IS/IT integration in mergers & acquisitions:
a framework for a systematic approach

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MANAGEMENT SUMMARY

This research focused on the issue of IS/IT integration within M&As by taking a holistic perspective. Because IS/IT has such an important role within organizations nowadays, integration of IS/IT is considered to be crucial in M&As. The reason for initiating this research was the intended IS/IT integration of two manufacturing companies which are active in the same market.

After a first exploration of existing literature regarding the topic we found that this literature did not provide us with a method for a systematic approach towards an IS/IT integration strategy. Therefore, the main objective of this research became to combine and reuse existing knowledge about IS/IT integration in M&As such that the issue could be approached in a systematic manner. The research started with an exhaustive and systematic literature review. This literature review allowed us to identify important topics and concepts that play a role within IS/IT integration. Based on the results of this literature review we formed a framework which had the form of several steps in which each step considered one or more concepts.

Our framework starts with an analysis of the M&A context to identify the goals behind the M&A and the desired synergies. Furthermore, this analysis includes determining the M&A type, the desired organizational integration, and the level of desired IS/IT integration. In the next step the actual IS/IT contexts are the subject of analysis. This analysis should entail the IS/IT organizations and corresponding cultures, the IT infrastructures and the IS landscapes. In the third step of our framework the possible integration methods and modes for the organizational structure, IT infrastructure, and IS landscape are investigated. The identified possibilities are then related to the objectives and expectation in liaison with top management to select the best option. Once this option is selected, the future IS/IT organization, IT infrastructure and IS landscape are designed in step 5 of our framework. The final step of our framework is the design of a change plan, which outlines how to achieve the designed solution. Next to the theoretical concepts that were derived from existing literature, we also included the use of Enterprise Architecture modelling in our framework.

In the second part of this research the framework was applied to the two manufacturing companies. Using the framework we identified the similarities and differences between the two organizations. We found that the two companies were very similar in terms of IT infrastructure and business processes, but differed in terms of the application landscape and IS/IT organization structure. Based on our findings we proposed a take-over approach, which means that the application landscape of one of the companies will be transferred to the other company.

For this specific case we found the framework to be very useful and it helped us in systematically analysing the current situation and working towards a solution. Also the IS/IT managers and top management of the two organizations had the feeling that the used approach led to a well informed solution. The application of the framework led to a design of a solution and change plan which were both well received and will form the basis for the integration. Furthermore, the usage of Enterprise Architecture modelling proved to be very useful in the domain of M&As, because it allows an explicit representation of the solutions which is easy to understand by different stakeholders.

It is however impossible to draw firm conclusions about the framework from this research. First of all, the solution has not been implemented yet which makes it unable to conclude that the application of the framework indeed let to a solid solution. Furthermore, to make solid conclusions about the added value of the framework it should be applied to multiple cases. Our application of the framework also turned out to be very time consuming, which might make it less suitable for M&As in which fast decision making is required. On the other hand, we believe that our developed framework is a good first attempt towards a more systematic approach. The framework builds upon existing literature and outlines the important aspects of IS/IT integration in M&As. Each M&A has its own peculiarities which should be accounted for by the integration team and our framework can serve as a 'template' for the actual approach. Based on the application to our case we would like to argue that our framework enables organizations to take a more systematic approach towards IS/IT integration, but it is clear that the framework requires further testing.

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LIST OF ABBREVIATIONS

BPMN – Business process modelling notation

BPS – Business problem solving

CIO - Chief information officer

EA – Enterprise architecture

ERP – Enterprise resource planning

IS – Information system(s)

IT – Information technology

IS/IT – Combination of IS/IT

M&A – Merger and acquisition

MER – Main equipment room

MES - Manufacturing execution system

PLC – Programmable logic unit

SAN – Storage area network

1. INTRODUCTION

This first chapter discusses the problem context which forms the basis for this research project. Furthermore, this chapter contains a first exploration of the research topic and states the research questions and objectives of this research. Finally the overall research methodology which was used for this research will be discussed.

1.1 RESEARCH TOPIC

This study focuses on integration of information systems (IS) and information technology (IT) in mergers and acquisitions (M&As). The reason for this study is the intended integration of the IS/IT departments of two companies which are active in the same market. The two companies in question are both manufacturing companies and already part of the same holding for a few years, but are now about to study the options for integration. The integration of these IS/IT departments entails organizational integration as well as the more technical integration of IT and IS. The goal of this research is to derive a general (i.e. not specific to the Company X-Company Y merger case) framework that can be used as guideline when analysing and planning for such an integration. This framework will be structured using concepts and theories of previous research. Finally, the framework will be applied to the case of the two involved companies.

In this thesis the term IS/IT integration is used instead of IS integration or IT integration because both components are to be considered in the integration of the departments. Furthermore, there are several definitions of both IS and IT around and the terms are often used interchangeably [1]. According to Iyamu and Kekwaletswe [1] IS are the collection of systems through which business carry out their processes and logic. The IT component, which enables IS, is formed by technology artefacts such as hardware and software. The difference is that IT generally does not include business logic. For businesses the combination of IS and IT can help to achieve their goals and objectives [1]. We continue using the combined term IS/IT because we want to pay attention to both aspects: IT and IS. Furthermore, in the examined literature the terms are often used interchangeably, and it might lead to confusion if we keep switching between the two terms.

Integration of IS/IT of different organizational units has been the subject of several studies and can be viewed from different contexts such as inter-organizational or intra-organizational integration. The former refers to connecting to external parties such as customers, suppliers and collaborative partners, whereas the latter refers to connecting internal business activities and functions together [2].

During the last years, the topic of IS/IT integration gained some attention in the context of mergers and acquisitions (M&As). However, the academic world has paid little attention to IS/IT integration compared to other corporate functions in M&As [3-5]. The overall success of M&As is often determined by how successful the integration of the different companies is [6]. IT/IS integration is one of the tasks that must be conducted in the integration process and could generate several benefits in the context of M&As [3]. Several authors even argue that its role is critical for success [4, 6-8]. Or, conversely, many M&As fail to meet expectations because the companies stumble on IS integration [9].

In most of the recent literature on M&As, the concept of synergy is used to explain the reasons for M&As. Achieving synergy means that two organizational units can be run more efficiently and/or more effectively together than apart [10]. In the context of M&As possible synergies are mainly of intra-organizational character [2, 10]. Therefore, when considering IS integration in M&As, an intra-organizational perspective seems useful [2].

In M&As the role of IS/IT can be reactive or proactive [6]. Reactive means that the topic of IS/IT integration arises after the initiation of the merger or acquisition. In this reactive role IS/IT needs to comply with the operational considerations. According to McKiernan and Merali [6] IS/IT can be

proactive in two situations. The first is when IS/IT is a facilitator for operational and organizational integration. In this situation integration of IS/IT is required before integration of other operations is possible. The other situation is when acquiring the IS/IT of the other party is the underlying reason of the merger or acquisition. When IS/IT plays a proactive role the topic of IS/IT integration is introduced in earlier phases of the M&A [11].

For the actual IS/IT integration, different methods are mentioned in the literature. The naming of these methods differs within the literature, but four general approaches can be distinguished [12]. These four are (1) replacing all IS/IT with a completely new IS/IT landscape, (2) using the IS/IT of one of the parties of the merger for both of the parties, (3) combining the best of the IS/IT of both of the parties and (4) leaving IS/IT as is, but introducing some synchronization of redundant systems.

Compared to a few decades ago, IS/IT now plays a more pervasive and significant role in business processes [13] and thus occupies an important place in businesses, which makes integration of IS/IT more crucial in M&As [2, 14]. For example, in many large companies an ERP system is used to support and manage all operations. These systems are large and complex systems, and integration of multiple of these systems is a complex and challenging project [15]. The increased importance of IS/IT within organizations emphasizes once more that IS/IT integration is an important topic.

1.2 PROBLEM CONTEXT

Company X is a manufacturing company which is located in the Netherlands since 1988. In 1994 Company X joined the Holding Z, the world market leader within the industry. Today, the Holding Z consists of more than 25 companies, all active in different parts of the production chain. Together, these companies cover the whole chain, which enables the Holding Z to come up with an integrated production chain. Besides Company X other manufacturing companies which produce similar products are part of the Holding Z. One of these companies is Company Y, which is closely located to Company X. Until 2011 Company Y was part of the Holding A. The takeover of the Holding A in 2011 made Company Y part of the Holding Z.

Company X and Company Y both existed a long time before joining the Holding Z and therefore have evolved separately. Because of this separate evolvement there are now many differences between the two companies. These differences exist in different aspects of the company such as company culture, workflows and information technology.

Company X and Company Y and want to explore the options for integrating their IS/IT departments. Currently, both Company X and Company Y have their own IS/IT department and IS/IT. Integration is expected to lead to cost reduction due to better deployment of resources and more and better information sharing. The idea of integration was already on the agenda of the companies, but is becoming a priority since the IT manager at Company Y is expected to retire in the coming years.

