, especially how to integrate the alignment into the daily routines. The primary findings concern knowledge, trust and communication. (H.-T. Wagner & Weitzel, 2012)

Operational aligning is ensuring to transfer the strategy into action. The strategic alignment model is pioneering with this, though only on a strategic level. The Opera

framework of Wagner et al. is connecting the operational alignment towards the strategic alignment model. The foundation for this alignment is the earlier named social capital or the so-called cross-domain knowledge. Challenging is to foster cross-domain expertise. The strategic alignment sets the global principles. (H.-T. Wagner & Weitzel, 2012)

This alignment aims to work and improve existing and new business processes besides working on a common strategic goal for the operations of a business (H.-T. Wagner & Weitzel, 2012). Business IT alignment is achieving operational value for the overall organization, majorly through improving or enabling business processes or linkages between processes or both of them (Paul P. Tallon et al., 2000).

The three dimensions of the OperA framework are interrelated. One dimension set the previous one as a prerequisite, while only all three measurements together can archive complete alignment (See Figure 2-2). The framework intends to transform the quantity of communication into quality.

The dimension of communication is accessing the structural linkage between IT and business. The purpose of this dimension is to create frequent and regular exchanges, formal and informal. The goal is to provide interaction as a basis for knowledge transfer and communication exchange. The communication dimension is establishing meetings and channels to exchange. The support of the management is necessary as a base for facilitating the communication on these established channels. As Wagner et al. are stating: "...placing people with no previous relationship in the same room does not guarantee interaction and knowledge transfer."(H.-T. Wagner & Weitzel, 2012).

The knowledge dimension aims to widen the horizon and scope of the IT and the business department members. Creating shared domain knowledge or social capital is one of the significant success factors for the Business-IT alignment. Understanding each other's work and needs, especially the business market and the processes, which are among the many channels for exchanging, leads to fully exploiting the potential. The continuous knowledge exchange builds up high domain expertise, leading to cross-departmental and functional ability, improving internal trust, respect, and mutual understanding. (H.-T. Wagner & Weitzel, 2012)

One critical success factor for the Business-IT alignment is knowing and understanding why things are happening instead of only what is happening or how things are happening. Wagner et al. are discussing the three questions of "Know-How", how specific problems are solved, "Know what", which topics or issues the business solves and "Know why", why this is relevant or important. Shared domain knowledge, continuously updated, is making sure these questions are answered. In particular, the Business-IT alignment demands why things are tackled or relevant to be responded to create a well-established and sustainable alignment. (H.-T. Wagner & Weitzel, 2012)

The last dimension of the OperA framework (See Figure 2-2 – adapted from OperA framework: The virtuous cycle of alignment (H.-T. Wagner & Weitzel, 2012)) is the dimension of trust or cognitive relationship. Trust must be created between departments to establish respect for others' work, beliefs, and knowledge within an organisation. Motivation and willingness to exchange knowledge and especially insights are growing, while the acceptance of this exchange is also increasing.

These three dimensions, introduced by Wagner et al., are heavily interrelated. Trust is enlarged by knowledge transfer, which is enabled by communication and vice versa. The framework of Wagner et al. (See Figure 2-2) introduces a robust framework that shows how these dimensions are interrelated and how they only in combination can lead to an effective alignment and collaboration. (H.-T. Wagner & Weitzel, 2012)

Knowledge within a company is one of the most valuable assets, ultimately resulting in a competitive advantage. This knowledge is principally categorised in two forms, tacit knowledge and explicit knowledge. (Alavi & Leidner, 2001)

Explicit knowledge is knowledge, which is present in a written or symbolic form. In contrast, tacit knowledge is deeply involved in actions, experience, or involvement in a particular setting, for example, process or organizational documentation.

Tacit or implicit knowledge cannot be documented or defined in words, symbols or even transmitted verbally. An example is how to contact a particular customer (S. F. Martin et al., 2008) (Alavi & Leidner, 2001). One of the goals of alignment should be to increase the others domain knowledge by knowledge transfer practices. The creation of expertise heavily relies on a substantial basis of explicit knowledge, for example, business process modelling and tacit knowledge. Tacit knowledge is shared passively by having a close relationship between these departments (Blumenberg et al., 2009). Tacit knowledge creates the setting for interpreting and analysing the explicit knowledge (Alavi & Leidner, 2001).

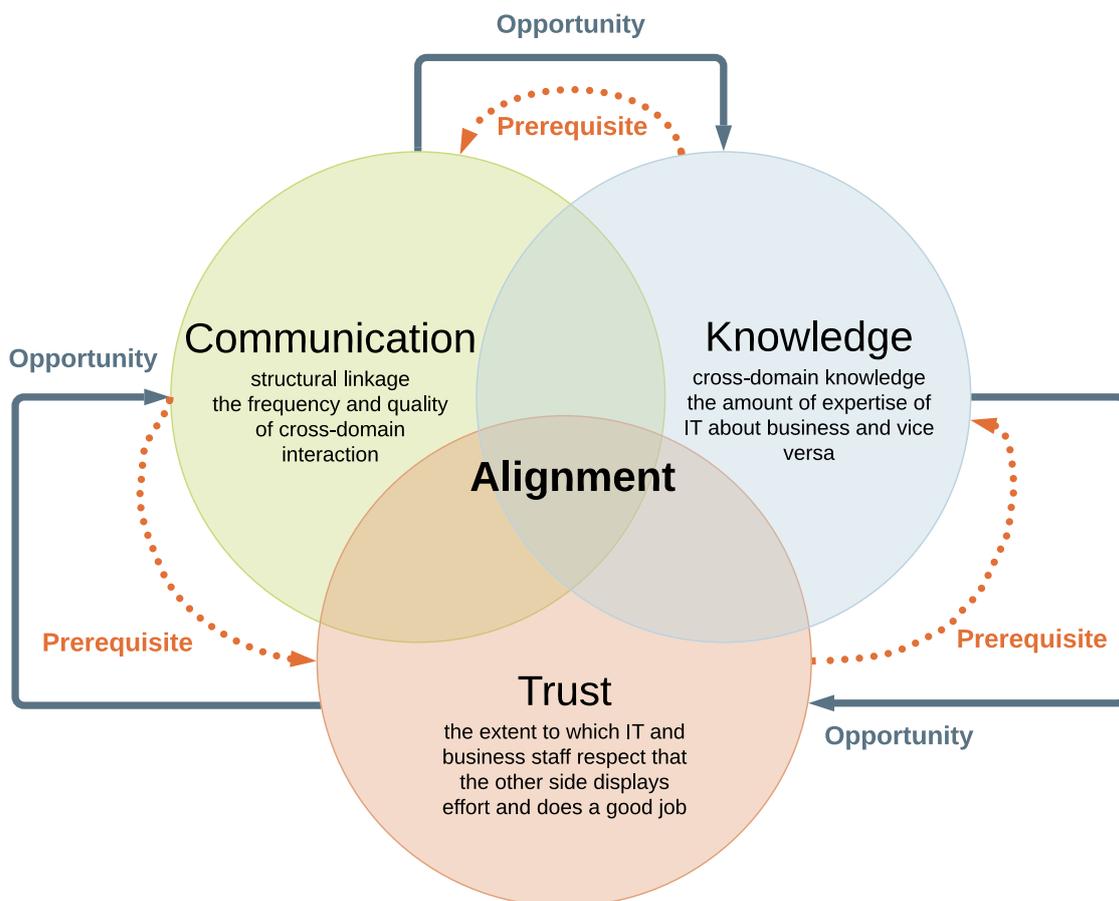


Figure 2-2 – adapted from OperA framework: The virtuous cycle of alignment (H.-T. Wagner & Weitzel, 2012)

Formal and informal procedures and connections are often used and maintained to build a close relationship between the IT and business departments. An approach for utilising these procedures can be up-to-date documentation of relevant processes. (Blumenberg et al., 2009)

The alignment of business and IT within an operational framework is often described through processes, sharing significant relation to strategic alignment and supporting process performance and increased IT flexibility. The functional alignment results from the mutual partnership between IT and business departments and a combined knowledge instead of a shared understanding. (H. T. Wagner et al., 2014)

Through business processes, the operational alignment can be supported. The process documentation can provide cross-departmental transparency. Business process documentation generally provides clarity across the organization due to the insights and dependencies on other processes or process chains. It provides answers to the question Wagner et al. identified as a driver for alignment: "Know why". (H.-T. Wagner & Weitzel, 2012) (Beimborn et al., 2008)

Process documentation is rising in importance within organizations, mainly due to the decentralization of IT and modularization. The IT needs to know and understand the business processes to develop the value and performance of the organization. Business processes are correlated to the three operational Business-IT alignment dimensions after the OperA framework. (Beimborn et al., 2008)

BPM is sharing the vision of the importance of process modelling. BPM is a rather complicated concept for organizations to implement and maintain. It is widely accepted and introduced; however, the main challenge is to convert the future benefits into success stories at the organization and increase the BPM capability. (de Bruin et al., 2007)

BPM is one of the building blocks for information systems (IS). Business processes are a concept that connects the business strategy with the system (Niehaves et al., 2014).

IT is one of the enablers of BPM (Hammer, 2015). Thereby the alignment of IT and business is enhanced by BPM. The alignment between business and IT is a mutual relationship as the closer the alignment, the more significant the improvement on the individual business processes (Paul P. Tallon et al., 2000).

The alignment of business and IT at the process level is founded to be correlated with BPM. Therefore, finding and detecting changes and incidents is more straightforward, ultimately leading to a competitive advantage. (Paul P. Tallon & Pinsonneault, 2011)

Business process modelling is a method for standardised describing processes and actions, which actively prevents the language barrier of aligning departments. Using BPM, the barrier can be eliminated and prevented (Paul P. Tallon & Pinsonneault, 2011). The content of operational alignment is the business process (Gerow et al., 2015).

Tacit knowledge has been found as an essential foundation of alignment, as described earlier. Martin et al. proved that a transformation of business process knowledge from the business to IT strongly supports creating tacit knowledge.

Nevertheless, organizations should not purely focus on process documentation and facilitating this knowledge exchange between the domains. The significance of shared knowledge and cognition is lower than without an up-to-date process description (S. F. Martin et al., 2008).

Business intelligence is an arising topic, such as the Business-IT alignment, by providing benefits for strategic and operational management systems. A vital issue of this trend is the missing knowledge between IT, which controls and operates the business intelligence and the business. Successful alignment facilitates the necessary capability to use business intelligence to support the business's performance by providing the partnership and collaboration of the domains at all levels. The enhanced payoff of business intelligence is not purely achieved by implementing comprehensive systems (Elbashir et al., 2013).

Other trends such as digitalization also provide approaches for introducing an operational business-IT alignment focusing on processes. As Kude et al. are stating after Draft et al., "Capabilities are the processes and skills needed to make use of assets for creating value" (Kude et al., 2018) (Daft, 2007). Business process affinity for the IT results from the increased understanding and higher transparency to the reduced need for specific solutions and additional software, leading to a reduced cost for maintaining, implementing and supporting activities (Kude et al., 2018).

The alignment of business and IT also gives an outlook on solving problems of IT processes within ERP software solutions. As Kude et al. are citing a manager of a market leader in several industries with a long tradition of engineering: "IT governance assured that [HITECH] was running only SAP on a unified hardware, but the business units were defining their processes themselves, and gradually the SAP R/3 was not standard any more, but merely a platform for various highly customized proprietary solutions [... which] represent very expensive tailored software solutions." The interviewed manager breaks down the exact problem and solution: "...Often, it is simply about knowing what is possible with our running solutions; in the past, this knowledge was often missing in the business units, leading to a process design that enforced unneeded new software applications." (Kude et al., 2018).

The alignment of IT and business departments can facilitate exchanging knowledge and capabilities, empowering organizations to harmonize business processes. A requirement for this is the shared or combined knowledge of business in IT. Therefore, business processes can be defined more within the standard of information systems, which results in cost synergies due to the similarity of functions.

The documentation of processes is, therefore, a critical success factor by facilitating this knowledge. Thereby opening the opportunity to more accessible spot innovation and quickly react to incidents as well as changes. The aim is to enhance the value of the business processes (Kude et al., 2018).

Kude et al. state that the creation of synergies between business IT will be: "With increasing digitization, this is likely a key differentiator in many industries" (Kude et al., 2018).

## 2.4 The Usage of Processes within Business Departments

Many modern enterprises or organizations use the concept of processes in their daily operations. A process that is used or controlled within the business departments is called a business process. Lindsay et al. are summarizing the old concept of a business process: “A sequence of activities which transform inputs into outputs” (Lindsay et al., 2003).

This definition is close to the definition of a business process of Sara Aguilar-Sav et al. “A business process is the combination of a set of activities within an enterprise with a structure describing their logical order and dependence whose objective is to produce the desired result” (Sara Aguilar-Sav, 2004).

Business processes can, however, be used within many different contexts. Toyota introduced process-orientated thinking by their Total quality management (Ting-Yi Ho et al., 2009). Business processes are mainly used within two domains, the operational processes, which focus on the firm’s value chain and the management processes, which integrate the information processing, control, coordination, and communication of the operation in general or the system (G. et al., 1996).

BPM is defined according to Aalst et al. as the supporting of tools, methods, and software to enact, control, analyse and design business processes that involve humans, organizations, applications and documents (Aalst et al., 2003). The framework of BPM sees an organization as a system consisting of linked business processes (Ting-Yi Ho et al., 2009).

To answer the research question: “*How are processes used within the business departments and for what purposes?*”, literature research of the year 2013 of Anand et al. on the three main paradigms about business processes will be discussed (Anand et al., 2013).

Anand et al. analysed 55 articles of top journals, published between 2005 and 2011, of the AIS and 61 peer-reviewed papers from the Science Direct database. The research aimed to differentiate between the different paradigms and their applications by answering questions about the current development level and potential future research directions. More than half of the analysed papers use a survey or a case study as an approach. The majority of literature is from the European region, followed by the USA (Anand et al., 2013).

The three main paradigms that organizations accepted as a primary strategy around business processes are business Process re-engineering, Business process innovation and Business Process Management. These paradigms are also focusing the close collaboration with IT (Anand et al., 2013).

The three paradigms build upon the definition of a business process. A process can be an operational process, which involves a company's value chain, or it can be a management process that governs the overall operation of that system. Business processes are one of the building blocks for a company to function. Improving the operations results in improved processes and vice versa. (Anand et al., 2013)

BPM is within the literature differently defined; nevertheless, the definitions have all in common that BPM is a concept that facilitates tools and methods to manage processes (Huang et al., 2011) (Anand et al., 2013) as well as it aims to optimize

processes by aligning, creating synergies as well as analyses of processes (Smith, 2003) (Anand et al., 2013).

Business process reengineering (BPR) is a term that got introduced by Hammer et al.. They define BPR as “the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed” (Hammer & Champy, 1993). A fundamental change of the concept and support aside due to the outdated reinvention of processes as Anand et al. are claiming: “Re-inventing has been primarily dependent on management wisdom, creativity and common sense in changing management. Hence, by definition, BPR supports scrapping the entire business process to build entirely new processes.” IT is a critical enabler. Nevertheless, the focus is on the individual processes which need to be transformed (Anand et al., 2013).

Business process innovation (BPI) is a framework that is sustained by the concept of innovation. Anand et al. are using the definition of Schumpeter “...who defined innovation as (i) a new way of handling processes, (ii) a new product unknown to clients, (iii) new markets previously not known, (iv) new sources of supplies, and (v) new competitive structure in an organization.” (Schumpeter, 1934) (Anand et al., 2013). BPI is therefore defined after Davenport as “performing work activities in a radically new way to attain visible and dramatic results to meet the business objectives” (Davenport, 1992).

BPI and BPR are closely related to each other the one is creating the innovation while the other is executing it. The IT is, like BPR, an essential enabler of BPI, making radical innovation and changes of processes possible. Anand et al. are giving an outlook on BPI, and the IT “process innovation can be perceived as a method to align resources such as IT with organisations' business strategies” (Anand et al., 2013).

The categories people, process, resource, and customer classify the most critical views on the concepts within the literature research. The view on processes is accessing integrated elements of the process, while the people view is accessing the organizational structures and responsibilities. The resource view accesses the integration of resources into processes, and the customer view is accessing the requirements of the customer standpoint (Anand et al., 2013).

Business processes are consisting out of several components. Specific topics they cover are customer management, planning, control, resource management, knowledge management, change process, learning, people and performance management (Van Rensburg, 1998) (See Table 2-1 Process components adapted from (Van Rensburg, 1998) including occurrence in literature adapted from (Anand et al., 2013)).