The integration of IS/IT is expected to make a significant contribution to the integration of the two companies. The creation of synergy between the two IT departments does not solely involve changes in *technology*, but also has a *business* focus.

From a technological perspective Company X and Company Y should look for a way to streamline their information technology. For example, at Company X the ERP software LOOP was developed to integrate all facets of Company X's operations. LOOP is fully custom-built and is tailored to the processes of Company X. Company Y does not make use of LOOP at the moment, but uses different software products.

From a business perspective Company X and Company Y have to investigate how they can orchestrate their combined resources. Currently the departments perform all activities independent from each other, but in the future it should be possible for the companies to perform activities in a more centralized manner. This results in a significant change in the organizational structure. This

affects the personnel at the information technology departments, but possible changes in the application landscape and business processes might affect employees outside the information technology departments as well.

1.3 RESEARCH PROBLEM AND OBJECTIVES

Although there is a reasonable amount of literature available regarding IS/IT integration, there is almost no prescribing theory available for IS/IT integration [16]. Instead, previous studies have focused on exploring the phenomenon and analysing and describing historical IS/IT integrations in an M&A context. Toppenberg and Henningsson [16] found that none of the reviewed publications contained theory for design and action. A frequently mentioned reason for the lack of this type of theory - that says "how to do" something [17] - is that the actual integration strategy is highly contextual dependent [18-20].

Although we agree with the argument that a large part of the strategy depends on the context, we also believe that developing a strategy can be done following a systematic approach. Theories and findings from previous studies can be used to identify the important areas on which the approach should focus. Thus, the approach should be based on existing theory. Such an approach should of course leave room for contextual influences.

We believe that taking more systematic approach can contribute to more deliberate decision making regarding the IS/IT integration strategy. There are many examples from practice in which the intended strategy is replaced with a new strategy because issues occur on a more tactical level [19, 21]. We believe that following a systematic approach - that pays attention to different levels of the IS/IT integration - should lower the risk of facing tactical issues at a later stage in the process.

The research problem however stems from a practical problem, which is the intended IS/IT integration of Company X and Company Y. The case of Company X and Company Y will be used to test the designed approach. The application of the approach is however not only meant for validation, but will serve as a means to provide a solution for the intended IS/IT integration of Company X and Company Y.

Up to this point we have used the term approach for the artefact that will be designed during this research. The term approach however might sound like a strict roadmap, which is not idea behind the artefact. Therefore, we prefer the term framework instead of approach, which is by definition more loose. With loose we do not mean less systematic, but leaving room for contextual considerations. This way organizations can decide which parts or steps of the framework are relevant or not.

In summary, the objective is to develop a comprehensive framework that provides guidelines how organizations can analyse the current environment and design the IS/IT integration strategy. A second objective is to design a solution for the practical problem, which is the integration of the IS/IT of Company Y and Company X. This second objective allows us to demonstrate and test the designed framework.

1.4 RESEARCH QUESTIONS

Based on the research problem and objectives we are able to form the research questions for this research.

The central research question is:

1. *How can organizations deal in a more systematic manner with the issue of IS/IT integration in an M&A context?*

The sub questions are:

2. *What is the nature of IS/IT integration problems caused by M&As?*
3. *What approaches exist for integration of IS/IT in M&As?*
4. *What are the critical success factors for IS/IT integration in M&As?*

We can use the existing literature to derive a framework that can help in analysing and planning for IS/IT integration:

5. *How can we use existing knowledge from literature to form a framework that contributes to designing a suitable IS/IT integration strategy?*

1.5 RESEARCH METHODOLOGY

This research uses the business problem solving (BPS) methodology of van Aken, Berends, & van der Bij [22]. This methodology was developed for university business programmes and focuses on solving real-life business problems and therefore differs from other research methodologies. The purpose of a general research project is to "*solve a knowledge problem in the immaterial world of knowledge*" [22, p. 12]. In contrast, the BPS methodology is about solving an actual business performance problem in the material world. Performance improvement is central in BPS projects and knowledge is used to achieve this. Combining findings of several BPS projects can enable one to develop general knowledge. However, this is not the focus of the BPS methodology [22, p. 12].

The BPS methodology is design-focused and theory-based. It is design-focused because it focuses on the design of the solution for the business problem and the change processes needed to realize the solution [22, p. 4]. Furthermore, the methodology is theory-based, which means that state-of-the-art literature is used in problem-solving. Theory should be used in a comprehensive, critical and creative way [22, p. 5]. Comprehensive refers to a systematic review of literature. To achieve this we use the literature review methodology of Wolfswinkel, Furtmueller, & Wilderom [23], which was specifically developed to conduct such a systematic review. Furthermore, we try to be critical by looking at the source of and the context of the examined researches and whether this matches our business problem context. Finally, we try to be creative with literature by applying and contextualizing it to match the situation at Company X and Company Y.

The BPS methodology builds on the regulative cycle of Van Strien [24], which consists of five steps. These five steps are (1) problem definition, (2) analysis and diagnosis, (3) plan of action, (4) intervention, and (5) evaluation. A visual representation of the regulative cycle can be found in Figure 1. The steps of the regulative cycle and their use in a BPS project are shortly discussed below.

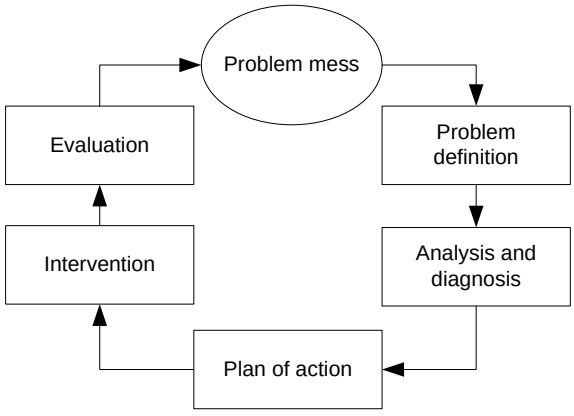

Figure 1: Van Striens regulative cycle [24]

The problem definition step is key in the BPS project. Often, the initial problem definition is somehow given by the organization. Important is to find out whether this is a real problem, or a so called "perception problem". Thus, step one is to come to a core problem, which may be the underlying problem of a perception problem. Furthermore, in a BPS project this step includes the creation of a project plan.

After the problem is defined the analysis and diagnosis step starts. The BPS methodology focuses on three approaches that together can (and should) be used to produce a diagnosis [22, p. 64]. These are empirical analysis, theoretical analysis, and process-oriented analysis. In general, in this step the business problem is validated and causes are explored and validated as well. Literature can be used to find support for causal relationships and analyse the situation using theoretical concepts.

Once the analysis and diagnosis step is completed, a solution for the business problem is designed in the plan of action step. Knowledge and solution concepts, which are derived from the systematic literature review, are used to design a solution. A plan of action is not only an object design but should be accompanied with a change plan that describes the process to realize the object design. The plan of action step is followed up by the intervention step, in which the actual change occurs in roles and work processes.

The last step is the evaluation step, in which learning to work with the new system and realizing the improvement in performance are central. The evaluation step however entails more than just the evaluation of the intervention. Besides evaluating the results of the BPS project, which focuses on determining whether the problem has indeed been solved, the evaluation step serves has three other purposes. The first is learning for the future, which is the process in which knowledge and capabilities are developed. The generated knowledge and capabilities can then be used for future projects. Furthermore, the evaluation step also serves as a means for scientific reflection. The last purpose of the evaluation step is the personal and professional development of professionals, which is achieved by reflecting on their own performance.

1.6 MOTIVATION FOR AND APPLICATION OF THE BPS METHODOLOGY

The BPS methodology was chosen because this research is driven by a real-world business problem. This is reflected by the second objective, which is about solving a real-world performance problem rather than a knowledge problem. In other words, the situation at Company X and Company Y asks for an actual solution rather than development of general knowledge. This perfectly aligns with the BPS methodology in which the focus remains on the actual performance improvement [22, p. 11] and thus is result-oriented. In other relevant (i.e. design science) research methodologies the main objective is generally not to solve a case specific real-world problem. Instead the focus is put on the development of an artefact, in our case the theory based framework. An example of such a methodology is that of Peffers et al. [25]. Such methodologies generally contain a demonstration step in which the artefact is applied to a practical scenario. The main objective of such a demonstration step is to verify the usefulness of the artefact, and not to solve the practical problem. In contrast, the BPS methodology considers intermediate developed artefacts as a means to come to a solution for the practical problem. The primary objective of a BPS project remains the design of solution for a specific business performance problem.

But our research has another objective, which is the development of theory based framework that should enhance the IS/IT integration strategy making process. The BPS methodology more or less considers a scientific contribution as a bonus [22, pp. 12, 124], we however aim for a scientific contribution in the form of a general framework for IS/IT integration. Van Aken et al. [22, p. 12] argue that general knowledge can be developed by combining findings of several BPS projects. There are however several scientists who argue that it is also possible to develop general knowledge from a single-case study. Flyvbjerg [26] for example says the following about the ability to generalize from single-case studies:

> *"One can often generalize on the basis of a single case, and the case study may be central to scientific development via generalization as supplement or alternative to other methods. But formal generalization is overvalued as a source of scientific development, whereas 'the force of example' is underestimated. … A purely descriptive, phenomenological case study without any attempt to generalize can certainly be of value in this process [the process of knowledge accumulation in a given field or society] and has often helped cut a path toward scientific innovation".*

In short, Flyvbjerg argues that it *is* often possible to generalize from single case studies and underpins this with examples. Furthermore, he argues that knowledge that cannot be formally generalized can be as valuable as formally generalized knowledge.

One way of generalizing from a case study is generalizing by similarity as proposed by Ghaisas et al. [27]. This similarity-based generalization of Ghaisas et al. is about identifying the architecture of the case and the mechanisms introduced by this architecture. The generalization is done by assessing whether a target case has the same mechanisms and a similar architecture to justify or block a generalization. This similarity-based generalization will be used in the evaluation step to make hypotheses about the generalizability of the applicability of the developed framework.

Although the BPS methodology generally does not focus on developing general knowledge, it leaves enough room for it. Therefore, we will start with an extensive literature review which allows us to develop a theory based framework. The framework should give us a good foundation in the process of designing a solution for the Company X-Company Y case, but we expect that this framework is also useful for other researchers and/or practitioners in the domain.

It might turn out during the BPS project that the developed framework does not satisfy all needs. In that case we will adapt the framework according to the needs. The evaluation step at the end of the BPS project then allows us to reflect on the framework and assess the usefulness and applicability of the framework by similarity-based generalization.

A note should be made regarding the intervention step. This step of the BPS methodology is not part of this research, because there is a limited time frame for this project. Thus, this research will follow the full regulative cycle. Omitting the intervention also implies that we will be unable to perform the full evaluation step. However, as we will see later, the evaluation step does not solely focus on the intervention itself but at the project as a whole. The evaluation will be done by focussing on the aspects that we are able to evaluate.

To summarize, this project is initiated by a real-world business problem that asks for a solution. The BPS methodology was chosen because this methodology keeps the focus on the actual performance improvement. To make our research more valuable for others, we will also develop a framework that should contribute in making well-informed decisions regarding the IS/IT integration strategy.

1.7 THESIS STRUCTURE

The structure of this thesis follows the steps of the BPS methodology and thus the steps of the regulative cycle. The first two chapters describe the problem definition step. This chapter introduced the project background, the research topic, the research objectives and corresponding research questions as well as the research methodology. In chapter 2 we elaborate on the actual business problem, define the assignments and give the project approach. Chapter 3 till 5 describe how the analysis and diagnosis step was conducted during this BPS project. We start with discussing the relevant literature in chapter 3. In chapter 4 we derive the framework from the discussed literature. We move back to Company X-Company Y case in chapter 5 to perform the empirical analysis. The plan of action step is described in chapter 6 and discusses both the development as well as the actual solution design and change plan design. In chapter 7, which discusses the evaluation step of the BPS project, we reflect on this research.

Figure 2 shows the thesis structure in relation to the adopted research methodology by linking steps of the BPS methodology and the regulative cycle to the thesis chapters. The figure shows that the intervention step is not part of this research. It might seem odd that while we do not perform the intervention step, we do include the evaluation step. But as already discussed in section 1.5, the evaluation step entails more than just an evaluation of the intervention. We use this evaluation step to look back on the specific case, but also to reflect on the developed framework. We drew a dotted line between the evaluation chapter of this thesis and the evaluation step of the regulative cycle to emphasize that our evaluation step does not fully correspond with the evaluation step of the regulative cycle.

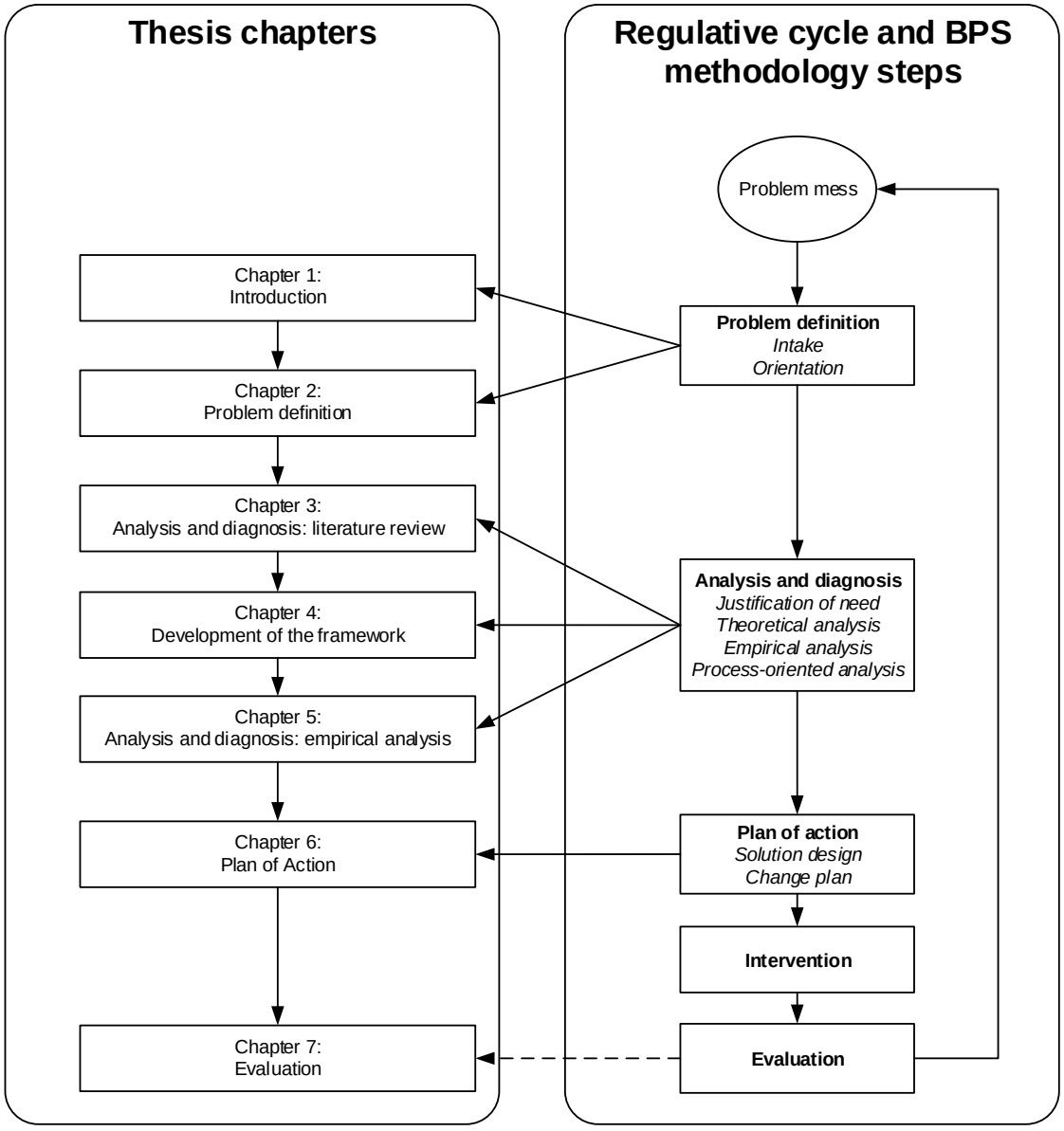

Figure 2: Thesis chapters related to BPS methodology steps

2. PROBLEM DEFINITION

According to Van Aken et al. [22], a BPS project starts with an intake and orientation process, which together form the problem definition step of the regulative cycle. The intake process is used to develop a written initial assignment. The intake process is succeeded by an orientation phase in which the technical content of the assignment is described in more detail. The orientation phase should result in a project proposal that typically contains six elements [22, p. 41]. These six elements are (1) the problem context, (2) the problem statement, (3) the assignment, (4) the project approach, (5) the costs of the project, and (6) organization of the project. The problem context and the organization of the project (see the general information section) are already discussed. Furthermore, the costs of the project are excluded from this thesis, because we believe these are not relevant for the reader of this thesis. The remaining elements will be discussed in the following sections.

2.1 INTAKE

This BPS project started with an intake meeting with the IS/IT manager of Company X. During this meeting several possible assignments were discussed. One of these assignments was to explore the options and benefits of implementing Company X's ERP system "LOOP" at Company Y. This ERP system is custom-built and is tailored to the processes of Company X. Since Company X and Company Y have been operating isolated from each other for a long time, it is unlikely that LOOP fits the situation at Company Y without any changes being made to the software or workflows.