Anand et al. adapted the framework of van Rensburg of the year 1998 to classify the most occurring topics which the processes cover within the organizations. The papers of the AIS journals and the Science Direct journals were analysed, and the occurrence of the process components after Van Rensburg was counted (Anand et al., 2013). Table 2-1 gives an overview of the after the occurrence in literature sorted results, besides the detailed process components including their goals and objectives.

Table 2-1 Process components adapted from (Van Rensburg, 1998) including occurrence in literature adapted from (Anand et al., 2013)

Process component adapted from (Van Rensburg,1998)	Occurrence within literature AIS Journals and Science Direct (some articles counted more than once) (Anand et al., 2013)	Goals adapted from (Van Rensburg,1998)	Objectives adapted from (Van Rensburg,1998)
Knowledge Management	19,4% / 15,6%	Grow organizational knowledge	Create knowledge In-source plans, controls, and solutions
Change Process	13,8% / 14,7%	Change the organization in order to meet customer requirements	Develop solutions through innovation; Re-establish control
Performance Management	10,1% / 14,7%	Evaluate performance of the organization	Reward and recognize people, Collate relevant performance levels
Control	13,0% / 11,3%	Establish measures for operational performance	Define standards; Define measurements
Planning	11,1% / 12,1%	Plan value and the delivery of value thereof to the customer	Establish goals (policies); Define capabilities
Learning	7,4% / 10,4%	Convert knowledge into innovation	Create innovation
Resource Management	7,4% / 8,6%	Manage operational activities of the organization	Obtain performance levels; Measure deviations
People	11,1% / 4,3%	Enable people in a changing environment	Establish structure; Establish the culture; Establish reward and recognition
Customer Management	6,4% / 7,8%	Integrate and focus value delivery on the customer	Identify needs/wants; Develop product /service profile; Obtain constant customer satisfaction feedback

The process components and their occurrence were analysed within the literature, subject to the review of Anand et al.. The literature research of Anand et al. reveals several components or areas of usage of these business processes across industries and the world. The data is evidence supported and well researched (Anand et al., 2013), leading to a valid and reliable outcome and answering the research question *“How are processes used within the business departments and for what purposes?”*.

Processes are mainly used for knowledge management, to share and build organisational knowledge, while at the same time also creating the necessary structure, plans and solutions for this. The second most occurring component of processes is change management. The focus is on getting more customer-oriented, changing the organization according to these requirements, and managing the development of solutions for this change by actively performing this change. The third most occurring within the organizational context of business processes is performance

management, aiming to evaluate performance and reward this. The components of planning and control nearly have the same relevance, by on the one hand measuring the operational performance and defining standards, on the other hand planning these values and goals and policies.

The component of learning follows planning. Converting knowledge into innovation is the focus, while the following component, resource management, aims to manage the organisation's operational activities. The last two relevant components, people, occurring second last and customer management, occurring last, focus on enabling people within a changing environment. Customer management aims to integrate and focus on the delivery of the customer, to identify the needs and requirements (Van Rensburg, 1998) (Anand et al., 2013).

## 2.5 Usage of Processes within the IT Department

The IT department of organizations is experiencing, within recent years, growing importance. Information technology provides a wide range of opportunities for organizations (Rahimi et al., 2016).

Understanding how the alignment of IT and business needs to function is vital for understanding both sides' requirements. To examine this and especially how processes support IT, the following research question is further investigated.

*“How is the IT-supported by processes in executing their tasks?”*

Many business processes are heavily supported by IT and therefore also vice versa. The IT supports nearly every part of a business operation ranging from an Enterprise Resource Planning (ERP) system to the E-mail application of a company. IT is mainly involved in three main capabilities, information management, information processing, and communication (Sidorova et al., 2015).

Processes, in general, are transforming an input into an output (Lindsay et al., 2003). Due to the growing complexity and flexibility of individual industries and organizations, modern ERP systems are building upon processes. Processes are the backbone of any ERP by setting the steps to produce an output. These systems construct a foundation for a business. However, it must get enriched by individual workflows to execute a process. These workflows represent a business process within software. (Kraljic et al., 2014).

During the implementation of such systems, processes are a needed foundation. They provide a shared understanding and analysis of the operation, which is a vital step in the blueprint phase and, after the implementation, managing changes and incidents of the workflows (Kraljić & Kraljić, 2017).

In general, IT deals with information management systems which are systems consisting out of several components which are integrated to support the operations as well as the management activities.

A business process consists of three logical components, the information process, the operations process, and the management process, which are the internal processes of the IT and their corresponding information systems (Gelinas et al., 2008).

These logical component processes are accomplishing the objectives of the business process. The information system is building upon these and is thereby supporting the organisation by executing the business processes (Gelinas et al., 2008).

This necessity of processes within the IT and their corresponding systems also changed the information systems from a data-aware system to a process-aware system. Those process-aware systems build upon the corresponding processes and are therefore not user-centric. They instead guide the user through the process (Riss et al., 2005).

Processes are generally in the IT a respond to the challenges of change within the organization. The changes and transformations are deployed within these business processes (Caverlee et al., 2007).

BPM is the primary modelling technique for IT to capture and support information technology infrastructure by coordinating and optimizing. BPM is providing IT insights into the identification of process bottlenecks and the infrastructure. Business processes also form the management of information processing between systems (Caverlee et al., 2007).

Central to the IT are workflows and executables, Van der Aalst et al. define the workflows after the Workflow Management Coalition: "The automation of a business process, in whole or part, during which documents, information or tasks are passed from one participant to another for action, according to a set of procedural rules." (Aalst et al., 2003).

## 2.6 Business-IT Alignment from a Theoretical Perspective

Within literature several alignment models exist, the most relevant one is the strategic alignment model of Henderson and Venkatraman, displaying the functional and strategic fit of the two departments. Wagner et al. are building upon this with their OperA framework, which shows the relation of communication, knowledge and trust. These three combined ultimately align the business and IT. All alignment models claim to deliver direct or indirect value towards the organization, some even set this as a strategic target. Improving the internal organization makes the company crisis-proof which is directly related to a competitive advantage.

Processes can be used for many different purposes, which requires different foci on the way they are modelled. Business processes are used most often used for knowledge management, followed by assisting the change progression and performance management. A process is in in general representing a business operation, by definition an input is transferred into an output.

The IT is using processes most often to manage the different systems and activities supporting the business operations. Especial the many information system change to a process aware system, meaning these processes build the foundation for a special transaction or program within these systems. Information exchange and dataflows between systems is traced by processes. Processes within the IT mean a higher flexibility allowing to change and adapt quicker.

### 3. Current Collaboration of Business and IT

Within this chapter, the current cooperation practises of the business departments and the IT will be described. [HIGH TECH COMPANY] has an own IT department. Many daily operations can be solved internally. If necessary external consultants and specialists will be hired for projects.

#### 3.1 The Central IT Service Management Processes

The management of the internal IT services is mainly structured within three different processes, IT Incident Management, IT Service Request Management, and IT Demand Management.

The IT has a Ticket Tool, this is a comprehensive organizational platform used as a communication tool between the business departments and the IT. It provides a ticket system, where employees can report and request things to the IT. Unique templates for regular occurring tickets are present to simplify and speed up the creation of a ticket.

Three main processes have been implemented (See Table 3-1). Different IT experts and solution owners are supporting these three processes. The three processes vary in their scope. Incident Management concerns problems, errors and malfunctioning occurring during daily work, while Service Requests are routine changes like configuration of specific settings or standard system modifications.

Demand Management is different to these short-term requests. In Demand Management, new systems, applications, or functions are introduced to simplify the daily work and processes of the business. This service type of IT is getting differentiated into two subsections: the demand where less than 50 IT man-days are needed and projects due to the need for more than 50 IT man-days.

*Table 3-1 Internal IT - Service processes (Company, 2020b)*

Process	Aim	Example
<b>IT Incident Management</b>	Rapid recovery of the IT service, if applicable with the aid of a workaround	Printer is malfunctioning
<b>IT Service Request Management</b>	Handling of service requests (standard catalogue requests)	Installation of a new printer
<b>IT Demand Management</b>	Requests for changes to the functional scope of existing IT applications to optimize workflows or processes	Implementation of Pull Print printing systems for shared use of printers by several people

The procedure per type of service varies. For service requests and incidents, the IT is directly responsible and takes care of the execution and prioritisation. The procedure for demands and projects is different. Projects need a manager, and the responsibility for execution lies within this project. The procedure for demands is also different. The development function plays here a management role. It decides on the prioritisation and approves the demand.

### 3.2 The Process of IT Demand Management

The process of Demand Management (See Table 3-1) focuses only on demands within existing applications or systems. It only manages demands estimated with smaller or equal than 50 IT man-days. All demands bigger than this are worked on within projects. These demands are called changes, mainly focusing on improving or optimizing existing processes or workflows within systems.

The business departments mainly request changes. Then the changes are transferred to the responsible or associated development function for approval and prioritisation. Next, IT is implementing this change. Once implementation is done, IT asks the business department to execute tests before the final GO LIVE is scheduled. The entire process flow, including the tasks per department, is visible in the following figures (See Figure 3-1, Figure 3-2 and Figure 3-3).

The business department is filling out the requirement specification template as a starting point for the change. The IT department sets up the documentation of the change before the GO LIVE. It is also stored with them. Documentations are stored in many places. The IT expert is often personally saving it on his drive.

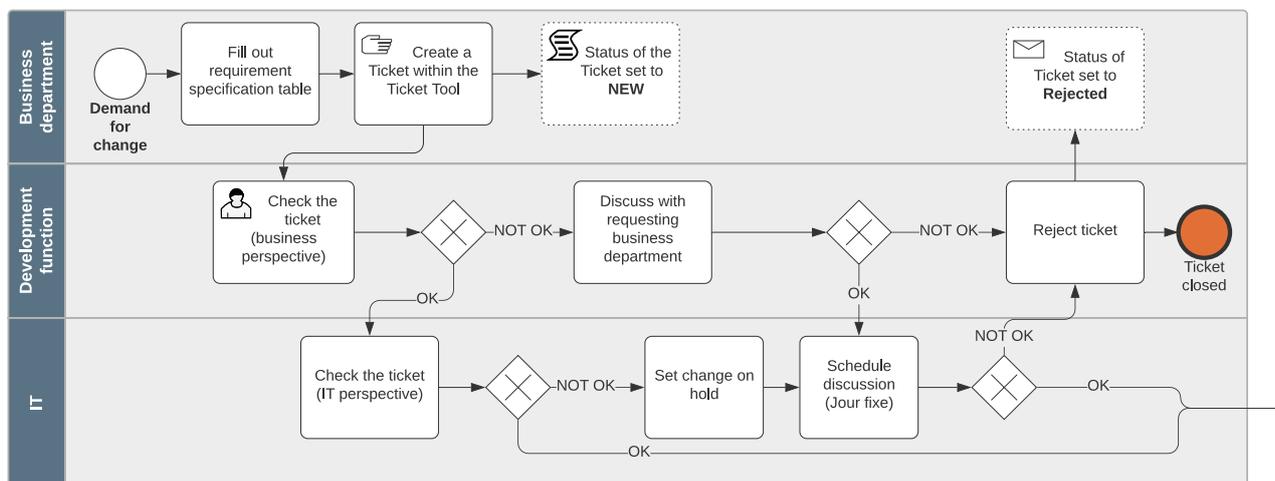


Figure 3-1 IT Demand Management Process Part 1 (Company, 2020a)

Implementation Phase - Executed in KANBAN Board

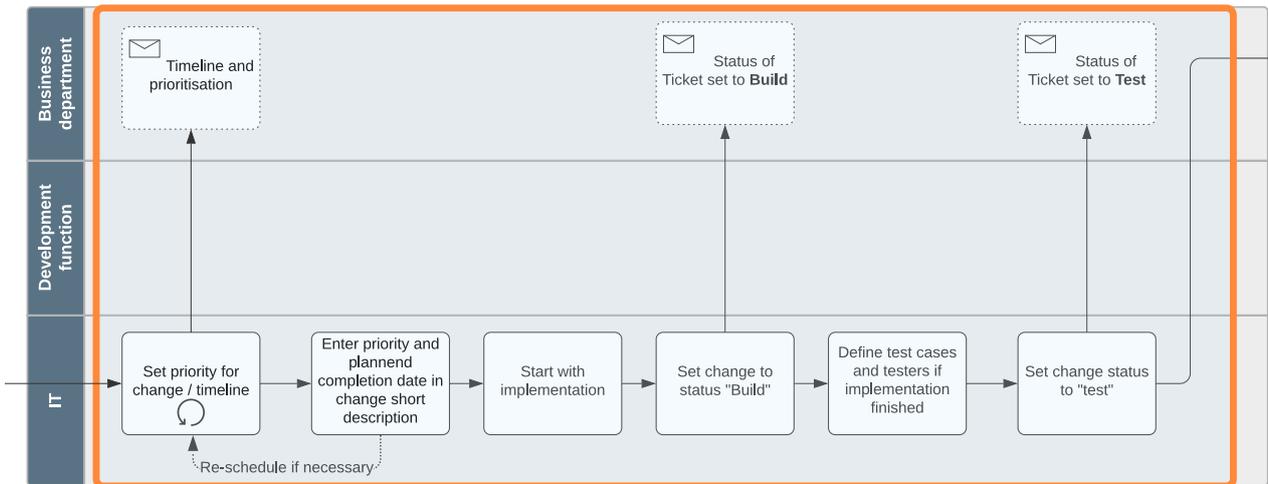


Figure 3-2 IT Demand Management Process Part 2 (Company, 2020a)

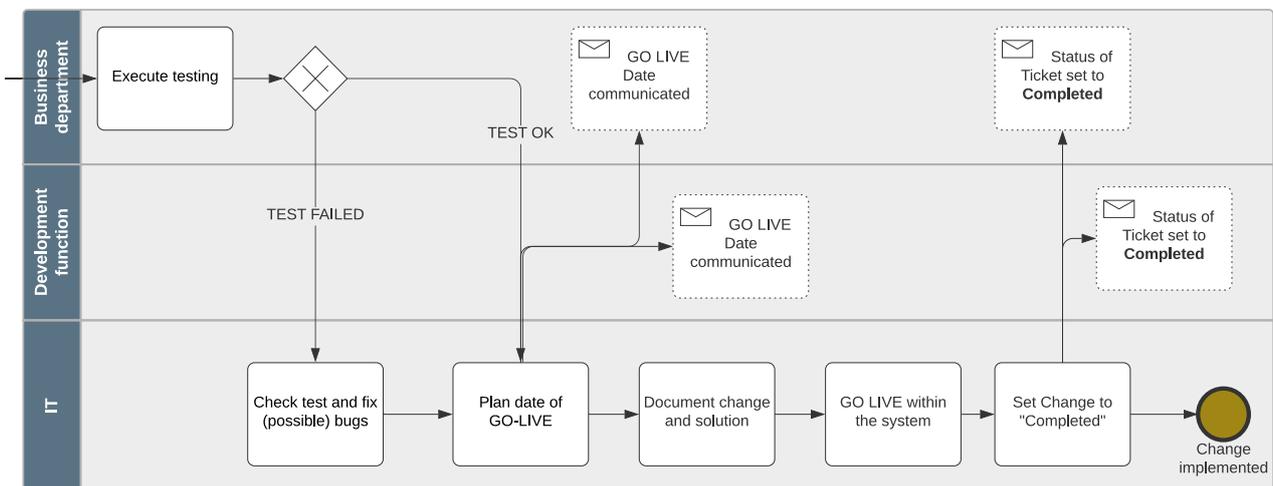


Figure 3-3 IT Demand Management Process Part 3 (Company, 2020a)

### 3.3 A Pioneering Project of a Business-IT Alignment

Within the Business are of Sales and Services, a new organization called the Digital Processes (DP) got created. This department got introduced due to the rising demand for IT solutions within the sales and service area. Examples are Customer Relation Management (CRM) systems and many opportunities to automate existing business processes.

The DP department has solved a common problem of internal IT. Many business departments have budgets with associated IT man-days. They require a change referencing their man-day budget.

It results in a chaotic situation, where the organizations themselves set priorities for the changes. An enormous backlog list without organization-wide priorities is arising. This is leading to a problematic situation for IT, which ultimately results in inefficiency.

The DP department has tackled this problem and is thereby a pioneer within the [HIGH TECH COMPANY] organization. Aligning the business and IT has improved the limited workforce of the IT, which can now be used with high efficiency. The priority is now getting accessed for the entire group, which results in overall better performance.

The DP department is classified as a [HIGH TECH COMPANY] Domain. This means it is a cross-functional, permanent team, which is in the long-term working on a specific topic. In this case, the DP department is working on IT service solutions.

These cross-functional domains combine the advantages of different structures, the topic-oriented working of a project, with the permanently working environment of the line organization. The lead of this Domain is shared equally by the business and the IT. An IT Solution Owner and a Business Product Owner share the responsibility and management of the Domain.