Although this was not an actual business problem, it was a good starting point for further questioning and forming an initial problem mess. It turned out that the implementation of LOOP at Company Y was seen as the solution to achieve IS/IT integration between the two companies. One of the reasons for starting with the IS/IT integration is the retirement of the current IS/IT manager at Company Y. The situation in which two completely distinct IS/ITs should be managed is considered to be an unsatisfactory state of affairs and is expected to lead to performance problems. Rather, Company Y and Company X want to examine whether it is possible to standardize the application landscape and perform activities in a more centralized matter. Standardization and centralization should make it possible to deploy the IS/IT resources more efficiently, ease information sharing and make the IS/IT landscape maintainable.

Thus, instead of solely examining the possibility of implementing LOOP at Company Y, the focus was changed to examine how IS/IT integration could be achieved between Company X and Company Y. This initial assignment was discussed with the university supervisors and agreed upon.

2.2 ORIENTATION

After having formed the initial assignment, the orientation phase started in which we further elaborated on the problem. Several (informal) interviews were held with different stakeholders to discuss the business problem and find out whether other or root causes existed.

During this interviews we found out that a first step was already taken in the IS/IT integration. Company X and Company Y were arranging a point-to-point glass fibre connection to create a high speed link between the two firm sites. This was of course only possible due the close geographic proximity. Furthermore, small steps were made to make the technical platforms more compatible. Company X is an avid user of virtualization and now Company Y made their first steps in creating a more virtualized environment. This compatibility should ease further integration.

Furthermore, the orientation phase was used to get a first understanding of the primary process of Company X and the role of IS/IT within this process. This allowed us to identify important stakeholders within the organization and think about how the empirical analysis could be carried out.

In the orientation phase we also made the first step for the literature review. Initial examination of the literature allowed us to put the situation of Company X and Company Y into perspective and name and frame the problem.

2.3 PROBLEM STATEMENT

According to Van Aken et al. [22, p. 48], cause and effect diagrams are useful for representing the problem mess. Out of this problem mess one or more problems can be chosen for the BPS project.

Figure 3 shows the cause and effect diagram for the situation at Company X and Company Y. Most important is the autonomy of both the companies, which results in no or little overall integration. This is also reflected in the IS/IT departments. The departments operate in a more or less isolated fashion, which withholds the companies to achieve possible IS/IT related synergies and thus disables efficiently deploying the IS/IT resources. Furthermore, there is limited communication, which makes it hard to identify possible ways for integration.

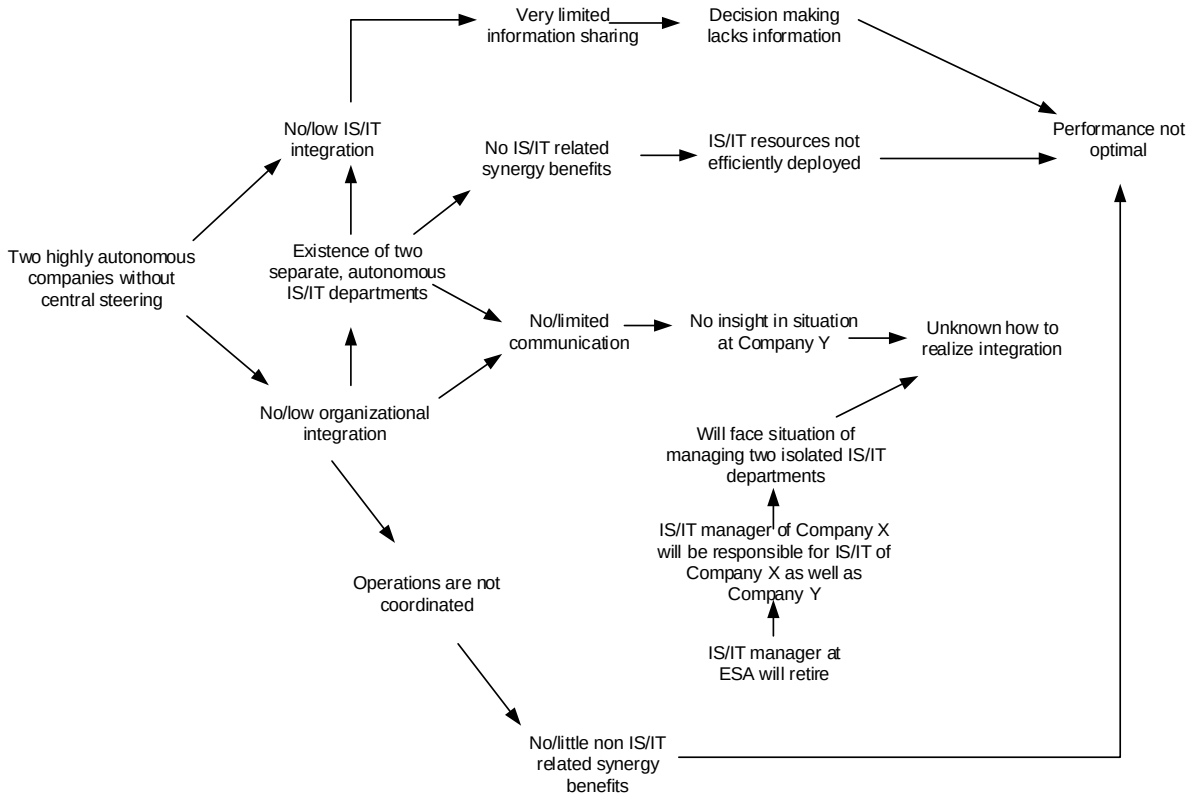

Figure 3: Cause and effect diagram of situation at Company X and Company Y

There are several reasons for the performance not being optimal. Information sharing is limited due the lack of IS/IT integration between the companies, which makes it harder to make well informed decisions. Another reason was the already mentioned inefficient deployment of IS/IT resources. Finally, there is only very limited organizational integration, which withholds the companies to achieve the non-IS/IT related synergies. Even though that these factors were collected by focussing on our case, the causes and effects in the model are quite generic and may apply to other organizations as well.

This BPS project concentrates on the existence of two separate, autonomous IS/IT departments having their own IS/IT landscapes and the lack of IS/IT integration. Thus, the focus of this BPS project is not on achieving company wide organizational integration. Rather it focuses on exploring the options to integrate the two IS/IT departments, IS/IT related activities and IS/IT itself.

2.4 ASSIGNMENT

Based on the problem statement we are able to form an assignment. The overall assignment is to find a solution to integrate the two IS/IT departments. This assignment can be split up in several sub-assignments:

- Analysis and diagnosis and justification of the incentive for the IS/IT integration
- Analysis and diagnosis of the two IS/IT organizations, the current (IS/IT related) operations and IS/IT landscapes at Company X and Company Y to identify bottlenecks
- Exploration of potential solutions to achieve integration
- Elaboration of a particular solution into a solution design and a corresponding change plan

The outputs of these sub-assignments form the deliverables of this BPS project. Van Aken et al. [22, p.50] argue that not only the solution itself, but all deliverables are of value for the client. The analysis and diagnosis and exploration of alternative solutions for example, can be of value in future decision making.

For the analysis and diagnosis, and exploration of potential solutions state-of-art literature will be used. Existing literature will be summarized into a framework which can be used to analyse the current situation and plan for IS/IT integration. This framework is thus another deliverable of this BPS project.

2.5 PROJECT APPROACH

2.5.1 CONCEPTUAL PROJECT DESIGN

Figure 4 shows the conceptual design of the research and design approach. This conceptual model is based on the general structure of Van Aken et al. [22, p. 52]. The conceptual design contains the subject of analysis, the theoretical perspectives that are applied in the analysis, a confrontation between theoretical perspectives and the subject of analysis, and the deliverables of the project.

The subjects of analysis are the two companies Company X and Company Y. First, we want to identify the reasons for the M&A and the agreed IS/IT integration in order to understand the degree of integration. Furthermore, the operations and IS/IT of both companies will be analysed in order to identify where integration is possible and where bottlenecks are present.

The theoretical perspectives can be used to study the subject of analysis. In this case these theoretical perspectives cover IS/IT integration in M&As. This is a rather broad subject that entails many different aspects as we will see in the next chapter.

The theoretical findings and the subject of analysis are confronted to deliver analysis results and conclusions. Theory and practice can be compared, but it is also possible to interpret the practical situation using available theory.