Domains can be subdivided into smaller topic-oriented teams with the same structure of having a Solution Owner on the IT side and a Product Owner on the business side (See Figure 3-4 - DP Organizational Chart ).

Once a business department demands a change, they contact the specific domain responsible for the topic, the domain product owner and solution owner are together analysing the change. They also estimate the required IT man-days and classify the change into a priority. This change is then included on the backlog list of that domain.

This backlog list per domain is then discussed in a rhythm of four weeks. The changes are getting implemented into the next sprint, and the expert teams are implementing them. Once the planning for the sprint (lasting four weeks) is done, it is fixed and is not changed anymore.

Due to this Business-IT alignment, the budget of IT man-days is lying with the DP department domain, the solution owner and the product owner of that specific domain. Therefore, all change demands of a specific domain can be clustered and prioritized per topic for the entire group, regardless of whom requested them.

The main critical takeaway of this domain thinking in combination with a Business-IT alignment is the cross-functional work, which creates a shared mindset for the team members. Changes can be prioritised and implemented better, leading to more productive work and better business results.

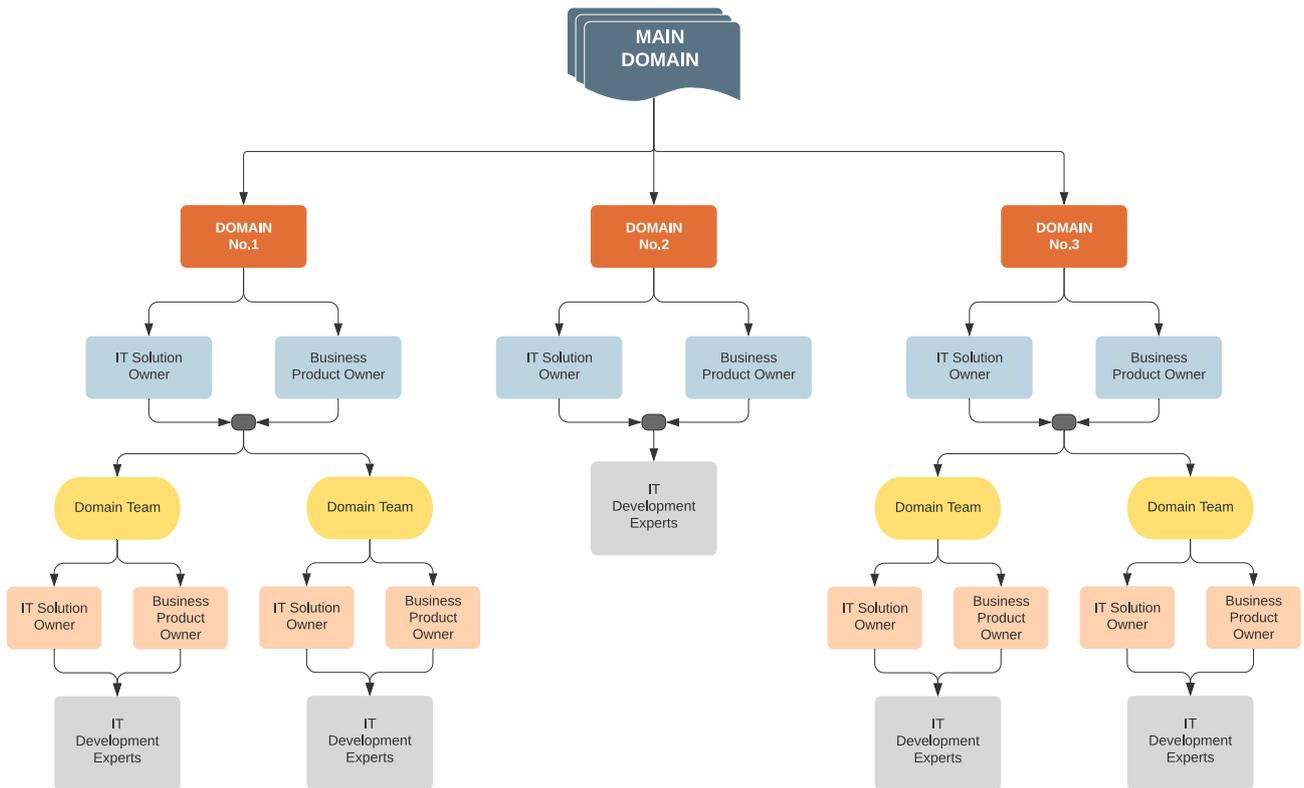


Figure 3-4 - DP Organizational Chart (Company, 2021a)

### 3.4 Current Collaboration of Business and IT

At [HIGH TECH COMPANY] the IT and business cooperate not on a regular basis, most of the cooperation can be summarized within one of the three IT service processes: incident management, service request management and demand management. The business and IT are documenting the operations and transactions individual, IT for their service management and business for quality and regulative purposes.

Within [HIGH TECH COMPANY] a strategic project within the Sales and Service division got developed, tackling the Business-IT alignment. Central targets where an improved communication and prioritization of demands, leading to an overall more efficient implementation. Business and IT are in close collaboration within a Domain, which resulted already in success.

## 4. Solution Design

This chapter will discuss the research results on establishing an operational alignment of business and IT with processes. The literature, the analysis of the current situation, several observations, expert talks, and the outlook on pioneer projects have brought up a profound overview of the situation and difficulties at hand. A guideline on how to model a process in the BPMN standard is presented.

### 4.1 The Business Process as a Communication Tool

The central solution of this report and the answer to the main research question: *“How can Business process management contribute to the operational alignment between the business departments and IT.”* suggests using the business process as a communication enabler.

The alignment mainly misses the operational collaboration between the departments, resulting in little communication, trust, and limited knowledge exchange. The process as a facilitator of the alignment can enable these missing activities. Processes are frequently modelled and reviewed and thereby shared with all other departments of the organisation.

The increased transparency opens up trust, leading to increased communication and collaboration between the departments and specific foci. Various synergies between BPM and the Business-IT alignment can be used, leading to overall better efficiency and cost reduction in the organisation. Examples of these synergies are documentation, cross-functional view on the relationships between operations, transparency for more suitable solutions, more efficient communication and many more.

### 4.2 Guideline for Modelling of Business-IT Process

Business processes can be used in several scenarios. Business process modelling aims to bring transparency and to transfer knowledge. Different situations require various aspects and, therefore, a various set of attributes attached. The following guideline focuses on the BPMN notation. Other process modelling notations are also applicable for getting adapted to the solution.

The solution to the central research question is advising to use the process as a facilitator for the Business-IT alignment. To maximise the effectiveness of the Business-IT alignment, several factors have to be noted. The following modelling guideline proposes some aspects to consider while defining these processes.

Processes at [HIGH TECH COMPANY] are modelled within the Business Process Manager Symbio. The process is modelled within the Business process modelling notation (BPMN 2.0). Symbio is automatically creating this BPMN model in a simplified way. Only the elements of tasks, events and gateways are possible. Several attributes can enrich each object in Symbio.

The process landscape has various levels (See Figure 4-1), ranging from the End-To-End process to details attached like artefacts.

The overall system landscape within [HIGH TECH COMPANY] uses a hybrid End-To-End (E2E) process landscape (See Figure 9-1). Processes are modelled within the so-called Process Functions and later linked to the process landscape, including the E2E view. These process functions are cross-functional and, therefore, function orientated. This enables higher transparency and reflects the actual work executed in daily business. A Process Function consists of several categories where the sub-processes are clustered (See Figure 9-2).

To clarify the following context: We define the processes intending to support the IT as “IT processes”, while we define the other processes as “business processes”.

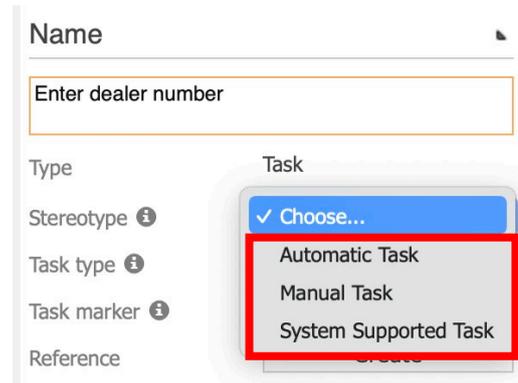


Figure 4-1 Different task types

The introduced IT process as a solution to the problem requires different details and approaches than the business process used for quality management systems or other usages.

IT processes are slightly different integrated within the process landscape. The End-To-End processes remain at Level 0. Individual process modules of the End-To-End processes build Level 1. Both levels remain unchanged and are shared with the existing business processes. Processes can be connected using interfaces.

Level 2 is, however, different. The IT processes are due to technical constraints limited to have a primary process on the second level. The usual process functions, which are modelled as categories, are not an option. Therefore, a separate parallel Level 2 is getting introduced. The process functions are modelled parallel to the existing ones. They are modelled as a structure giving object in the form of the primary process.

From Level 3 onwards, the operational perspective is starting. Subprocesses are mapping the knowledge. The process integrates the entire operation from the event or input, triggering it until the output or end event is achieved. This process flow aims to transfer the full knowledge of the operation. Therefore, activities performed by solely an operator and activities executed entirely by a system are integrated. The process should be named after the output or product it creates. A viewer should have an easy understanding of what the process executes. If a specific workflow is solely modelled, add in square brackets the name of that workflow. The sub-processes are named after active verbs, e.g., “Send email [Transaction name]”. It ensures directly approaching the viewer what has to be done.

IT processes are modelled as a subprocess with specific attributes (See Table 4-1 IT Sub Process Attributes). These attributes enrich the subprocess, ensuring an essential quality of processes within the Business Process Manager Symbio. Mandatory attributes are the name, the stereotype, the details, the participants, the accountable organization, the in-/outputs, the applications and finally, the scope filter.

A sub-process is defined as a sequence of tasks achieving a standard product or output within a specified sequence. For modelling, it is essential to separate processes. Once the output or product is different, a new process must be created rather than extending the existing one. IT processes representing a workflow or a

transaction within a system should only include tasks occurring within this workflow. An interface to the following workflow is modelled by setting this process as a successor process. This enables better transparency for documentation purposes. Further, it decreases the possible error rate of the process model by reducing the number of tasks within a subprocess. Every process has to be modelled with a start and end event.

Level 4, the task level, uses the core elements of the BPMN notation. The process can be displayed in several graphic options. They focus on different aspects of the process. The most important is the organizational view, showing the different roles responsible for execution in swim lanes. Also, the application view is essential, where the focus is on displaying the systems where tasks are executed in swim lanes.

For task-level modelling, it is highly recommendable to stick to the core and most common BPMN elements: tasks, events, interfaces to other processes and the either-or- and the and-gateway. These simple elements ensure an easy understanding also for people with limited knowledge about BPMN. The acceptance of the model is thereby increased. People are willing to use it due to its ease of use.

Tasks are activities, steps, instructions, or procedures contributing to the process's overall aim and goal. An essential factor of this level 4 is the level of detail. The correct level of detail is chosen if no single task can be removed for letting the process be executed by an outsider who never worked before on that process. This means that every step executed by an operator or by a system must be captured and described. Especially the logic steps of the IT systems are adding value to the process.

Tasks should be consistently named after the specific activity they execute. The name should be convenient to get a rough overview of what the task does. Active language is preferred. It approaches the viewer and gives a straightforward idea of what has to be done, e.g., "Calculate budget". Events are modelled in the past tense. This clarifies that the event is in the past, e.g., "Letter received".

Modelling the tasks is best done by starting with a rough overview of the process and then attaching details to it stepwise. The process is enriched with tasks until it is not value contributing anymore. The correct level of detail for that process is easier found, besides the easier modelling of gateways and side paths.

Artefacts enrich these tasks. Artefacts are the last building component of the process landscape level. Artefacts for the IT process are stereotypes, descriptions, roles, in-/outputs, applications, application services, documents, requirements, and attachments.

The artefacts are contributing significantly to the added value of process modelling for IT. They are managed within repositories, which means they are not solely added to a task; they are managed individually and are linked to that specific task. This enables one to dive through the artefacts and view the processes linked to them, or vice versa. Particularly for the applications and their application services, this way of modelling adds value. They are modelled within the system landscape. Thereby the system landscape and the process landscape are connected. Each landscape enables easy and convenient access to the content required.

Applications represent entire information systems or software packages, while application services are workflows, processes, transactions, or executables within

these systems. In the system landscape, the application is the parental element. Application services are sorted beneath their leading systems in building blocks.

The IT documents their solution as an attachment to each application or service. This leads to higher transparency and a single source of truth for document management. At each application or service, the connections to all elements of the process landscape model are shown. Interrelations of tasks and processes, in general, are shown, which enables efficient and improved management.

Similar in-/outputs are used in modelling. Input is used to connect the different tasks, besides mapping the data streams between systems. A particular task creates an input. This input needs, by the definition of a process, to be converted to a specific output. An output, on the other hand, needs to be used in the successor process. It represents the product or turnout of that specific process.

The IT process differentiates from the business process. The task level consists of the actual steps and activities essential for the IT during implementation.

Each task needs to be classified after the different stereotypes available. The options of “Manual Task”, “System Supported Task”, and “Automatic Task” are available. Stereotypes classify further whether the step is executed solely by an operator, by an operator with support or within a system and steps executed solely by an application. In addition, they add to the task within the flowchart a symbol making it easy to differentiate them.

For each different type of task, different artefacts must be filled. For a Manual Task that is executed manually, the name, the stereotype and the roles need to be filled. Artefacts can be attached, such as a description, in-/outputs and supportive templates or directives in the form of a document.

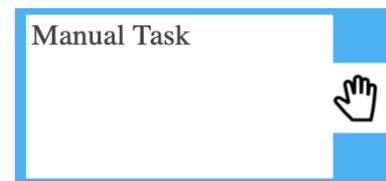


Figure 4-2 Symbio Manual Task

The System Supported Task is getting supported by an operator and an application or system. Often an input is entered into the system, which is then further edited. The modelling is equal to a Manual Task. However, the attributes application, application services as well as possible requirements must be attached.



Figure 4-3 Symbio System Supported Task

The Automatic Task is defined as a task that is solely executed by a system. The system is for this task, not requiring any user-specific user input. The task is getting modelled the same way as a System Supported Task with the difference to provide a rough explanation of the operation in the description field, such as references to other transactions or tables. The attribute attachments can be used to link or upload any supporting documentation as an attachment.

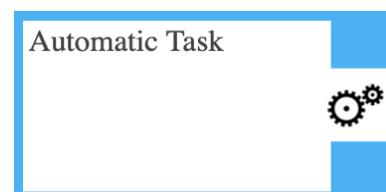


Figure 4-4 Symbio Automatic Task

All these different attributes can be attached to a sub process for delivering enhanced value. In the table IT Sub Process Attributes (See Table 4-1) all of these attributes are listed with an explanation, description and an example. The more attributes are

attached to the sub process and corresponding tasks the higher the value contribution within the organization can be.

Table 4-1 IT Sub Process Attributes

IT Sub Process Attributes	Explanation	Description
<b>Name</b>	Use a name which gives a rough idea what the process is doing	Verb followed by subject e.g. Pay invoice
<b>Stereotype</b>	Used for clustering several process types	Use "Application process"
<b>Description</b>	Further insights what the process does & administrative details	Details for the scope of the process and technical details of the process
<b>Details</b>	Explain the overall purpose and process goal	Argue why the process is necessary and where it brings added value
<b>Participants</b>	Who is in charge of the process and who is in charge of the process quality?	Use the process owner (business) as responsible and the organization head as quality manager
<b>Key Performance Indicators</b>	Indicators for measuring the performance or achievements of the process	Allow easy monitoring of performance and quality
<b>Predecessor/Successor process</b>	Lists processes which trigger this process or vice versa	Where is the input of the process coming from and where is it going (process chain)?
<b>Accountable Organization</b>	The organization responsible for execution of the process	Corresponds with the process function the process is categorized
<b>In-/Outputs</b>	Integrate here the main input of the process that triggered it and the output it generates for the following process	Use the rule: Object + [Status] + Technical description
<b>Applications</b>	List here the main or leading application of the process	Main system of execution e.g. ERP, CRM
<b>Documents</b>	Attach here documents of the repository	Templates, Procedure directions and other supportive general documents
<b>Requirements</b>	Integrate here possible IT requirements	If applicable: List user stories and user gap stories
<b>Attachments</b>	Specific documents only valid for this process	Documents such as the requirement specification sheet
<b>Scope Filter</b>	List the organizations for which the process is valid	Use only organizations or business areas

### 4.3 Social Capital as an Essential Aspect of the Solution

The analysis of this research develops mainly two solutions. Generally, the collaboration of these two departments needs to aim for enabling communication which results in knowledge transfer, ultimately leading to trust.