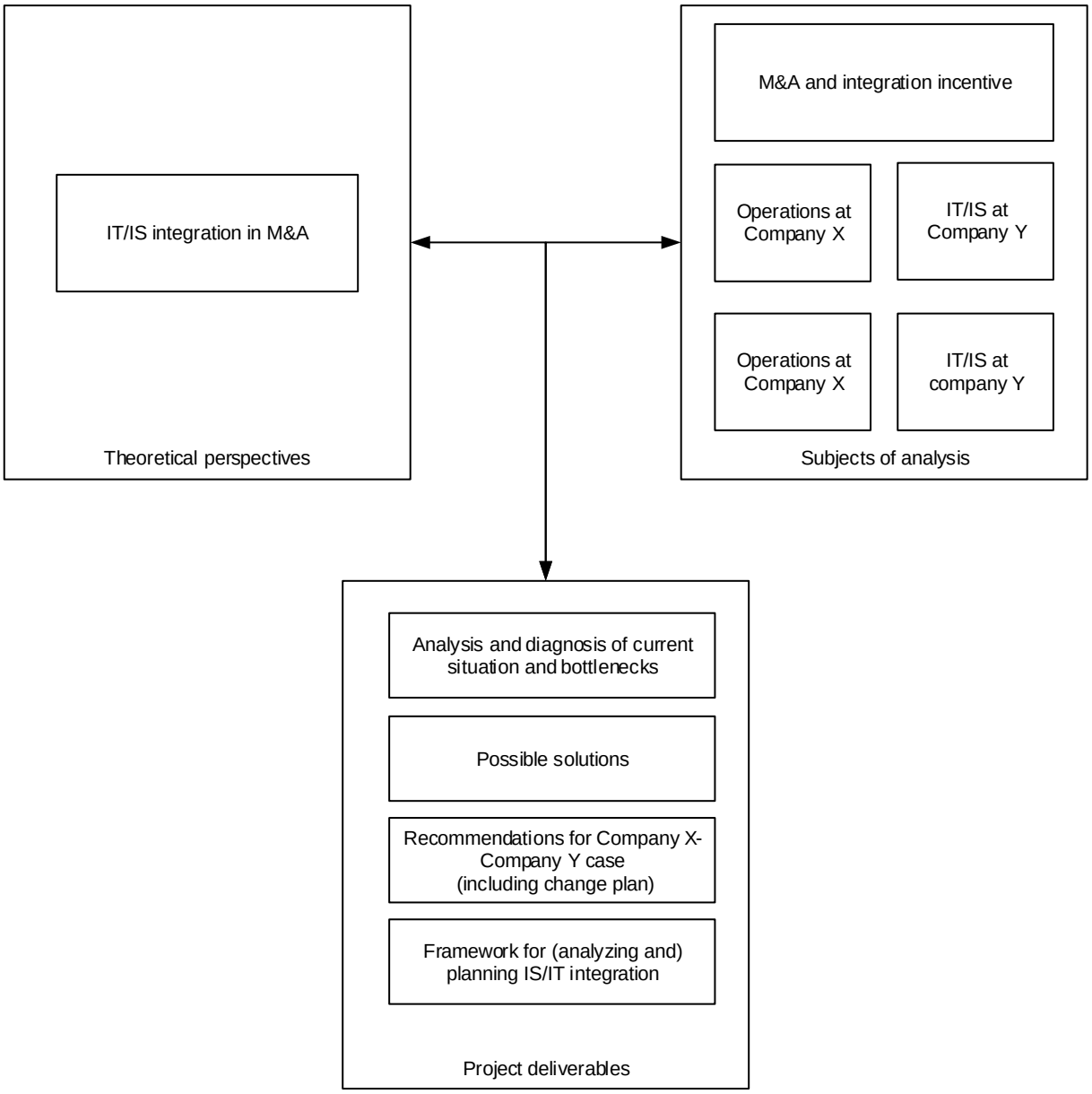

Figure 4: Conceptual project design (based on Van Aken et al. [22])

2.5.2 PROJECT OUTLINE

The following list is a rough outline of the activities that will be undertaken during the research:

1. Perform a systematic review of state-of-art literature on IS/IT integration in M&As to answer the research questions
2. Develop a framework that is built on existing literature that can be used to analyse the current situation and plan the IS/IT integration in M&As
3. Empirical, theory-based analysis of the Company X-Company Y case using the framework
4. Explore possible solutions for the IS/IT integration of Company X and Company Y
5. Elaborate on one possible solution in a solution design and a corresponding change plan
6. Collect feedback on proposed solution and change plan
7. Improve and deliver final solution and change plan
8. Evaluate and reflect on the project, framework and overall research

2.5.3 DATA COLLECTING

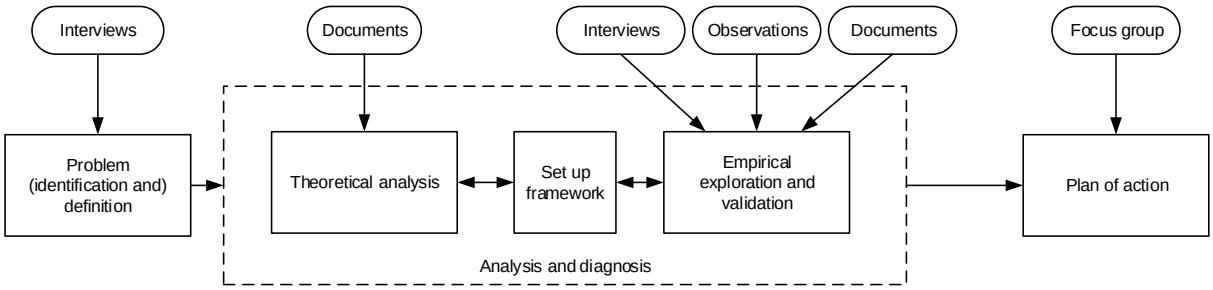

Figure 5: Conceptual overview of methods and techniques for collecting data

Figure 5 shows the conceptual design of the methods and techniques that will be used for collecting, analysing, and processing the data. This overview quite general, because at this stage it is not clear which stakeholders should be interviewed or what exactly should be observed. During later stages of the project, more detailed plans for the interviews, observations and focus groups will be set up.

The problem identification will be based on interviews with stakeholders. In the theoretical analysis existing papers and articles will be used to form a good theoretical background and a framework for analysis and planning. In the empirical phase the studied literature will be used, as well as organizational documents (e.g. organization charts and global process models), interviews and observations to analyse the situation at the two companies. This information is used to form a solution and change plan. The solution and change plan will be validated using a focus group. To summarize, we plan on using multiple data collecting methods (data method triangulation) for retrieving our data.

3. ANALYSIS AND DIAGNOSIS: LITERATURE REVIEW

This chapter serves a preparation for the actual analysis which will be described in the next chapter. The goal of this chapter is to explore the research domain to find out what is already known about the research topic. Van Aken et al. describe four different ways in which theory can be used [22, p. 70], namely literature as support, conceptualization, suggesting causes and theory as a guiding framework. In the first way, literature as support, existing literature is used as evidence for casual relationships. Conceptualization is about using concepts from theoretical literature to interpret empirical phenomena. These concepts provide a way to abstract from the practical problem, which is useful for building on existing literature. Another way of using the existing literature is to identify alternative causes which are suggested by literature. Finally, existing theory can be used as a guiding framework which can have several forms.

Using the chosen methodology we aim at giving a comprehensive review of existing literature. The chosen methodology, which builds upon Grounded Theory, is focused on identifying concepts in literature. Based on the extensive review of literature and the identification of the different concepts we will design a theoretical framework that has the form of a solution creating process. Thus, we mainly focus on conceptualization and creating a framework. However, while discussing the existing literature we see evidence for identified causes such as the lack of possible synergies.

The chapter starts with discussing the methodology that was used to perform the literature review. Next, the existing literature will be discussed in detail. Finally the framework will be derived and discussed.

3.1 DATA COLLECTION METHODOLOGY

3.1.1 DEFINE

For the literature review we used the methodology of Wolfswinkel, Furtmueller, & Wilderom [23], which allows conducting a rigorous literature review using Grounded Theory. The five stages of the method are: (1) define, (2) search, (3) select, (4) analyse, and (5) present. The following sections discuss how the different stages were completed for this thesis.

The business problem shows that the focus is not on a single company; rather it is focused on combining (elements of) companies. In other words, the situation can be seen as a merger or acquisition. Furthermore, the problem is about IS/IT integration. Thus, we're looking for literature on IS/IT integration within M&As.

The search for literature will be mainly focused on scientific publications such journal articles and conference papers. Furthermore, books, PhD theses, and master's theses will be taken into consideration. We do not put constraints on the time frame of publication, since were not *specifically* interested in the latest developments, but are looking for all relevant literature regarding the topic.

For the actual search we will make use of two databases, namely Scopus and Web of Science. The content of the database of Scopus includes (peer-reviewed) journal articles, conference papers and

books[1]. Web of Science indexes books, journals and proceedings[2]. Both index patents, but these are not considered in this thesis.

After some initial searches to identify key words and synonyms, the following search statement was formed:

("information systems" OR "IS" OR "information technology" OR "IT" OR "IS/IT") AND
("integrate" OR "integration" OR "integrating") AND
("merger" OR "mergers" OR "acquisition" OR "acquisitions" OR "M&As" OR "M&A")

3.1.2 SEARCH

Both the databases Scopus and Web of Science allow searching through different combinations of fields such as the article title, abstract and keywords. Initially we searched for the search terms in the combination of the article title, abstract and keywords. However, this led to more than 14,000 results in Scopus only and included (based on the article title) many irrelevant results. Therefore, we restricted the search by looking for the search terms in the article title only. It would have been also possible to restrict the number subject areas to be searched and consider the abstract and keywords as well. However, we think that restricting the search by focusing on the title gives us the most specific articles. Furthermore, when having this small set of articles with a very narrow focus, we can use the "snowball-method" to broaden our scope. The snowball-method refers to examining the references of the papers of the sample to identify more relevant literature [22].