Combined are these three concepts building up social capital among the departments. The research shows that social capital is the major success factor for the Business-IT alignment. Wagner et al. define with the OperA framework this social capital into communication, knowledge and trust (H.-T. Wagner & Weitzel, 2012).

The model of introducing cross-functional domains, such as the DP Domain case, is precious for this social capital. People are working, independent of their position in the organization, together.

Interviews with stakeholders of this domain model displayed the efficiency and result oriented domain model, precisely achieving the desired results. The cross-functional Domain Managers, the IT Solution Owner, and the Business Product Owner are modelling the business processes. The budget of IT demands lies with this team in addition to the prioritisation of demands.

The other solution developed throughout the research aims to align the business and IT without the domain structure. Instead, business processes are used as a facilitator of this alignment.

A process model is one of the first steps for requesting a demand. The process is modelled after a standard which allows an easy understanding of the demand.

Alignment by processes creates additional synergies between IT and business. Most systems transformed from data-aware to process-aware systems.

The process cultivates the domain knowledge, making further communication more effortless and building trust and respect. Thus, ultimately the social capital among the departments is build up. The development functions do the budget and prioritisation. They develop an interface between the IT and the business departments who request the demand.

Both solutions strengthen social capital among the departments, which is the main success factor for achieving alignment and collaboration.

However, the solution introducing domains is a strategic decision, which needs restructuring of the entire organization. The domain model is highly effective. Nevertheless, it brings a high amount of bureaucratic effort. The high effort is justified in areas where many changes occur, such as sales and service. However, in other areas in the organization, such as production, the number of changes per year is lower, the added bureaucratic cannot be justified.

The implementation for an entire enterprise is a long-term decision that needs to be interlinked in the strategy. In addition, the domain model only aligns with internal IT departments. Once external consultants are hired, it is not applicable.

This research aims for an operational decision that works independently of in-house IT experts or outsourced experts. Therefore, the second solution present is suiting these requirements.

Besides more application cases, the solution of the business process as a facilitator for cross-domain knowledge is also operational. Meaning it can be quickly introduced and tested as well as it qualifies for several adjustments making it suitable for many applications.

Therefore, the following solution concentrates on the solution of introducing the business process as a knowledge facilitator. The business process consists of three main components: information, operation and management processes, thereby facilitating the alignment besides accomplishing the objectives of the process. IT classifies their main internal processes after these categories, so the systems are designed after these process components.

#### 4.4 The Contribution of BPM to the Operational Business-IT Alignment

BPM is a framework that is currently rising in importance. Business processes play a central role within the organisation, both in the IT and the business departments.

BPM contributes to the management of information processing between systems (Caverlee et al., 2007). The literature suggests several critical success factors. One of the most named is creating shared domain knowledge to enable trust and communication (H.-T. Wagner & Weitzel, 2012).

As Reich and Benbasat state, the alignment is influenced by four factors: shared domain knowledge, IT implementation success, communication between business and IT, and the linkage between business and IT planning processes (Reich & Benbasat, 2000). The drives of pursuing BPM within the organization are, among others, these factors. Internal synergies can be used, which means the alignment is not creating additional effort. It instead supports the roll-out of BPM. BPM and the Business-IT alignment can sustainably utilize these synergies and thereby promote each other's success.

The process landscape integrates all E2E processes. The processes are clustered into customer-oriented and enabling processes (See Figure 9-1 for an example). BPM is as a result of this integrating the enabling processes with the customer-oriented processes. Enabling processes are management and support processes. The IT and business planning processes are thereby linked to the associated E2E process. The BPM harmonizes and integrates, therefore, the planning processes with the method of E2E process modelling.

The business process, as an underlying concept of BPM, supports this domain knowledge. BPM tremendously supports the creation of domain knowledge by enhancing transparency and accessibility within the organisation. More people have access to cross-functional information about business operations, thereby enriching the awareness for synergies and interactions between operations. Since creating flow charts can be tricky for untrained people, using a unique tool is highly advisable. Besides the automatic creation of the process model, a BPM tool, as a platform solution, is a single source of truth, resulting in extra transparency within the organization. Transparency among all departments can ultimately result in alignment. (Mendling et al., 2010)

Transparency within the entire organization is a requirement of modern IT managers. Previously this missing transparency in both alignment directions has forced unnecessary costly IT solutions (Kude et al., 2018).

Besides the establishment of knowledge, BPM aims for improving communications across the entire organisation. Process models are the foundation for this communication, especially the first-time-right interaction is thereby improved. The methods and tools of BPM are used for defining standardised processes. The quality of the communication can be raised to a higher level by forming a common understanding. The business process is defined so that the communication is clear and precise. The message can be easier transmitted between participants.

The IT implementation, as a success factor for the alignment, is a good example. Demands requests require an accurate and detailed description for the correct evaluation and prioritisation. By accurate and first-time proper communications, the

success rate of IT implementation projects can be increased. Successful implementations tend to be more efficient and more favourable. The IT can specify the demand more precisely, thereby finding more suitable solutions with enhanced features. The internal satisfaction of the implementation can be raised.

#### 4.5 The Improved IT Demand Management Process

Demands constitute a significant collaboration point for IT and business. Currently, the IT service demand process involves three main stakeholders. The business department as a requestor, the development function for approving and the IT as an executor.

Once a demand is requested, a ticket within the Ticket tool must be filled in. In addition, the Requirement Specification Table (See Figure 9-9) is filled out. The requestor of the demand is additionally modelling the To-Be process within the BPM Manager Symbio, concerning the modelling guideline. The “As-Is” process is besides the To-Be process attached in the Ticket and the Requirement Specification table.

The business process mapping of the “To-Be” state ensures a common understanding of the entire business process. The process entails the entire scope, involving both steps executed within systems and manual steps. Process modelling is essential to transfer the complete knowledge of what and how the business process is executed.

The demand requestor models the process. To ensure the process model is correct and modelled in a standard form, the development function reviews the BPMN model and is adjusting or revising together with the business department requesting the demand.

Once the process model and the ticket are reviewed and, if necessary adjusted, the business perspective of the demand request is accessed. Focus is here on the actual improvement and motivation of the change. A business perspective priority of the demand is thereby also set since the workforce of the IT is limited. If a particular priority is not given, the ticket is rejected.

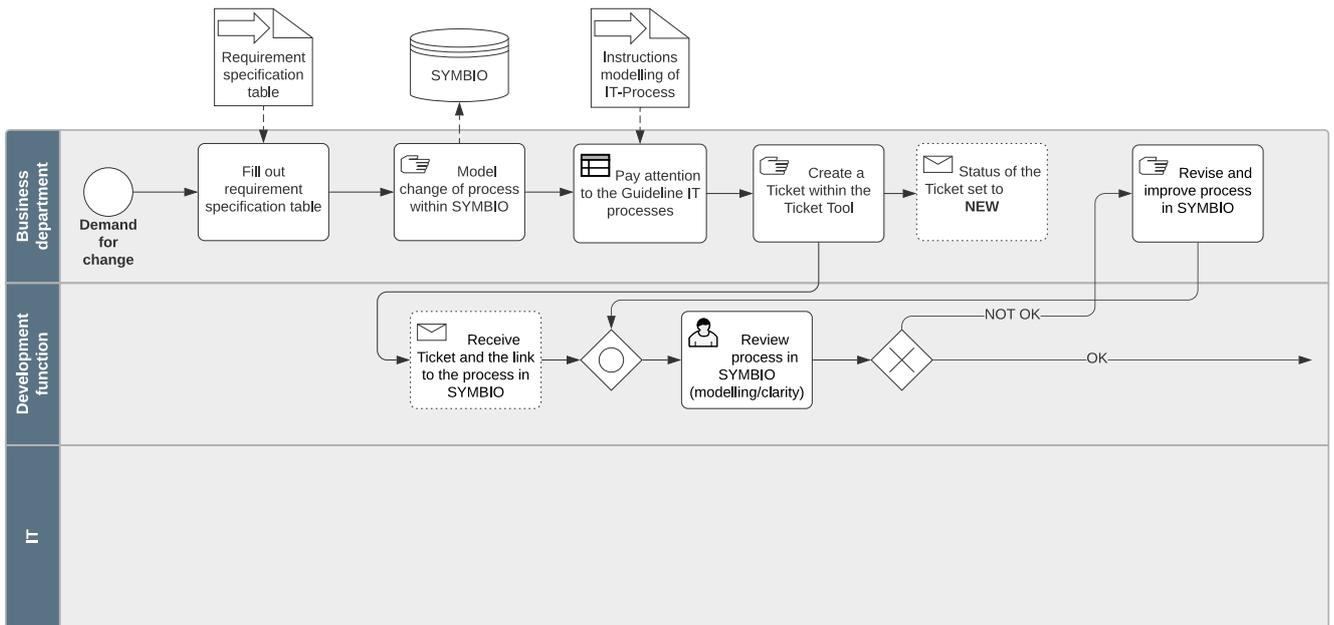


Figure 4-5 [Updated] IT Demand Management Process Part 1 (Company, 2020a)

The IT is then receiving the demand and all associated documents. The process model is a central knowledge transfer facilitator. The IT can understand the context of the demand and better and earlier estimate the effort and the approach for implementation.

Especially the context and scope of the process are essential. Many processes use the output of another process as an input and therefore share an interface. A business process modelled and linked in the End-to-End process landscape (See Figure 9-1) ensures understanding of the entire process chain.

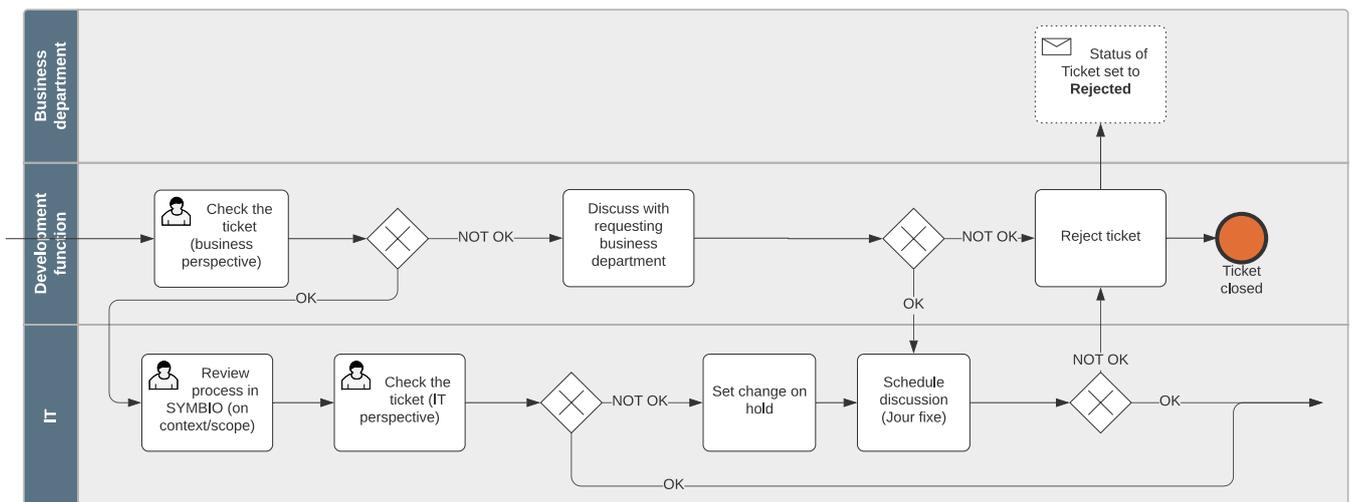


Figure 4-6 [Updated] IT Demand Management Process Part 2 (Company, 2020a)

Once the clarification of the demand is finished, IT is setting the ticket on hold. It clarifies further details in a Jour Fixe, or the IT is scheduling the demand request within their KANBAN backlog. The KANBAN board is organized after priorities set by the IT.

### Implementation Phase - Executed in KANBAN Board

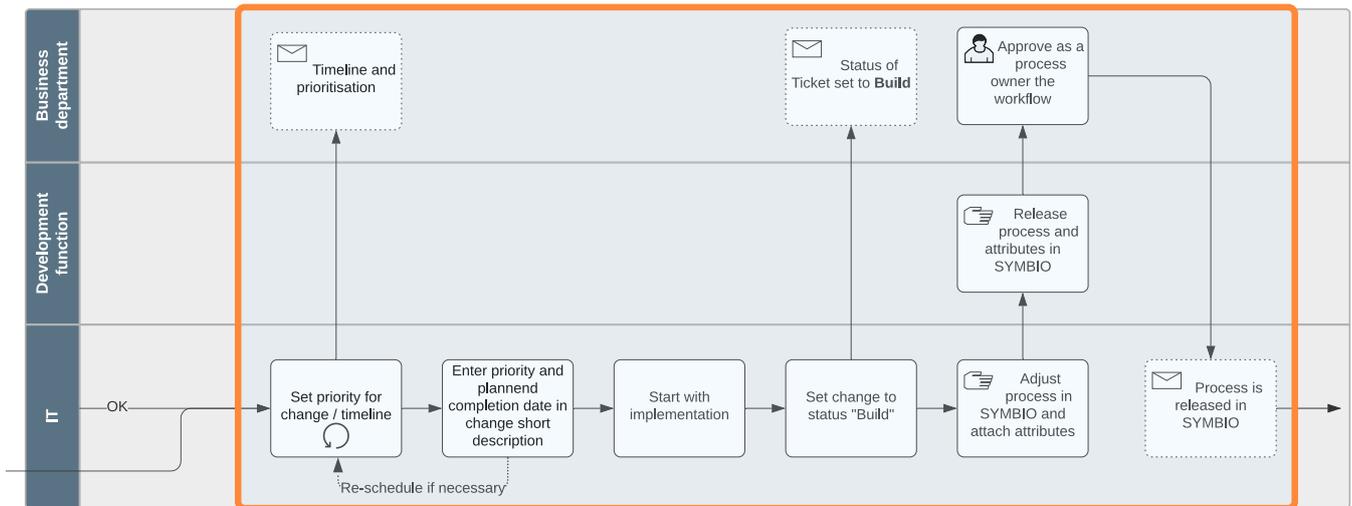


Figure 4-7 [Updated] IT Demand Management Process Part 3 (Company, 2020a)

After the priority for the demand is set, the IT sets up a timeline for the implementation phase. Once implementation starts, the status of the ticket is set to “Build”, and the implementation starts.

Besides working on the change, the IT expert is adjusting and updating in collaboration with the business department the Symbio process model. This BPMN model is getting adjusted to display the exact process as it will function after the change. The focus is to attach attributes such as the exact application or application service, requirements, and user stories or user gap stories.

Once the implementation is finished, the process is getting released and the attributes attached to it. An exception is an application, where the release will be the last step. The process owner of the process is the business department. The business department is within daily operations responsible for the execution of the process. The development function is taking over the role of the quality manager, reviewing it on correctness.

Testing Phase - Executed in SAP Solution Manager 7.2

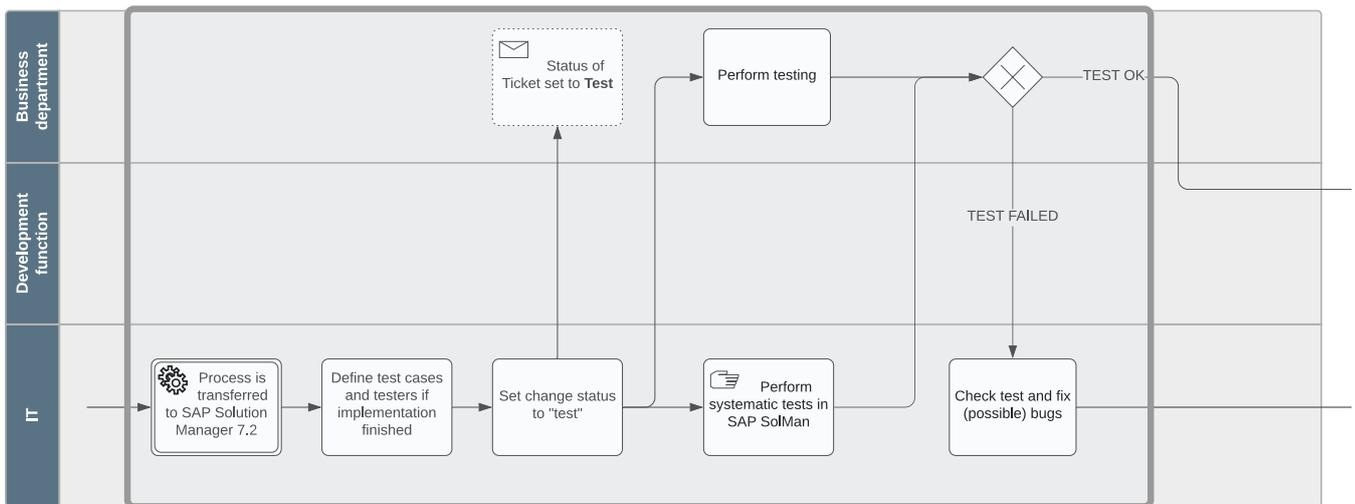


Figure 4-8 [Updated] IT Demand Management Process Part 4 (Company, 2020a)

Upon release within Symbio, the SAP Solution Manager (SolMan) interface will automatically transfer the process steps and attributes. The process steps are then visible in the SAP SolMan.

The IT expert is setting up test cases in collaboration with the business department. These test cases are a vital part of finding bugs and problems with the application. The IT defines these test cases and defines testers, persons who will execute the test within the SAP SolMan.

Next to the systematic test in the SAP SolMan, either manual or automatic, the business department can test within a sandbox system.

Once the tests are finished, possible problems and bugs are getting fixed or performance issues during tests.

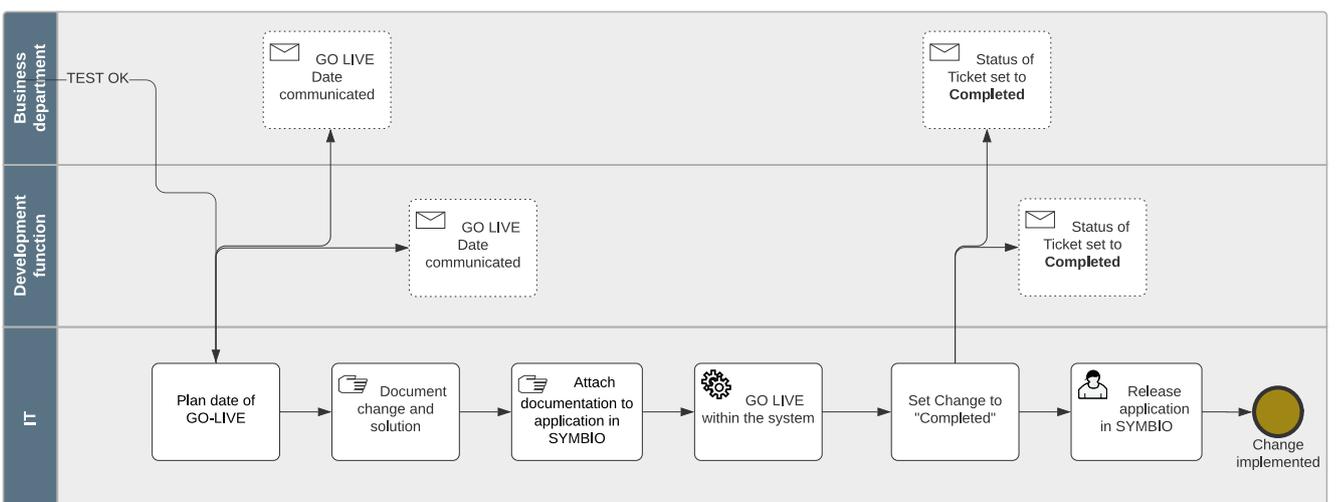


Figure 4-9 [Updated] IT Demand Management Process Part 5 (Company, 2020a)

The finished test is initiating the next step, the planning of the GO Live date. Once the GO Live date is set, the IT documents the change and their solution for it.

The IT expert is attaching the documentation to the new application created in the repository in Symbio. This ensures a single source of truth for documentations on changes as well transparency among the entire organization.

After a successful GO Live of the system, the ticket or change is set to complete. The last step is to release the application, including the documentation as an attachment in Symbio. The IT expert is the responsible person and owner.

## 5. Validation of the Developed Solution

### 5.1 Process Automation of “Provide Registration Documents”

Within this chapter, the implementation of the solution will be presented. To validate the solution and adjust if needed, a case within [HIGH TECH COMPANY] has been identified.

The validation example concerns a process of the sales department for printing the registration documents. The registration process is possible to automate, other similar processes require more customized documents therefore making it impossible to automate the process.

This research aims to demonstrate how BPM can support operational alignment. This alignment is needed in various situations. The automation process involves many similar steps to other situations like transforming a process into a new system or adjusting an existing process.

The process chosen to validate the solution combines the domain model as a strategic alignment and the process modelling as an operational solution. Evaluating this demanding project will analyse both alignment models and give an outlook on their importance.

The process, subject to this validation, is executed within the central ERP system of [HIGH TECH COMPANY]. The ERP system is an SAP R/3 ERP system.

The business process “Provide registration documents” is executed on average per week 42 times. Due to the high number of repetitive tasks, the business department sees an improvement by automation. The process consists out of two steps. The first step involves the dealer who request the papers. The second step involves the logistics experts of the distribution.

The first step of the process takes place within the online tool for sales. A tool introduced by [HIGH TECH COMPANY] to communicate with their dealers. They can order over the platform or get support for products. The tool is getting extended for the feature of requesting for the delivered products the registration documents. The tool is then automatically requesting the papers from the ERP system.

The second part is happening within the ERP. Several tables are used and checked to execute the printing of the registration paper and documents. Roughly the process takes currently about three minutes to execute. The process throughput time will be after automating zero. A remark is errors as well as abnormal situations. These must be still done manually.

### 5.2 Modelling the Process Within Symbio

The demand followed the solution of this research. Instead of only filling out the requirement specification table, the IT process is modelled within the BPM Manager Symbio (See Figure 9-3). According to the guideline presented in the solution part, the process got modelled (See 4.2).

The subprocess belongs to the End-To-End process of Order Products. The process is situated within the process module – Deliver Product.

The product is getting delivered to the customer. At the same time, the dealer can currently via E-mail request to get the registration papers printed. They can trigger this process once the product reached a certain production status. The logistics department is then checking the E-mail and looks up the production status. If this status is higher than eleven, the papers can be printed. If not, the request is declined.

Within Symbio, all attributes relevant for the implementation have been filled (See Table 5-1). The current process is not modelled within Symbio. Therefore, the To-Be process got modelled in the tool.

The process consists of several tasks classified into manual, system supported, and automatic tasks. In addition, each task is modelled with a so-called responsible role. These are within this example the dealer and the Automatic System Task.

The Automatic System Task is part of the modelling guideline of the business processes used for QMS and IMS management. It describes tasks that are happening within systems. The process is getting triggered by the event "Registration documents needed" it ends with either "Request not doable" or the event "Documents provided".

Table 5-1 Process Attributes Provide registration documents

IT Sub Process Attributes	Process: Provide registration documents
<b>Name</b>	Provide registration documents
<b>Stereotype</b>	Application process
<b>Description</b>	The process is describing the steps executed before printing registration documents. It involves the dealer who triggers this process and the logistics department conducting it and ending the process—if possible, printed documents sent to the dealer or a note explaining the reason for rejecting.
<b>Details</b>	We need the process to provide the registration papers to the dealers in order to register them. The process aims to provide all needed documents for registrtation in a short time after the dealer has requested them.
<b>Participants</b>	Logistic Experts, IT Department - Sales Solutions
<b>Key Performance Indicators</b>	Throughput time (starting with the request / ends with delivery of the documents)
<b>Predecessor/Sucessor process</b>	Potential Predecessor Processes - deliver product Potential Successor Processes - none
<b>Accountable Organization</b>	Sales; Logistics & Supply Chain
<b>In-/Outputs</b>	Inputs: Product number; Recipient of documents; Registration Certificate (blank); Online Request [granted], Outputs: Certificate of agreement; Data Confirmation Paper; Registration Certificate (filled)
<b>Applications</b>	Product Sales Online Tool,SAP R/3; VIA (SAP CRM) [only serves as input]
<b>Documents</b>	-NONE-
<b>Requirements</b>	Successful printing of Registration documents
<b>Attachments</b>	Improvement One Pager (Excel file for uniform project understanding)
<b>Scope Filter</b>	Sales

The process model was modelled before contacting the IT expert who is implementing the process. Besides the process model, the regular process requirement table got filled out and sent to the IT Solution Owner.

The process consists of a total of 41 tasks, one Manual Task. Seven System Supported Tasks and thirty-three Automatic Tasks. Each task got modelled after the different requirements set in the solution description.

Modelling the process was done by starting with a rough process flow, then stepwise enriching this process flow with more and more tasks. This stepwise approach made it easy to end at the needed level of detail. In addition, the modelling of the several gateways was easier using this iterative approach.

The stereotype enriched all tasks indicating the task type and the corresponding in- and outputs. Tasks which supported by systems or entirely executed within systems

got the application attached. In addition, the application service is attached, which shows the workflow or transaction of that specific system if applicable.

The description has shown as the main success factor, within this field, details of each task were stored. This process uses many references to other transactions or tables, such as the dealer's address stored in the CRM system. Providing them within the description helped during the analysis of the process within the ERP system.

The process flow enabled an excellent overview of the sequence of the tasks and the usage of gateways in all possible scenarios.

The details attached to the tasks enriched this process flow extensively. It was easier to understand the references to other transactions. In this example, the reference to tables and the relevant cell is attached.

### 5.3 Implementation of the Requested IT Demand

Since the logistic department requests this IT demand, the DP Department approved the demand, the domain model introduced within [HIGH TECH COMPANY].

The IT Solution Owner and the Business Product Owner have received the requirements specification table and the link to the process model within Symbio.

The demand was analysed based on the process model, which resulted in the priority for implementation.

The IT expert responsible for all registration solutions received the process model besides the requirement specification.

During the first phase, the process model was used extensively to understand the To-Be process and estimate its effort to implement the demand.

Weekly Jour Fixe got introduced, which facilitated an exchange between the business department and IT. The process model was an excellent model to explain specific steps and elaborate more on the exact execution to spot further small details that could also be improved.

For implementing the demand, a transaction got created. The transaction is located within SAP R/3 and is called "Y\_Registration\_Documents". The transaction is automating all tasks with the stereotype "Automatic task" of the Symbio model. The application service called "Y\_Registration\_Documents" got created and attached.

During these regular meetings, the model adjusted and improved accordingly, due to the same understanding about the new process, mainly because of the process model.

The documentation of the ERP transaction got created and attached to the Symbio Application Service for providing extended transparency.

### 5.4 Test Management of the Implemented Workflow

Symbio, the new BPM manager, facilitates several technical interfaces to other programs and databases to deliver symbolic value.

One of these technical interfaces is towards the SolMan. The transaction, subject to this IT demand project, is facilitated within the SAP ERP R/3 system, connecting with the SolMan.

The process flow is upon release transferred towards the SolMan. The process flow chart with tasks and gateways is shared (See Figure 9-4; Figure 9-5). Process tasks are getting in addition displayed within a table with the applications and application services attached. Documents or attachments, in general, are also transferred (See Figure 9-7).

The SolMan facilitates the SAP system landscape and several other IT management components such as a ticketing tool or a Test Suite.

This Test Suite facilitates several functions for testing workflows besides the management of them. The suite enables SAP- and non-SAP products (See Figure 9-6).

Testing refers to the investigation of possible issues or errors within the executables or workflows of the systems. The two primary forms of tests are the Function Test and the System Integration Test.

The Function Test entirely checks whether the process is executing precisely what was programmed and whether no bugs or other problems are disturbing the execution.

The System Integration Test is analysing more extensive system components or elements with each other. The correct exchange of data and information is the focus. A System Integration Test is often entailing several Function Tests.

System testing, in general, is an essential part of demand management. Before the GO-Live of a system, IT must test the transaction to avoid apparent errors or malfunctions. The aim is to prevent as many errors as possible; experience has shown that it is impossible to avoid all mistakes by testing, though a high percentage.

IT can execute the test fully manually. However, also system supported or automatic. Manually means the IT expert in creating test cases and tests without a systematic tool. Record is, for example, held in Excel.

System supported, or automatic testing is executed within the SolMan, for each task or series of functions, test cases are generated (See Figure 9-8). These test cases are brought into a sequence for the test execution. A tester, the person testing, is assigned and receives the workflow. Errors and other observations are recorded and documented within the SolMan Test Suite. Incidents will be forwarded to the IT expert.

The process flow of Symbio is a significant building block. For each task or block of tasks belonging together, a test case is created. These test cases are brought into a sequence, following a systematic methodology. The IT expert can automate a test case. It is then executed fully automated. For critical processes, a regular test interval can be set.

For the process "Provide registration documents", a Functional Test and a small System Integration Test was executed. The process flow within the SolMan enabled the creation of several test cases in the sequence needed. Mainly the sequence of the test cases relied on the process model. Once the dealer inserted the required data, the interface between the online sales tool and the ERP system got within a system

integration test analysed. Other Function Test cases within the ERP system and the transaction “Y\_REGISTRATION\_DOCUMENTS” were executed.

In the form of a logical error, an incident within a table created for managing the several scenarios got spotted.

The process model supported this incident tracking. Next to the execution of the test, the process model is used as a guideline to check the correct output of the process for each scenario. The scenario of the process got modelled by using gateways.

## 6. Evaluation

Part of a possible implementation is a successful validation of the concept and an evaluation analysing the effects of change. Several interviews have been conducted to evaluate the solution, two in a semi-structured form where the minutes can be found in the appendix (See Chapter 9.8 and 9.9). In addition, seven unstructured interviews have been conducted, three with colleagues from the business department and four with IT colleagues. The SWOT method will be used to visualize the answers to the interviews.

### 6.1 The Evaluation Method

The evaluation will use a SWOT analysis to visualize the responses of the interviews. SWOT is a method where the exact origin is unknown. Within the early 1960s and 1970s, several papers started using the term. The method of analysis is highly used in literature. (Helms & Nixon, 2010)

The SWOT analysis is a method that accesses four different areas, strengths, weaknesses, opportunities and threats. Initially, the analysis tool was to develop for problem analysis and assist an organisation in positioning itself in the market. Varies different application cases have been explored since the introduction (Helms & Nixon, 2010). The SWOT analysis comes with a simple and still robust methodology by classifying strengths and weaknesses into the two areas of core abilities and core difficulties (Helms & Nixon, 2010). These core abilities and problems can evaluate a company or a new strategy and evaluate a solution.

The solution has been reviewed during and after the validation. Expert interviews have been conducted; two full interview transcripts can be found in the appendix (See Chapter 9.8 & 9.9). During the validation, observations, as well as direct feedback, has been recorded.

Nine interviews are summarized in this evaluation, five interviews with colleagues of the business departments and four colleagues of the IT departments. The positions of the interviewees varied, from department head over team leader to managers and solution experts.

The interviews are intended to review the outcome of this research as well as give an outlook. To categorise this feedback, the SWOT analysis method has been used (See Figure 6-1). The four different categories provide a good overview of the solution's direct and indirect abilities and difficulties.

### 6.2 SWOT of the Process as a Facilitator of the Business-IT Alignment

Generally, the evaluation by the interviews resulted in similar answers, where the strengths outweigh the potential weaknesses. However, the threats must be continuously monitored and controlled.

A vital strength of the solution is the improved accessibility and transparency of the knowledge. The process modelled within a platform that provides access for every employee gives everyone access to the information and knowledge. Employees can, therefore, better understand how the entire business operates and how data is

transferred through the organisation. This is improving the overall business, not only the Business-IT alignment. The IT often has limited knowledge of the interconnectivity between operations. Extended transparency can create synergies between different operations and optimise them.

Another strength of the solution is the visual method. Getting a mutual understanding of an operation is often challenging. People have different expertise and are therefore biased by their context. A visual method is preventing this by not requiring any expertise for reviewing the model. A mutual understanding can therefore be made while the synergies between Business and IT are fully exploited.

On the other hand, the solution comes with some weaknesses. Process modelling always requires some time, especially since people are often not used to this simple but systematic thinking. A high effort is therefore often required for modelling a process. Especially a weakness is that the added value for the entire company and the colleagues is only visible in the long run. The probably most critical weakness of the solution is the level of detail. The level of detail of the process makes the difference on whether added value can be created. If the process is modelled to be detailed, the amount of information is too tremendous, making it hard for the viewer to retrieve the essential points. On the other hand, if the process is modelled roughly without much detail, only the broad concept is visible, making the information unnecessary.