Using the search statement of the previous section and limiting the fields being searched to the article title yielded 45 results in Scopus and 22 results in Web of Science.

3.1.3 DEFINE

The next step was to filter out doubles. It turned out that Scopus and Web of Science had nineteen publications in common. Thus, Scopus and Web of science yielded twenty-six and three unique results, respectively. Altogether, the search led to forty-eight unique publications. Figure 6 is a Venn diagram that shows the overlap and the number of unique results of the databases.

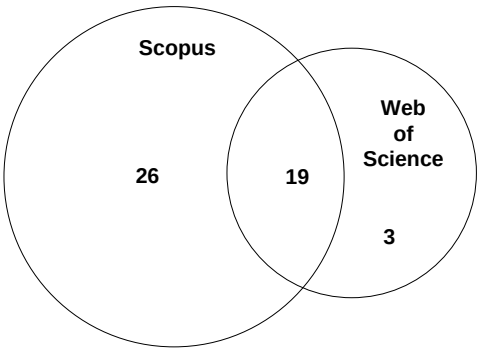

Figure 6: Venn diagram of search results

[1] http://www.elsevier.com/online-tools/scopus/content-overview

[2] http://thomsonreuters.com/thomson-reuters-web-of-science/

After filtering out duplicates, it turned out that there were several publications that we could not retrieve due restricted access or unavailability. The papers that we were able to retrieve were judged on relevance by reading the titles and abstract, and sometimes parts of the full text as well.

Furthermore, it turned out that some articles were republished using a different title. We compared these publications and when we could only identify minor differences, one of these publications was removed from the sample. Otherwise, both papers were included.

The selection process resulted in a sample of thirty papers that were considered for analysis. An overview of the results of the search together with the reasons for exclusion can be found in Appendix A.

3.1.4 ANALYZE

The analysis phase started with reading the papers and highlighting interesting parts of the text, thus creating excerpts. After reading a small set of papers, we were able to identify recurring topics (open coding) such as "IS/IT integration methods". We created a spreadsheet with the list of papers and identified concepts. Note that we did not specify a list of concepts beforehand. Rather, this list of concepts expanded over time because new concepts were identified after reading more papers. We did not explicitly defined properties for the concepts, but rather decided whether a new excerpt fitted an existing concept or not.

During this analysing phase we also performed the snowball method. That is, while reading the texts we looked for interesting references, which then were scanned and possibly added to our sample. Furthermore, we tried to focus on the contributions of the papers to identify new concepts.

The next step in the Grounded Theory method is axial coding, which is about identifying relationships between concepts and sub concepts. This is the first step in structuring the concepts and this was done by grouping related concepts in a 'super' concept. Finally, the main concepts and relationships between these main concepts were identified (selective coding). It is clear that the overall main concept is IS/IT integration in M&As. This main concept is formed by concepts from the M&A domain as well as IS/IT integration concepts. In the next sections we will present the concepts.

3.2 IS VERSUS IT

When examining existing literature about IS/IT integration we noticed that the different terms IS and IT were used in different papers, but in general were meant to refer to the combination of IS/IT. In other words, much of the literature does not make a strict distinction between IS and IT. Although there is a general acceptance that difference exists between IS and IT, the two terms are often loosely and interchangeably used, even by computing practitioners [1]. Henningsson [2] classifies the relation between IS and IT as "intriguing and fuzzy" and shows that there is a lot of discussion about the terms. Iyamu and Kekwaletswe [1] use the concept of computing environment, which they define as "*a structured environment that encompasses software, hardware, provides computer services, support and maintenance*", to illustrate the interrelationship between IS and IT. Figure 7 shows an overview of the computing environment.

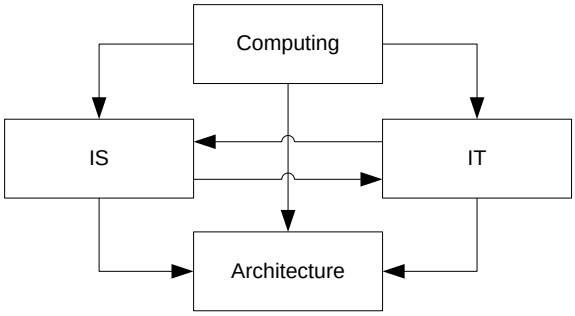

Figure 7: Illustration of the computing environment [1]

The computing environment consists of three elements: IS, IT and architecture [1]. The IS component consists of the systems that are directly used by the end user and through which the business carries out its processes and logic. The IT component consists of hardware (sometimes referred to as technology infrastructure) such as servers and disk, and the system software such as operating systems and utility software which are the tools that enable the IS software. Only the combination of IS and IT can help organizations achieve the goals and objectives. The architecture component is "*the strategic design and implementation of systems, technologies including processes and governance*" [1].

Based on their study, Iyamu and Kekwaletswe identified seven main areas of practice within the computing environment and related these areas to IS and IT [1]. An overview of these areas of practice can be found in Figure 8.

In the context of M&As, the scope is not limited to one of the components, but the computing environment as a whole. We prefer the term IS/IT instead of computing environment, because these terms are more common in other literature. With the term IS/IT in this thesis we implicitly mean architecture as well. In fact, architecture can be used to compare the different IS/IT between the two companies.

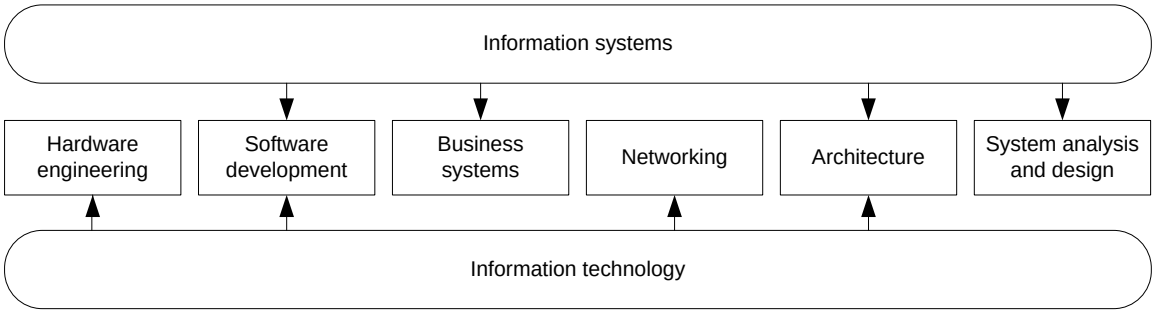

Figure 8: Seven areas of practice within the computing environment [1]

3.3 MERGERS & ACQUISITIONS

3.3.1 MERGERS VS ACQUISITIONS

Just as there is confusion about the terms IS and IT, there is confusion about the terms merger and acquisition. Although many authors agree on the fact that there is a difference between a merger and an acquisition, the two concepts are used interchangeably and often studied as one phenomenon using the term M&As [2].

A review of existing literature reveals different classifications of the terms. Giacomazzi et al. [5] define an acquisition as the exchange of *some* assets of the target company, whereas a merger is seen as combining *all* the components of the two companies for the operation of one company. According to Giacomazzi et al., a merger can be achieved in two ways. The first is incorporation, which implies a power difference and results in the absorption of the target company. A merger of equals results in a totally new company, which is built from two companies. Henningsson [2] uses the distinction of organizational processes. A merger is then a combination of equally powered companies, whereas an acquisition involves a power difference.

Different authors have argued that the distinction is not always easy to make and is mainly a legal issue [2]. When the focus is on integration of IS/IT and not on the legal or property aspects, the legal or property aspects are not of importance [5]. An acquisition of an empty industrial building for example does not fulfil the condition that different IS/IT need to be integrated and thus is out of scope of this thesis.

In this thesis the term M&As is used to refer to both mergers and acquisitions. Thus, we follow the reasoning that the legal or property aspects are out of scope and agree with other authors to study the activities as one phenomenon.

3.3.2 REASONS FOR M&AS

In M&As the core task is to create value that becomes possible when the two organizations are combined [28]. This opportunity thus not exists if the firms remain separate. Many authors use the concept of "synergy" to explain the reasons for engaging in M&As. In the context of M&As, achieving synergy means that two operating units can be run more efficiently and/or more effectively together than apart [10].

Lubatkin [10] distinguishes three groups of synergies. These are technical economies, pecuniary economies and diversification economies. Technical economies refer to the situation in which a company can create more output without changing the input, or create the same output while lowering the input. Thus, technical economies are scale economies. Pecuniary economies occur when a company can dictate prices because of its market power. Diversification economies are risk reducing economies. An overview all the different synergies can be found in Table 1, which is adapted from Henningsson [2].