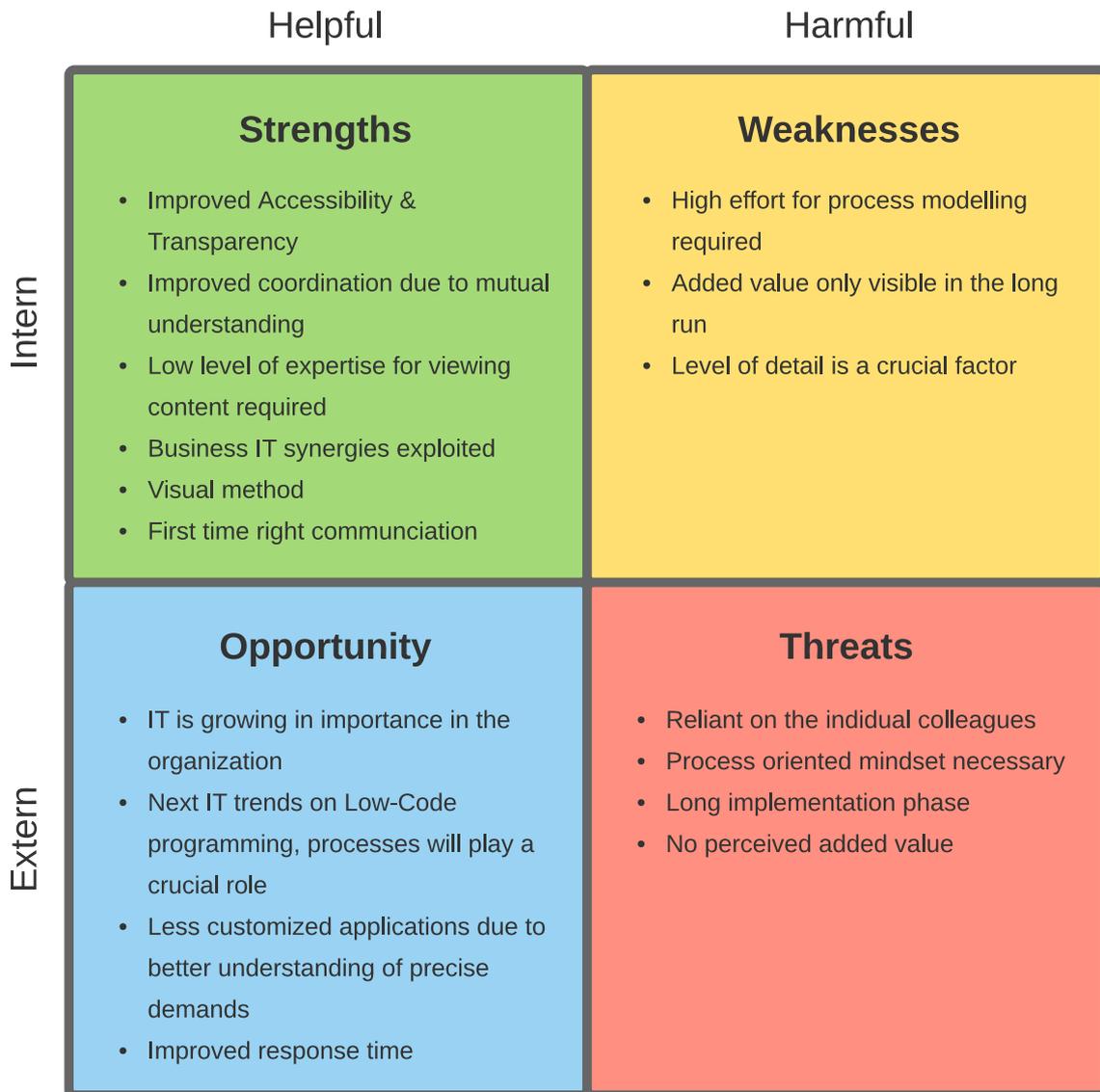


Figure 6-1 SWOT Analysis Business IT Alignment by Processes

Analysing the external factors of the solution, the categories of the SWOT analysis Opportunity and Threats are in focus. Instead, these are accessing the external factors influencing the solutions, which are hard to control or influence.

Significant opportunities for the solution concern current trends. IT departments of organisations are growing in importance; they are one of the fastest-growing departments. An alignment solution improving the communication in the organisation overall is there assisting. Besides the importance of IT, the IT colleagues move from being experts to being managers. The IT system landscape is continuously growing the demand for management and control is there. Processes on the individual operations and systems are reducing the complexity of managing it.

The application of Low-Code systems is developing rapidly. The process is playing thereby a significant role. Simple detailed flow charts can develop applications; the process is automated by a system reading the process model. A quicker implementation can be, therefore, possible.

Besides these trends, a significant opportunity for the solution is the lower need for less customised applications due to the higher transparency. IT experts can better understand the fundamental requirements and intentions and better understand whether a standard solution can fit after adjusting details. Synergies between applications can therefore also be spotted and in favour of the company be used.

Threats are possible risks of the solution that are hard to control. For the solution of this research, the biggest threat is the reliance on individual colleagues. Since the solution is an operational one, the colleagues must not lose sight of the main idea. With their input and motivation, the solution either stands or falls. This is also in line with the risk of the needed process-oriented mindset. Without being able to develop a process-oriented mindset, it will be hard to model a process correct. Once a process is model faulty, the entire added value is gone. Two other substantial risks are the long implementation phase of the overall alignment. Small success stories can be seen quickly. However, to fully align the two departments, a long time is necessary. Usual threats as the loss of motivation and perceived relevance are therefore a risk. The risk of no perceived added value plays thereby also a role. The individual colleagues placing the effort might not see the added value and therefore refuse to continue.

### 6.3 BPM as a Solution for the Operational Alignment

The solution is, in general, a bottom-up operational approach for aligning the business and IT departments. Especially the possible threats for the solution are known risks that apply for a bottom-up approach. To prevent these risks, active mitigation of risks must be done. By mitigating the weaknesses of the solution with a clear and robust guideline, the risks and weaknesses can be reduced.

The strengths and opportunities are clearly showing the high potential in the solution. Especially, in the long run, the need for this systematic process modelling to manage and control the system landscape is likely. The solution's transparency and the cross-functional view improve the overall knowledge of the internal sequence of operations and their data streams.

## 7. Discussion

This chapter concludes the research besides answering and proposing a solution to the central research question: "*How can Business process management contribute to the operational alignment between the business departments and IT*". In addition, an outlook on the Business-IT alignment will be presented by discussing limitations and recommendations.

### 7.1 Conclusion

The research started with a situation analysis, clarifying the problem context and the core problem to solve. To solve the core problem, the main research question got defined, besides several sub research questions contributing to it. Literature research and an investigation of the current state resulted in a first solution design. Validation was executed in the form of a pilot implementation within a project, followed by an evaluation of the solution. Interviews and observations during the validation were reflected in a SWOT analysis.

The central solution of this research proposes to use the process as a facilitator of the operational alignment by using the several synergies between BPM and Business-IT alignment.

#### 7.1.1 Sub Research Questions Contributing to the Aim of the Research

During the analysis phase, sub research questions accessed the usage of processes within the business and IT departments and their purposes. To build up an alignment of two parties, it is vital to understand the different requirements besides their daily operations involving processes.

Other sub research questions analysed different Business-IT alignment frameworks existing in the literature and how alignment can lead an organisation to develop a competitive advantage.

Business processes are tasks or activities in a sequence with a common objective to produce a defined output. Processes are majorly used to grow the organisational knowledge, primary by creating transparency and accessibility among the entire company and subsequently transform this knowledge into innovation. In addition, business processes are often used to control and plan operations, thus facilitating an organisation's change and performance management.

Processes within IT are used differently. The process is a fundamental part of modern information systems. These systems have moved from a data-aware system to a process-aware system. Information systems utilise these processes to reduce complexity and increase thereby the flexibility. The infrastructure of the IT is captured and supported by processes. They enrich the system landscape of an organisation for integrated management besides managing the data streams between systems and their applications.

The Business-IT alignment is a concept where several frameworks exist, with varying perspectives. A ground-breaking theory is the strategic alignment of Henderson and Venkatraman. The model divides the alignment into two dimensions, the functional and the strategic fit and the internal and external domains, showing the strategy and

operational infrastructure integration, displaying that all four domains should be interrelated.

Several other models adapted the strategic alignment model and discussed the model in more detail. These models propose to identify key enabler of alignment being the only constant parameter in alignment due to the dynamic approach.

All models have in common to focus on shared domain knowledge, which closes the cultural gap between the business and IT. The OperA framework builds upon this, further determining the alignment by social capital. The three questions of "Know-How", "Know What", and "Know Why" are central for the alignment (H.-T. Wagner & Weitzel, 2012)

The OperA framework establishes a connection between the three dimensions: communication, knowledge and trust. Each of these dimensions depends on each other where one requires the other for a complete alignment. Knowledge exchange is split into implicit and explicit knowledge, which cannot be defined in words or transmitted at all and knowledge that can be documented. Tacit knowledge requires explicit knowledge to enable the overall aim to create a setting for analysis and interpretation.

Competitive advantage is enabled by Business-IT alignment through several aspects. Innovativeness by IT can be more effectively used in the business. One of the two can create it instead by applying the organisational knowledge to IT capabilities. The alignment is overall leading to monetary success and non-financial success. The synergies of the alignment generally lead to a competitive advantage.

The alignment of business and IT creates operational value by improving and enabling linkages, thereby supporting the transformation of explicit and implicit knowledge. The documentation of processes rises in importance due to the decentralisation of IT and modularisation.

### 7.1.2 BPM as a Supporter of the Business-IT alignment

The main research question aims to find a solution for the question of how BPM can contribute to the aim of aligning the business and IT. BPM aims to control, analyse, design and manage business processes. The answers to the sub research questions combined give further insights into the solution to the central research question.

The research discovers the business process as a leading contributor of the Business-IT alignment, facilitating the knowledge transfer. Especially the transfer of tacit knowledge is enabled by processes which is a foundation for a fully aligned interface of business and IT.

Aligning business and IT allows to utilise the synergies between BPM and IT fully. IT processes rise in importance due to the growing modularity of systems and the increasing complexity of the system landscape. BPM facilitates the necessary tools and methods for modelling and managing these processes. BPM aims to map an organisation's entire operations within processes chains, thereby providing transparency about linkages, data streams, and dependencies of functions. IT needs this transparency, especially to further understand the business context of operations for managing IT. By creating this knowledge exchange, trust between the departments is built, enabling more frequent communication and interaction. Ultimately this unites the departments with each other.

Processes contribute to better and more efficient communication between the IT regarding the overall service management. Updated service management processes result in a first-time right touch and, thereby, a better response time. Requests can be better understood, and a better service delivered. IT can better spot opportunities to improve and simultaneously decrease the number of customised solutions, resulting in less operational cost. Accessibility among the entire organisation improves the overall transparency and builds up a single source of truth for documentations of the business operations and their corresponding IT solutions.

## 7.2 Limitations

The research itself was conducted in a restricted time frame. Alignment between departments is a long process that is highly dependent on management support and the people involved. This research is establishing for this alignment a platform that can facilitate operational aspects.

The outcome of the validation project shows promising results. However, the people involved were motivated to conduct this project and being part of it. Further projects with a variety of people must be undertaken to reveal insights into the feasibility further.

The achievement of this alignment depends highly on the process quality and level of detail. This research only touches the surface of possible assessment schemes and methods for ensuring process quality that supports the Business-IT alignment. The story of detail is in the form of a process modelling guideline included nevertheless, a further specification is necessary for a complete illustration of all possible instances.

Processes part of an active interface between the business and IT can result in many different applications consequential improving an existing business. However, many other use cases are possible and need further research. The research gives an outlook on test management. Many IT systems changed from a data-aware to a process-aware system, making the process and the Business-IT alignment especially necessary for migration or implementation to new systems. The research shows the necessity, further research on how to utilise best this opportunity is possible.

## 7.3 Recommendations

The research reveals how important the business process is for IT. BPM can tremendously improve the integration of IT into the business. This research mainly proves the usage of business processes as an alignment facilitator. As described in the limitations, the level of detail is for this alignment an essential factor. To little detail can contribute to no value, to great detail can lead to inefficiency and no added value for the organisation. The quality of modelling is the main success factor. Therefore, the first recommendation is to explore the methods of quality assurance for modelling further, especially the aspect of modelling the required detail. This will assure the goal and purpose of the alignment.

Current trends in IT go towards the management of system landscapes rather than maintain central systems. The system landscape is continuously growing. The direction goes to connecting specialised systems rather than buying one central system where all operations are executed. The complexity of managing these

increases, and more system rollouts and connections between them will occur. IT is actively approaching these trends information systems which maintain other systems. The processes are an emerging trend, supporting in various settings. Test management is here one example, which arises due to this IT trend. Testing is a crucial part of every IT implementation. Due to tremendous operations involving various systems, a functional test is not sufficient any longer. Automatic system integration tests are a solution to this problem. An input for execution is the sequence of operations and their systems, mapped in business processes.

The second recommendation is to explore these opportunities further and investigate how an organisation's digital transformation can be supported by the business process, especially the aligned business and IT. The process can be seen as an interface between technology and business with gaining significance.

The outcome of this research is an operational alignment solution for the business and IT. Aligning operational brings advantages and disadvantages. The approach suits the bottom-up approach, integrating a potential success story into the future strategy. A significant risk for this approach is the lack of cohesion – the risk of losing the concept out of sight. Therefore, for a successful operational solution, it is vital to investigate strategic programmes or solutions that integrate this functional solution.

Therefore, the third and last recommendation is to investigate further how to integrate and develop this operational approach into a long-term strategic solution. Management support is crucial for comprehensive and large-scale usage. This research shows the alignment by BPM and by a domain model. Investigating these two solutions, especially incorporating them, will be a significant step into a fully aligned business.

## 8. Bibliography

- Aalst, W. M. P. van der, Hofstede, A. H. M. ter, & Weske, M. (2003). Business Process Management: A Survey. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, 2678, 1–12. [https://doi.org/10.1007/3-540-44895-0\\_1](https://doi.org/10.1007/3-540-44895-0_1)
- Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly: Management Information Systems*, 25(1), 107–136. <https://doi.org/10.2307/3250961>
- Anand, A., Wamba, S. F., & Gnanzou, D. (2013). A literature review on business process management, business process reengineering, and business process innovation. *Lecture Notes in Business Information Processing*, 153, 1–23. [https://doi.org/10.1007/978-3-642-41638-5\\_1](https://doi.org/10.1007/978-3-642-41638-5_1)
- Beimborn, D., Hirschheim, R., Schlosser, F., Schwarz, A., & Weitzel, T. (2008). How to Achieve IT Business Alignment? Investigating the Role of Business Process Documentation in US and German Banks. *AMCIS*. <http://aisel.aisnet.org/amcis2008http://aisel.aisnet.org/amcis2008/291>
- Beimborn, D., Schlosser, F., & Weitzel, T. (2009). Proposing a theoretical model for IT governance and IT business alignment. *Proceedings of the 42nd Annual Hawaii International Conference on System Sciences, HICSS*. <https://doi.org/10.1109/HICSS.2009.358>
- Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: Toward a next generation of insights. *MIS Quarterly: Management Information Systems*, 37(2), 471–482. <https://doi.org/10.25300/MISQ/2013/37:2.3>
- Blumenberg, S., Wagner, H.-T., & Beimborn, D. (2009). Knowledge transfer processes in IT outsourcing relationships and their impact on shared knowledge and outsourcing performance. *International Journal of Information Management*, 29, 342–352. <https://doi.org/10.1016/j.ijinfomgt.2008.11.004>
- Business Process Management Cambridge English Dictionary*. (2021). <https://dictionary-cambridge-org.ezproxy2.utwente.nl/de/worterbuch/englisch/business-process-management>
- Carr, N. G. (2003). IT Doesn't Matter. *Harvard Business Review*, 81(5), 41-49+128.
- Caverlee, J., Bae, J., Wu, Q., Liu, L., Pu, C., & Rouse, W. (2007). Workflow management for enterprise transformation. *Information Knowledge Systems Management*, 6(1, 2), 61–80.
- Chan, Y. E., Huff, S. L., Barclay, D. W., & Copeland, D. G. (1997). Business Strategic Orientation, Information Systems Strategic Orientation, and Strategic Alignment. *Information Systems Research*, 8(2), 125–150. <https://doi.org/10.1287/ISRE.8.2.125>
- Chau, D. C. K., Ngai, E. W. T., Gerow, J. E., & Thatcher, J. B. (2020). The Effects of Business-IT Strategic Alignment and IT Governance on Firm Performance: A Moderated Polynomial Regression Analysis. *MIS Quarterly*, 44(4), 1679–1703.