Table 1: M&A synergies (adapted from [2])

Synergy group	Synergy	Description
Technical economies	Marketing	Scale economies in marketing and branding
	Production	More efficient production of larger quantities
	Scheduling	Occur in vertical mergers when two levels of production are joined
	Experience	Reduction in cost that come with accumulated experience with a common technology
	Banking	Reduction in outstanding cash balances as consolidation reduces banking relationships
	Compensation	Consolidation can lead to savings per employee for offerings such as health and life insurance
Pecuniary economies	Monopoly	Ability to force buyers to accept higher prices
	Monopsony	Ability to force suppliers to accept lower prices
Diversification economies	Portfolio management	Consistency of assets which markets' development are negatively correlated with each other
	Risk reduction	Lower transaction costs to stakeholders

3.3.3 M&A TYPES

There are various frameworks that distinguish different types of M&As. Angwin [29] performed an extensive review of prominent typologies that exist in literature. He distinguishes pre-acquisition strategy typologies, a negotiation strategy, post-acquisition integration typologies, and an overarching integrative framework. Many of these typologies use different dimensions such as strategic fit, speed of integration or cultural integration. We will not discuss all the different typologies here, but only the most common ones.

As mentioned earlier, M&As can involve unequally powered companies or equally powered parties. The level of power difference is likely to affect decision making in M&As [30]. Next to the degree of difference in power, M&As can differ in the level of friendliness [2]. M&As can range from being very friendly (by rescuing a company) to a raid, which is very hostile. Friendly M&As are in general well perceived by the target, whereas a raid often leads to employee resistance which makes integration more challenging [2].

A pre-M&A strategy typology that focuses on strategic fit is the framework of Larsson [31], which is based on the FTC classification. The FTC classification is based on two dimensions: the market relation of two involved companies and the product relation. Figure 9 shows Larsson's framework. An M&A of competitors, i.e. two companies that are active in the same market and produce the same product, is called a horizontal merger. Market extension involves companies that produce the same product but are active in different (geographical) markets. Vertical integration refers to a combination of a buyer and supplier. Vertical backward is the situation in "buying" a supplier, whereas vertical forward is "buying" a customer [29]. Product extension refers to a combination of companies that are active the same market but in a different value chain [2]. Conglomerate M&As involve companies that are not related at all: they are active in different markets and focus on different products.

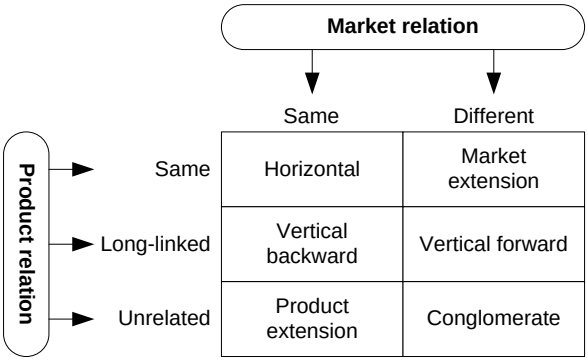

Figure 9: FTC classification framework [31]

Another commonly used and mentioned framework to categorize M&As is the framework by Haspeslagh and Jemison [28] which can be found in Figure 10. This framework is a post-M&A typology [29] that includes strategic and organizational fit and is based on the idea that the companies are looking for a way to create value that is only possible after combining the companies.

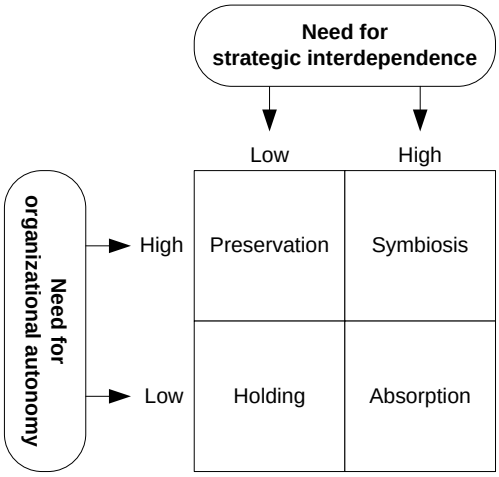

Figure 10: The four integration approaches of Haspeslagh and Jemison [28]

The dimensions of the framework are the need for strategic interdependence and the need for organizational autonomy. Strategic interdependence refers to the nature of interdependence, which is a requirement for capability transfers. Organizational autonomy refers to need for organization boundaries. The need for organizational autonomy should not be determined by the wishes of the companies but should be based on whether the organizational boundaries are crucial for retaining strategic capabilities. Based on these two dimensions, four different integration approaches are distinguished. These are preservation, symbiosis, absorption and holding.

Preservation refers to the situation in which there is a high need for organizational autonomy, because removing the organizational boundaries is expected to negatively influence the strategic capabilities of the company. Since the strategic capabilities are the reason for the M&A, in those situations organizational autonomy should be maintained. The preservation approach corresponds with a low need for strategic interdependence, which means that it's not likely that resources will be shared or functional skills will be transferred. Rather, capability transfer is likely to be limited to general management capability transfer.

Symbiosis is the most complex approach and involves a high need for organizational autonomy and a high need for strategic interdependence. According to Haspeslagh and Jemison, the organizations first coexist and the gradually become interdependent. The problem is that the need for strategic

capability transfer often conflicts with the need for organizational autonomy. On one hand the boundaries between the companies should remain intact, while on the other hand there is a wish for strategic capability transfer, which implies crossing the boundaries.

Absorption implies full consolidation of the two companies. In this situation, a high degree of strategic interdependence is required to create value. Furthermore, organizational autonomy is not required and thus the objective is to remove boundaries.

The holding approach is actually not considered an integration approach. In this situation, there is no intention to integrate the companies. Value is only created by financial transfers, risk sharing or general management capability [28].

The different typologies show that it is possible to look at M&As from different perspectives. On one hand, the frameworks allow researchers to generalize the problem by grouping and focusing on certain characteristics. On the other hand, the frameworks allow researchers to see M&As not as one generic phenomenon, but as different specific versions of the phenomenon. The frameworks are not comprehensive, but rather complement each other by looking at other characteristics of the phenomenon.

3.3.4 M&AS PHASES/LIFECYCLE

M&As can be seen as a process that consists of several phases. At the highest level three different phases can be distinguished [19]. These phases are pre-merger, merger and post merger. The pre-merger phase includes the search for a partner, strategic planning, due diligence, negotiations and making announcements to media and analysts. The merger phase, which is relatively short, occurs after the shareholders approve the plans and ends when the deal is actually closed. The post-merger phase starts after the deal is closed and focuses on achieving the integration.

Besides the three phased model, the research domain of M&As also contains more detailed models of the M&A process. These models split up the three phases in more specific phases (see Henningsson [2] for a comparison of some of theses models). The scope of this thesis and the business problem is mostly on the post-merger phase; however we will sometimes refer to the other phases of the M&A process.

3.3.5 INTEGRATION ON DIFFERENT LEVELS

Integration can take place on different levels within the organizations. From an IS/IT perspective, there are four general levels of integration in M&As [2]:

- Strategic
- Organizational
    - Operational (primary process chain)
    - Functional (administrative or support activities)
- Information system
- IT system

Integration at the strategic level is about aligning the high level strategies of the companies. Organizational integration is about forming a whole from different parts of the companies such as organizational units, business processes and people. Organizational integration can focus on operational integration, functional integration, or both. Operational integration concentrates on integrating the different stages of the primary process chain. Functional integration concentrates on integrating the administrative or support activities. At the level of Information systems the integration can refer to linking the IS to each other. However, IS integration can also have a much broader

scope: it can help to standardize and couple business processes [2]. The IT system level is the underlying level of the IS level and integration on this level ignores application and business logic.

3.4 IS/IT INTEGRATION IN M&AS

3.4.1 IS/IT IN THE DOMAIN OF M&AS

For a long time the focus in M&As was on strategic and organizational factors. However, the growing importance of IS/IT led to the idea that IS/IT should also be considered when evaluating candidates for an M&A. Buck-Lew, Wardle, & Pliskin [32] introduced the concept of IS/IT fit in the domain of M&As, arguing that IS/IT is "*so interrelated with many key aspects of the business*" that attention should be paid to it beforehand. The concept of IS/IT fit helps companies to identify the contribution that both companies can bring to the combined company. Besides, assessing the IS/IT fit should play a role when negotiating about the price and in integrating the companies. For example, incompatible IS/IT environments may lead to expensive integration effort. Buck-Lew et al. do not argue that IS/IT fit is crucial for success in every situation. Rather, the importance of a good fit depends on the desired level of integration.

3.4.2 VALUE OF IS/IT INTEGRATION IN M&AS

Many of the authors that do research on IS/IT integration in M&As stress its importance (for example [4] and [21]). The findings of an empirical study by Weber and Pliskin [33] indeed show that there is a positive relationship between IS/IT integration and overall M&A effectiveness. However, this positive relationship was only seen in cases when controlling for IS/IT intensity and organizational culture differences between the firms. This shows that IS/IT integration should not be seen as a purely technological issue. Rather, IS/IT integration success depends on many different factors as we will see in the following sections.