<https://doi.org/10.25300/MISQ/2020/12165>

- Company, H. T. (2019). *BPM @ High Tech Company*. <https://www.hightechcompany.com>
- Company, H. T. (2020a). *IT Demand Management*. <https://www.hightechcompany.com>
- Company, H. T. (2020b). *IT Service Processes*. <https://www.hightechcompany.com>
- Company, H. T. (2021a). *DP Organisation*. 2021. <https://www.hightechcompany.com>
- Company, H. T. (2021b). *Internal Documents*. <https://www.hightechcompany.com>
- Cragg, P., Tagliavini, M., & Mills, A. (2007). Evaluating the Alignment of IT with Business Processes in SMEs. *ACIS 2007 Proceedings*. <https://aisel.aisnet.org/acis2007/10>
- Daft, R. L. (2007). Organization theory and design. In *Organization Theory and Design*.
- Davenport, T. H. (1992). *Process Innovation: Reengineering Work through Information Technology*. <https://www.researchgate.net/publication/216300521>
- de Bruin, T., Rosemann, M., & Bruin, de. (2007). *Association for Information Systems AIS Electronic Library (AISeL) Using the Delphi Technique to Identify BPM Capability Areas Recommended Citation Using the Delphi Technique to Identify BPM Capability Areas*. 42. <http://aisel.aisnet.org/acis2007><http://aisel.aisnet.org/acis2007/42>
- Definition of Business Process Management (BPM) - IT Glossary | Gartner*. (2021). <https://www.gartner.com/en/information-technology/glossary/business-process-management-bpm>
- Elbashir, M. Z., Collier, P. A., Sutton, S. G., Davern, M. J., & Leech, S. A. (2013). Enhancing the business value of business intelligence: The role of shared knowledge and assimilation. *Journal of Information Systems*, 27(2), 87–105. <https://doi.org/10.2308/ISYS-50563>
- G., M., GurbaxaniVijay, & L., K. (1996). A process oriented framework for assessing the business value of information technology. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, 27(2), 68–81. <https://doi.org/10.1145/243350.243363>
- Gelinas, U. J., Steve Sutton Jane Federowicz, J. G., Jr, G., Sutton, S. G., & Federowicz, J. (2008). *Business Processes and Information Technology Business Processes and Information Technology A Global Text*. <http://www.thomsonrights.com>
- Gerow, J. E., Thatcher, J. B., & Grover, V. (2015). Six types of IT-business strategic alignment: an investigation of the constructs and their measurement. *European Journal of Information Systems*, 24(5), 465–491. <https://doi.org/10.1057/EJIS.2014.6>
- Hammer, M. (2015). What is business process management? In *Handbook on Business Process Management 1: Introduction, Methods, and Information*

- Systems* (pp. 3–16). Springer Berlin Heidelberg. [https://doi.org/10.1007/978-3-642-45100-3\\_1](https://doi.org/10.1007/978-3-642-45100-3_1)
- Hammer, M., & Champy, J. (1993). Reengineering the corporation: A manifesto for business revolution. *Business Horizons*, 36(5), 90–91. [https://doi.org/10.1016/S0007-6813\(05\)80064-3](https://doi.org/10.1016/S0007-6813(05)80064-3)
- Heerkens, H., & van Winden, A. (2017). Solving Managerial Problems Systematically. In *Solving Managerial Problems Systematically*. <https://doi.org/10.4324/9781003186038>
- Helms, M. M., & Nixon, J. (2010). Exploring SWOT analysis – where are we now? A review of academic research from the last decade. *Journal of Strategy and Management*, 3(3), 215–251. <https://doi.org/10.1108/17554251011064837>
- Henderson, J. C., & Venkatraman, N. (1993). Strategic alignment: Leveraging information technology for transforming organizations. *REPRINTED FROM IBM SYSTEMS JOURNAL*, 32(1).
- Hertis, M., & Juric, M. B. (2013). Ideas on improving the Business-IT alignment in BPM enabled by SOA. *2013 International Conference of Information and Communication Technology, ICoICT 2013*, 55–60. <https://doi.org/10.1109/ICOICT.2013.6574549>
- Huang, Z., Van Der Aalst, W. M. P., Lu, X., & Duan, H. (2011). Reinforcement learning based resource allocation in business process management. *Data & Knowledge Engineering*, 70(1), 127–145. <https://doi.org/10.1016/J.DATAK.2010.09.002>
- Kavakli, V., & Loucopoulos, P. (1999). Goal-driven business process analysis application in electricity deregulation. *Information Systems*, 24(3), 187–207. [https://doi.org/10.1016/S0306-4379\(99\)00015-0](https://doi.org/10.1016/S0306-4379(99)00015-0)
- Kraljić, T., & Kraljić, A. (2017). Process driven ERP implementation: Business process management approach to ERP implementation. *Lecture Notes in Business Information Processing*, 295, 108–122. [https://doi.org/10.1007/978-3-319-64930-6\\_8](https://doi.org/10.1007/978-3-319-64930-6_8)
- Kraljic, T., Kraljić, A., Devos, J., & Poels, G. (2014). Business Process Modelling in ERP Implementation: Literature Review. In *Proceedings of the 8th European Conference on Information Management and Evaluation, ECIME 2014*.
- Kude, T., Lazic, M., Heinzl, A., & Neff, A. (2018). Achieving IT-based synergies through regulation-oriented and consensus-oriented IT governance capabilities. *Information Systems Journal*, 28(5), 765–795. <https://doi.org/10.1111/ISJ.12159>
- Lindsay, A., Downs, D., & Lunn, K. (2003). Business processes - Attempts to find a definition. *Information and Software Technology*, 45(15), 1015–1019. [https://doi.org/10.1016/S0950-5849\(03\)00129-0](https://doi.org/10.1016/S0950-5849(03)00129-0)
- Lu, Y., & Ramamurthy, K. (2011). Understanding the link between information technology capability and organizational agility: An empirical examination. *MIS Quarterly: Management Information Systems*, 35(4), 931–954. <https://doi.org/10.2307/41409967>
- Luftman, J. (2003). Assessing it/business alignment. *Information Systems Management*, 20(4), 9–15.

<https://doi.org/10.1201/1078/43647.20.4.20030901/77287.2>

- Luftman, J., & Brier, T. (1999). California Management Review Achieving and Sustaining Business-IT Alignment. *California Management Review*, 42. <https://doi.org/10.2307/41166021>
- Luftman, J., Lyytinen, K., & Zvi, T. ben. (2017). Enhancing the measurement of information technology (IT) business alignment and its influence on company performance: <https://doi-org.ezproxy2.utwente.nl/10.1057/Jit.2015.23>, 32(1), 26–46. <https://doi.org/10.1057/JIT.2015.23>
- Luftman, J. N. (2003). Competing in the Information Age: Align in the Sand: Second Edition. *Competing in the Information Age: Align in the Sand: Second Edition*, 1–430. <https://doi.org/10.1093/0195159535.001.0001/ACPROF-9780195159530-CHAPTER-18>
- Martin, A. (2012). Enterprise IT Architecture in Large Federated Organizations: The Art of the Possible. <http://ezproxy.utwente.nl/2099/10.1080/10580530.2012.662103>, 29(2), 137–147. <https://doi.org/10.1080/10580530.2012.662103>
- Martin, S. F., Wagner, H.-T., & Beimbom, D. (2008). *Association for Information Systems AIS Electronic Library (AISeL) Process Documentation, Operational Alignment, and Flexibility in IT Outsourcing Relationships: A Knowledge-Based Perspective Recommended Citation "Process Documentation, Operational Alignm.* 1–1. <http://aisel.aisnet.org/icis2008/75>
- Mendling, J., Reijers, H. A., & Aalst, W. (2010). Seven Process Modeling Guidelines (7PMG). *Information and Software Technology*, 52, 127–136. <https://doi.org/10.1016/j.infsof.2009.08.004>
- Niehaves, B., Poepelbuss, J., Plattfaut, R., & Becker, J. (2014). BPM capability development—a matter of contingencies. *Business Process Management Journal*, 20(1), 90–106. <https://doi.org/10.1108/BPMJ-07-2012-0068>
- Rahimi, F., Møller, C., & Hvam, L. (2016). Business process management and IT management: The missing integration. *International Journal of Information Management*, 36, 142–154. <https://doi.org/10.1016/j.ijinfomgt.2015.10.004>
- Reich, B. H., & Benbasat, I. (2000). Factors that influence the social dimension of alignment between business and information technology objectives. *MIS Quarterly: Management Information Systems*, 24(1), 81–113. <https://doi.org/10.2307/3250980>
- Riss, U., Rickayzen, A., Maus, H., & Aalst, W. (2005). Challenges for Business Process and Task Management. *Undefined*.
- Sabherwal, R., & Chan, Y. E. (2001). Alignment between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders. *Information Systems Research*, 12(1), 11–33. <https://doi.org/10.1287/ISRE.12.1.11.9714>
- Sabherwal, R., Sabherwal, S., Havakhor, T., & Steelman, Z. (2019). How does strategic alignment affect firm performance? The roles of information technology investment and environmental uncertainty1. *MIS Quarterly: Management Information Systems*, 43(2), 453–474.

<https://doi.org/10.25300/MISQ/2019/13626>

- Sara Aguilar-Sav, R. (2004). Business process modelling: Review and framework. *Int. J. Production Economics*, 90, 129–149. [https://doi.org/10.1016/S0925-5273\(03\)00102-6](https://doi.org/10.1016/S0925-5273(03)00102-6)
- Schumpeter, J. A. (1934). The theory of economic development. Harvard economic studies, vol. XLVI. *Harvard Economic Studies*, 34, 255.
- Setia, P., & Patel, P. C. (2013). How information systems help create OM capabilities: Consequents and antecedents of operational absorptive capacity. *Journal of Operations Management*, 31, 409–431. <https://doi.org/10.1016/j.jom.2013.07.013>
- Sia, S. K., Weill, P., & Zhang, N. (2021). Designing a Future-Ready Enterprise: The Digital Transformation of DBS Bank. *California Management Review*, 63(3), 35–57. <https://doi.org/10.1177/0008125621992583>
- Sidorova, A., Torres, R., & Beayeyz, A. (2015). The Role of Information Technology in Business Process Management. In *Handbook on Business Process Management 1: Introduction, Methods, and Information Systems* (pp. 421–444). [https://doi.org/10.1007/978-3-642-45100-3\\_18](https://doi.org/10.1007/978-3-642-45100-3_18)
- Smaczny, T. (2001). Is an alignment between business and information technology the appropriate paradigm to manage IT in today's organisations? *Management Decision*, 39(10), 797–802. <https://doi.org/10.1108/EUM0000000006521>
- Smith, H. (2003). Business process management—the third wave: business process modelling language (bpml) and its pi-calculus foundations. *Information and Software Technology*, 45(15), 1065–1069. [https://doi.org/10.1016/S0950-5849\(03\)00135-6](https://doi.org/10.1016/S0950-5849(03)00135-6)
- Tallon, P.P., Kraemer, K. L., & Gurbaxani, V. (2000). Executives' perceptions of the business value of information technology: A process-oriented approach. *Journal of Management Information Systems*, 16(4), 145–173. <https://doi.org/10.1080/07421222.2000.11518269>
- Tallon, Paul P. (2007). A process-oriented perspective on the alignment of information technology and business strategy. *Journal of Management Information Systems*, 24(3), 227–268. <https://doi.org/10.2753/MIS0742-1222240308>
- Tallon, Paul P., Kraemer, K. L., & Gurbaxani, V. (2000). Executives' perceptions of the business value of information technology: A process-oriented approach. *Journal of Management Information Systems*, 16(4), 145–173. <https://doi.org/10.1080/07421222.2000.11518269>
- Tallon, Paul P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: Insights from a mediation model. *MIS Quarterly: Management Information Systems*, 35(2), 463–486. <https://doi.org/10.2307/23044052>
- Taylor-Cummings, A. (1998). Bridging the User–is Gap: A Study of Major Information Systems Projects. <https://doi.org/10.1177/026839629801300103>, 13(1), 29–54. <https://doi.org/10.1177/026839629801300103>
- Ting-Yi Ho, D., Jin, Y., Dwivedi, R., Ting-Yi, D., & Jin, H. Y. (2009). *Association for*

*Information Systems AIS Electronic Library (AISeL) Business Process Management: A Research Overview and Analysis Recommended Citation Business Process Management: A Research Overview and Analysis.*  
<http://aisel.aisnet.org/amcis2009/785>

- Van Der Zee, J. T. M., & De Jong, B. (1999). Alignment Is Not Enough: Integrating Business and Information Technology Management with the Balanced Business Scorecard. *Journal of Management Information Systems*, 16(2), 137–156. <https://doi.org/10.1080/07421222.1999.11518249>
- Van Rensburg, A. (1998). A framework for business process management. *Computers & Industrial Engineering*, 35(1–2), 217–220. [https://doi.org/10.1016/S0360-8352\(98\)00068-0](https://doi.org/10.1016/S0360-8352(98)00068-0)
- Wagner, H.-T., & Weitzel, T. (2012). How to Achieve Operational Business-IT Alignment: Insights from a Global Aerospace Firm. *MIS Quarterly Executive*, 11(1). <https://aisel.aisnet.org/misqe/vol11/iss1/5>
- Wagner, H. T., Beimborn, D., & Weitzel, T. (2014). How social capital among information technology and business units drives operational alignment and its business value. *Journal of Management Information Systems*, 31(1), 241–272. <https://doi.org/10.2753/MIS0742-1222310110>
- Wang, Y., Toseef, M., & Gong, Y. (2021). IT Process Alignment in Business Strategy: Examining the Role of Transactional Leadership and Organization Culture. *Information (Switzerland)*, 12(6). <https://doi.org/10.3390/info12060237>
- Weske, M. (2007). Business process management: Concepts, languages, architectures. In *Business Process Management: Concepts, Languages, Architectures*. <https://doi.org/10.1007/978-3-540-73522-9>
- zu Ortenburg, A. (University of T. (2021). *Project Plan - Bachelor Thesis IEM*.

## 9. Appendix A (Public)

### 9.1 Methodology of Managerial Problem-Solving Method

The Managerial problem solving method is a methodology developed explicitly for solving problems within organizations, it guides the researcher until then implementation of the technical solution as well as in the last phase an evaluation phase (Heerkens & van Winden, 2017).

The different phases of the method are divided into seven steps, first the definition of the problem, followed by the formulation of an approach, then analysing the problem, following formulating solutions, followed by choosing a solution, then implementing a solution and finally evaluating a solution. Each phase may call up so called knowledge problems, which must be solved within a research cycle, an additional part of the MPSM. A knowledge problem is different from an action problem only solving the knowledge discrepancy (Heerkens & van Winden, 2017). Heerkens defines it as "... a description of the research population, the variables and, if necessary, the relations that need to be investigated" (Heerkens & van Winden, 2017). Thereby searching for information rather than solutions.

### 9.2 Literature Review Frameworks on Business and IT Collaboration

#### 9.2.1 Defining the Inclusion and Exclusion Criteria

This literature research aims to answer the two selected related research questions. Both topics belong in between the IT, so Computer Science and the Business area. Therefore, defining inclusion as well as exclusion criteria can be somewhat helpful.

In general, since the topic of the two research questions is highly discussed, articles which no or only a few citations will be excluded. This gives the outcome of the research as well a higher validity. In addition to these measures, articles published before 1990 will also be excluded since the information technology has changed and transformed a lot. Therefore, it might falsify the research outcome. Additionally, only literature where access to the full article via the University of Twente is possible and all articles not in English or in German will not be included.

In comparison to these exclusion criteria, there are no general inclusion criteria's, all literature presented by the search engine can be included. Generally, however the business IT alignment of interested is focusing on business processes as a collaboration method. Therefore, a particular focus is on BPM as well as in general on business processes. The sector is in general the IT and business departments, papers withing the production environment will be prioritized.

#### 9.2.2 Databases

For this systematic literature research, the two central databases used are the Business Source Elite and Scopus. These databases are known for their peer reviewed highly reliable content. In addition to this these databases are both available via the University of Twente.

The business source elite is a known database for full-text articles and journals covering the wider business area.

In comparison, Scopus is an across discipline database, meaning it covers a lot of different topics, providing a more general view on topics with a high-quality standard.

### 9.2.3 Describing the Search Terms and the Used Strategy

For the research in these databases, the research questions have been split up into separate parts.

The first research question, therefore, consists out of the following parts:

*Framework (and) Business (and) IT and (alignment)*

The second research questions consist mainly out of the parts:

*Business (and) IT (and) alignment (and) competitive advantage (and) organization*

These concepts, building the research question II be presented within the search matrix with alternative search terms and terms narrower and broader defined (Table 9-1 - Search matrix RQ1)( Table 9-2 - Search matrix RQ2).

### 9.2.4 Search Matrix

First research question

<b>Concepts</b>	<b>Related Terms</b>	<b>Narrower Terms</b>	<b>Broader Terms</b>
Framework	architecture, network, theory, approach	Plan, Design, configuration, model	Organization, schema, groundwork, structure
Business	Company enterprise, corporation	Department, sector,	Organization, corporate, institution
IT	Computer science, ICT, tech, information technology	Data processing, Information processing, Systems	Computer technology, Communication,
Alignment	Collaboration, Arrangement	Adjustment, positioning	Alliance, relationship, partnership

Table 9-1 - Search matrix RQ1

## Second research question

Concepts	Related Terms	Narrower Terms	Broader Terms
Business	Company, enterprise	Department, sector,	Organization, corporate, institution
IT	Computer science, ICT	Data processing, Information processing, Systems	Computer technology, Communication,
Alignment	Collaboration, Arrangement	Adjustment, positioning	Alliance, relationship, partnership, composition
Competitive advantage	Excellence, Outsmarting	Performance, artfulness	Competitive edge, Canniness

Table 9-2 - Search matrix RQ2

### 9.2.5 Business Source Elite

Within the database Business Source Elite, the following search term was used to retrieve literature on the business & IT alignment:

*“(business or company or organization or corporation) AND (framework or model or theory or approach) AND (it or information technology or tech) AND (alignment or collaboration or alliance)” with a filter on languages (English and German) and a filter on the publication date (all after 1990)*

With these search terms, around 14.000 results were found. After sorting, the most relevant ones have been accessed. Due to a high number of irrelevant papers, the search has been redefined:

*2<sup>nd</sup> search:*

*“(Business or company or organization) AND (framework or model or theory or approach) AND (IT or information technology) AND (alignment)”*

With these search terms, around 2.000 results were received. Both searches combined resulted in 11 relevant papers.

### 9.2.6 Scopus

Within Scopus, with the first search, 206 results were found. Due to the high number of papers not answering the research question, the search has been narrowed down to add the search term “operational”.

*“(business or company or organization) AND ( framework or model or theory or approach) AND (IT or information technology) AND (alignment)”*

And

*“(operational) AND (business OR company OR department) AND (framework OR model OR theory OR approach) AND (IT OR is OR information AND technol*

ogy OR information AND system) AND (alignment).”

This redefined search retrieved around 3.000 entries. The most relevant ones have been selected and further examined.

### 9.2.7 Conceptual Matrix

Articles / Papers / concepts	Strategic alignment	Operational alignment	BPM/Process orientated	Knowledge management	Competitive advantage	Framework or theory or model
(Paul P. Tallon, 2007)	X	X	X			(X)
(Kude et al., 2018)	X		X	X	X	X
(Sabherwal & Chan, 2001)	X					X
(Van Der Zee & De Jong, 1999)	X	X				X
(J. Luftman, 2003)		X		X		X
(S. F. Martin et al., 2008)		X	X	X		X
(de Bruin et al., 2007)		X	X		X	X
(J. Luftman & Brier, 1999)	x	x			x	x
(J. N. Luftman, 2003)	X			X	X	X
(Paul P. Tallon & Pinsonneault, 2011)	X		X		X	X
(Sia et al., 2021)	X					X
(Bharadwaj et al., 2013)	X		X		X	
(Elbashir et al., 2013)	X		X	X		X
(J. Luftman et al., 2017)	X	X				X
(A. Martin, 2012)	X	X				X
(Cragg et al., 2007)	X					X

(P.P. Tallon et al., 2000)	X		X		X	X
(Reich & Benbasat, 2000)	X	X		X		X
(Kavakli & Loucopoulos, 1999)		X	X			X
(Sabherwal et al., 2019)	X				X	X
(Setia & Patel, 2013)	X			X		X
(H. T. Wagner et al., 2014)	X	X	X	X		X
(Beimborn et al., 2008)		X	X	X		
(H.-T. Wagner & Weitzel, 2012)		X	X	X	X	X
(Hertis & Juric, 2013)	X		X			X
(Smaczny, 2001)	X					X
(Wang et al., 2021)	X				X	X
(Blumenberg et al., 2009)		X	X	X	X	X
(Beimborn et al., 2009)		X		X	X	X
(Gerow et al., 2015)	X	X	X		X	X
(Henderson & Venkatraman, 1993)	X	X	X			X
(Chau et al., 2020)	X				X	

### 9.3 End-To-End Process Landscape

See 10. Appendix B (non-public appendix)

### 9.4 [HIGH TECH COMPANY] Process Model

See 10. Appendix B (non-public appendix)

### 9.5 Symbio Process View – Provide registration documents

See 10. Appendix B (non-public appendix)

### 9.6 Process Models Provide Registration Documents

See 10. Appendix B (non-public appendix)

### 9.7 SAP Solution Manager 7.2 – Overview

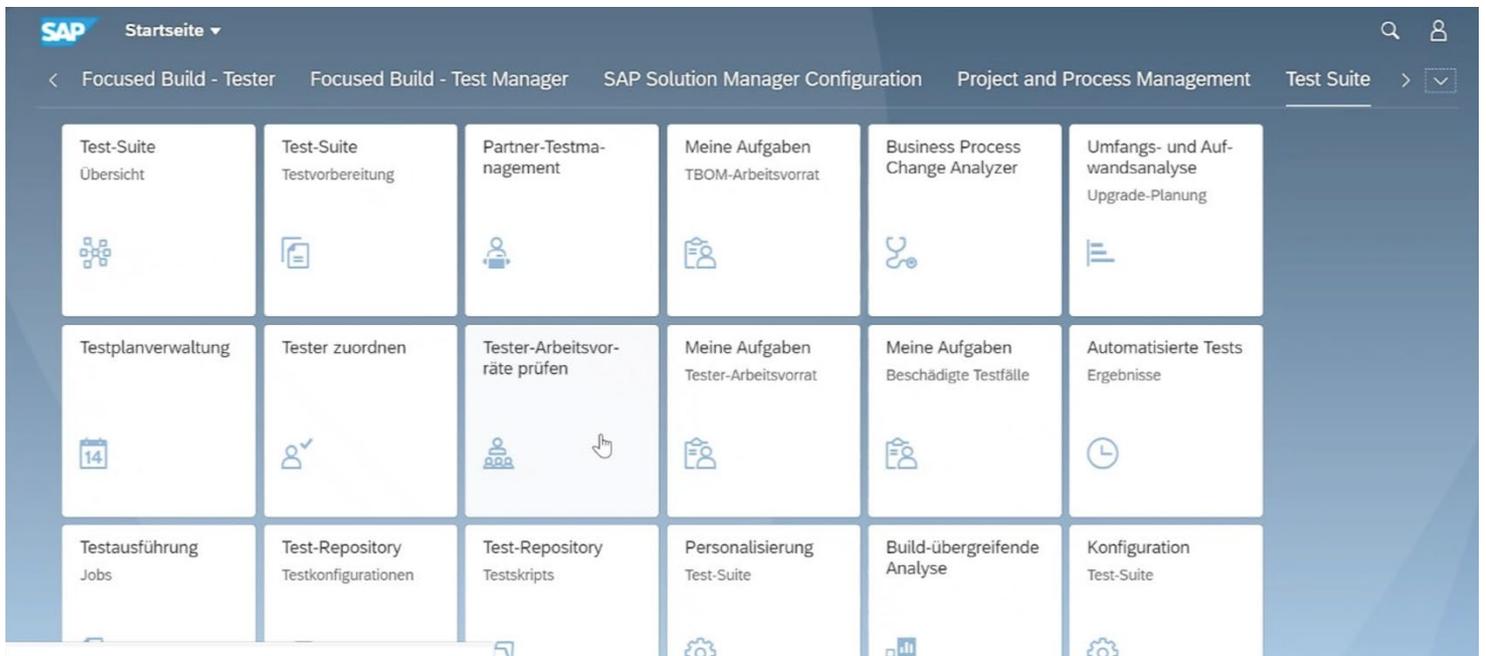


Figure 9-1 Solution Manager 7.2 Test Suite

## 9.8 Interview with [Mister X]

Interview with	[Mister X]
Position in the company	Business Process Management
Date of the interview	24 <sup>th</sup> of August 2021
Place of the interview	Virtual Meeting
Interview duration	22 Minutes

### Note:

The statements do not correspond to the exact wording of the interviews. They have been summarised without changing the meaning of the content.

### Which value does the designed solution have for [HIGH TECH COMPANY] in both the short and long term?

The solution has a vital role for [HIGH TECH COMPANY] in the short term. We depend on the technical interaction of the SolMan, which encourages IT to promote the solution. The joint synergies with IT are enormous and offer great potential. Coordination often leads to a particular inefficiency; improving this and at the same time creating transparency in the company solves two separate problems.

Apart from that, the solution offers enormous significance for [HIGH TECH COMPANY] in both the short and long term. BPM is still being rolled out and therefore needs all the backup it can get. In a long time, the solution offers a systematic approach to demand process descriptions on a large scale, significantly transforming the practice of BPM at [HIGH TECH COMPANY] from a quality perspective to a whole perspective. Everyone can benefit from improved communication through the business process.

### How do you evaluate the relevance of Business-IT Alignment in the company?

The success of a company nowadays depends heavily on its IT. Whether the IT is outsourced or still present in-house does not play a significant role. The coordination and communication with IT are comparable.

Business IT alignment means more efficient, incredibly faster solutions. Direct channels and efficient consultation shorten the process of developing new solutions. In addition, IT has a better idea of the precise goal of a requested solution and can shape it actively. As a result, solutions can be partly solved in the standard, and different solutions do not have to be created.

By documenting today's solutions and new ones, continuous improvement can be carried out more quickly. No time-consuming process recording is necessary anymore. It is already available, bringing together constant improvement and the process world.

*From a company perspective, would you instead prefer an operational or strategic solution and why?*

Both solutions have advantages and disadvantages. An operational solution has a particular advantage in that a solution is directly created that addresses the problem. With a strategic solution, this must first be developed. For [HIGH TECH COMPANY], the operational approach should be chosen, as it can be implemented better and faster.

*Could there be difficulties in implementing the solution in the company?*

Risks always must be considered. The most considerable risk I see with this solution is that departments do not adopt it, probably because they do not see the added value and want to put in the extra effort.

However, the same risk is shared by many new initiatives that need to gain acceptance. As soon as a majority acceptance is recognisable, this problem is solved. The issue can be brought under control organisationally.

*How would you describe the work of IT and Business in 10 years?*

I am sure that IT will become even more critical. The departments will be even more strongly connected to IT. Without it, it will hardly be able to function.

I also see great potential for low-code programming; the business process will play a crucial role.

*IT Alignment is strongly focused on social capital and sees the real problem there. Do you see any other issues in the company where social capital is a significant issue?*

There are many problems in companies where communication is the foremost hurdle. Often the process flow is used as a basis for discussion. Processes are excellent as a communication tool or even in an organisational context as a management tool. New employees are often trained through processes. It has established itself as good practice here, following the motto a picture is worth a thousand words.

Large global companies often have a complex network of organisations. It is often difficult to see the whole picture without an abstract representation, apart from the language or cultural barriers that such a model usually overcomes. These barriers do not arise in the first place. The process model immediately provides a common ground for exchange.

## 9.9 Interview with [Miss X]

Interview with	[Miss X]
Position in the company	Digital Quality Management
Date of the interview	26 <sup>th</sup> of August 2021
Place of the interview	Virtual Meeting
Interview duration	20 Minutes

### Note:

The statements do not correspond to the exact wording of the interviews. They have been summarised without changing the meaning of the content.

*The central solution of the paper proposes the business process as a medium of communication. How do you evaluate this? Can it help to build cross-disciplinary knowledge or overcome the barriers?*

Using the process as a communication medium is an excellent approach, especially as it is visual. Each person can use the model to walk through the process to build a mutual understanding. Each person takes a different role and perspective and understands the process in their context. Different perspectives cause various clarifications, to which the process provides the answers. Another crucial aspect is that the process is documented, which always ensures accessibility. For IT, the increased transparency is particularly noticeable in that it is then possible to see which process relates to which other processes. It is also possible to see which data flows into which process and where this data is used. Process models are an essential tool here. Processes should be understood as a joint solution; business and IT develop and use them together.

*Do you see any specific risks in implementing the solution in the company, and if so, why?*

Specifically, I see a considerable risk in process modelling, perceived as additional work without added value. It is crucial that BPM becomes more transparent and communicates the added value within the company. Employees must see this process modelling as added value and fundamental. Especially the level of detail plays an important role. This can help the implementation to stand or fall. The common understanding as one of the goals can only be built up if it is chosen correctly. Each person must be able to interpret the process correctly, regardless of the depth of knowledge. If this fails, it is challenging to build a shared understanding. Instead, each person will see a different picture. Critical points of the processes must be recognizable. Through cross-functional process chains, a process must also be sufficiently understandable beyond the area of expertise. Availability alone is not enough.

*Would you prefer a strategic or more operational solution for an alignment, and where do you see strengths and weaknesses?*

I think both approaches have strengths and weaknesses. In principle, the strategic solution acts top-down, the operational bottom-up. For an alignment solution, I see both methods in combination as most effective. Bottom-up is particularly suitable because of the valuable input of the individual colleagues and the many creative solutions that result from it. An operational solution often causes critical questioning, and the employees are motivated to propose their ideas. However, many different solutions can also emerge, and the original concept is lost sight of. In the top-down approach, the solution must be very precisely defined, including the direction to be taken. There is little room for input from the individual staff members. I think it is vital building up an intermediate level; without the necessary attention and support for the topic in management, an operational solution is challenging to implement; a strategic solution does not integrate enough of the required creative ideas of the employees.

*In your opinion, how important is close cooperation between the business and IT in both the short and long term?*

The importance of IT is becoming more and more relevant. However, I think that a change in IT will take place or is currently taking place. IT is changing from experts to managers. Low-code applications, among other things, will reduce pure programming, but the IT system landscape will thereby constantly expand. IT will therefore always be present for its management, and close cooperation is therefore inevitable.

*Do you think a technical solution for Business-IT Alignment is possible, or do you think a middleman (like the DP Department) must establish the link in the long run?*

I think this depends very much on the process level. Looking at the [HIGH TECH COMPANY] process model, I believe that alignment at the L0, L1 and L2 levels is possible without a middleman. At these levels, the processes are still on a very high level. As soon as we reach deeper levels, the interface becomes increasingly important. This is mainly about data fields, data streams, and integration into the company's overall architecture. As the system landscape becomes more and more complex, much coordination is required, and interfaces between systems become more critical. The system landscape is changing from a central system to many small applications that are interconnected.

# Requirement Specification Template

<<Please enter the short description of your requirement here>>

<b>Responsible Business</b>	Please enter the name of the responsible person in the business (and the department in brackets)
<b>IT Solution Owner</b>	Please enter the name of the responsible IT solution owner (and the IT solution in brackets)

<b>System</b>	Please enter the name of the relevant IT-system(s)
<b>Function</b>	Please enter the name of the affected function (e.g. SAP Transaction Code, Software Module or Program)
<b>Initial Situation</b>	Please provide a short explanation of the current situation. Why is it beneficial or necessary to implement this change?
<b>Description of Requested Functionality</b>	<p>Please describe the desired behaviour of the system, which you want to realize by this change. Think about the relevant aspects below and possibly refer to further attachments.</p> <ul style="list-style-type: none"> <li>• What are the new functionalities?</li> <li>• Which rules and/or automation procedures need to be implemented?</li> <li>• How does it relate to existing functionalities?</li> <li>• If needed, please describe the user interface for the new functionality.</li> <li>• How is the authorization concept affected?</li> </ul>
<b>Business Value</b>	Please outline the benefit for the business by providing the relevant KPIs and their expected improvements. (In case it is not possible to quantify the business value, please provide a thorough description.)
<b>Risks and Counter Measures</b>	Please state the potential risks associated with your requirement and explain counter measures to prevent them.
<b>Impact</b>	Please choose the number of affected users
	Please choose the organizational reach
<b>Deadline</b>	Please select a deadline for the Go-Live, if existing
	If there is a deadline, please provide a short explanation

Figure 9-2 Requirement specification template (Company, 2021b)

## 10. Appendix B (non-public appendix)

*Figure 4-1 [HIGH TECH COMPANY] Process landscape levels (Company, 2019)*

*Figure 9-2 [HIGH TECH COMPANY] E2E Process Landscape (Company, 2019)*

*Figure 9-3 [HIGH TECH COMPANY] Process Model (Company, 2019)*

*Figure 9-4 Symbio Business Manager - Process view*

*Figure 9-5 SAP Solution Manager Process Model Provide registration documents*

*Figure 9-6 Symbio Process Model Provide registration document*

*Figure 9-8 Solution documentation - Provide registration documents*

*Figure 5-7 SAP R/3 Transaction Y\_REGISTRATION\_DOCUMENTS Process: Provide Registration Documents*

*Figure 9-9 Solution documentation - Creation of test cases*