There are several benefits of IS/IT integration. Tanriverdi and Uysal [3] for example mention that companies with a superior capability in integration IS/IT can expect four main benefits. These benefits are (1) IS/IT cost savings, (2) minimized disruption to business operations, (3) enabled realization of business synergies, and (4) contribution to regulatory compliance and reducing the costs of achieving it. Robbins and Stylianou [34] list thirteen possible IS capability improvements. These include enhancing the organization's competitive position, better information accessibility and quality and being more efficiently in developing and operating systems. Thus, literature shows that there are several benefits of IS/IT integration in M&As.

3.4.3 ROLE OF IS/IT

Organizations can have different views on the role of IS/IT within their organization. This does not only apply to M&A situations, rather it plays a role companies in general. In their famous paper about Business-IT alignment, Henderson and Venkatraman [35] identify four domains that play a role in alignment. These four domains are (1) business strategy, (2) IT strategy, (3) organizational infrastructure & processes, and (4) IS infrastructure and processes. The former two are external domains, whereas the latter two are internal focused.

There are four dominant alignment perspectives through which alignment can be achieved, each having a different order of crossing the different domains. Figure 11 shows the four alignment domains and perspectives. Strategy execution and technology transformation are the two perspectives in which business strategy is the key driver and thus forms the starting point. The other two perspectives, competitive potential and service level, have IT strategy as IS/IT as starting point.

The different perspectives show that the role of IS/IT can vary from being a subordinate of the business strategy to the other extreme being driving for the company.

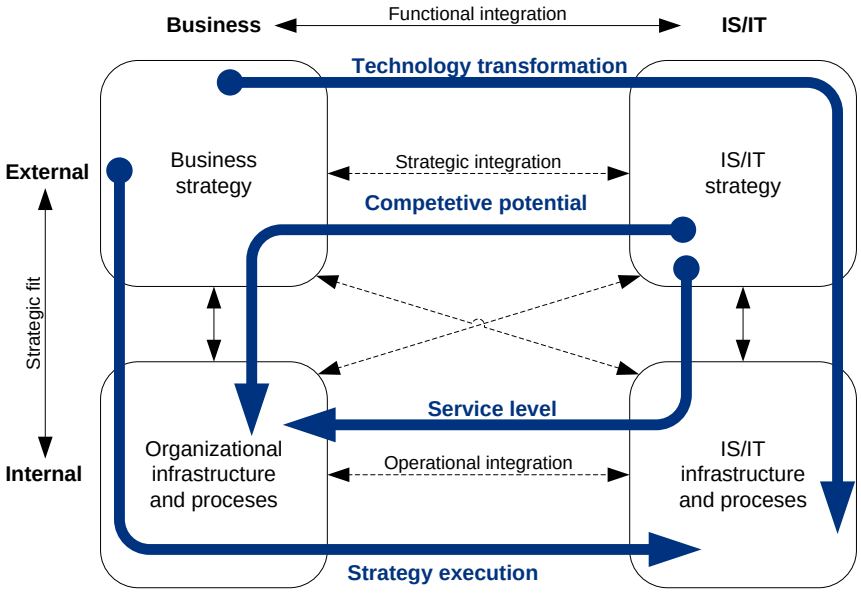

Figure 11: Strategic Alignment Model with alignment perspectives [35]

McKiernan and Merali [6] argue that, in the context of M&As, the role of IS/IT can be proactive or reactive. IS/IT can have a proactive role by when it is used an opportunity for creating competitive advantage or as driver for organizational change. A reactive role means that IS/IT is expected to change to "*accommodate other operational considerations*". Neglecting IS/IT at the strategic level withholds companies in creating a competitive advantage based on IS/IT.

The position that IS/IT has within a company will determine the role of IS/IT in an M&A [19]. If the role of IS/IT within a company is more or less supporting and is not considered at the strategic level, then it is unlikely that IS/IT will be involved in early phases of an M&A. On the other hand, when IS/IT is has an important position within a company, IS/IT is very likely to be considered in early phases of the M&A.

Although many authors stress the importance of early involvement of IS/IT, there few companies that actually consider IS/IT in early stages of the M&A such as ex-ante due diligence [6]. An important reason for this is the secrecy characteristic of early phases of M&As [19, 32, 34]. Involving more people such as CIOs will increase the chance of leaks.

3.4.4 DECISION MAKING AND PLANNING

As the above section shows, the role that IS/IT has within an organization is likely to influence the decision making. The role of IS/IT however, is not the only factor that influences decision making of IS/IT integration. Mehta and Hirschheim [36] looked at the decision making process of IS/IT integration in M&As. They propose three different lenses that can be used to interpret the decision making. These lenses are (1) the Wall Street effect, which focuses on meeting the external expectations, (2) the organizational power differences, and (3) the Business-IT strategic alignment. The Wall Street effect and the power differences will have a high influence in early phases of the merger, whereas Business-IT strategic alignment is more influencing in later stages of the process. Besides the identification of the lenses, Mehta and Hirschheim provided a framework to analyse and understand why and when IS/IT integration decisions are made.

An important aspect of IS/IT integration is planning. Alaranta and Henningsson [37, 38] adapted six dimensions of strategic IS planning in the post-merger IS/IT context to relate them to planning effectiveness. The six dimensions of strategic IS planning are comprehensiveness, formalization, creativity focus, flow, participation and consistency. Planning effectiveness is summarized into alignment, analysis, cooperation and improvement. Figure 12 contains a conceptual overview of the relationship between strategic IS/IT planning and planning effectiveness.

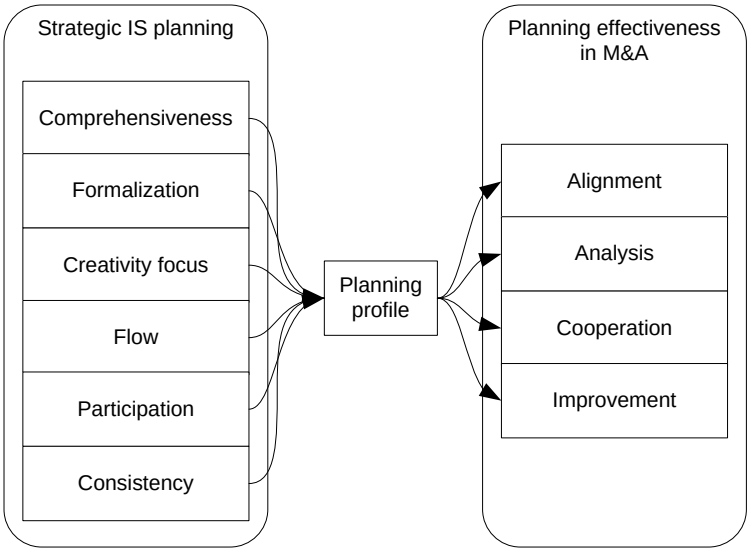

Figure 12: Effective IS/IT integration planning [38]

Comprehensiveness can be high or low, and refers to the intensity of information gathering. The formalization of the strategic IS/IT planning can be high (more efficient) or low (more flexible). Furthermore, strategic IS/IT planning can have a creativity or control focus. A creativity focus implies an external focus, whereas a control focus looks at the internal organization. Flow can be top-down or bottom up. Participation can be broad, which involves many organizational groups, or narrow by having a small group of key actors. Consistency, referring to the rigidness of the planning, can be high or low.

Alignment means whether the IS/IT strategy is well aligned with the overall integration plan. Analysis refers to the understanding of the information needs and required changes in the organizational processes. Cooperation is about agreeing on boundaries, risks and trade-offs. Improvement refers to learning for future M&As.

The research of Alaranta and Henningsson has some important findings. Most important is that there is not one single best way to achieve effective planning. Rather, IS/IT integration planning should take the characteristics of the M&A in consideration to be effective [37]. However, Alaranta and Henningsson argue that in M&As in which operational synergies are sought, a top-down approach and a control focus is desirable.

Brunetto [39] distinguishes two integration approaches in terms of planning and decision making. The first approach is prescribed integration which can be classified as top-down. In this approach the key actors, which are the project manager and the consultants, have a more or less closed vision. The key actors construct a future IS vision and based on this vision the new IS is/are installed. After the installation, other actors will make attempts to modify the new IS because they have a different vision. The project leader will set up negotiation sessions in which a selection is made from all initiatives. After the initial integration, the project leader allows more autonomous initiatives of IS employees. In summary this approach follows the pattern of retention-selection-variation.

The second approach is constructed integration, which can be classified as bottom-up. This approach is assumes that formulating a precise future IS vision on forehand is infeasible. Therefore the project leader has an open vision and wants to solve issues as a collective. In this approach, different actors have more influence when forming the new IS situation. Various views from stakeholders are collected in an inter-hierarchical and interdisciplinary setting. A selection is made from this set of ideas to refine and form the future IS vision. The final step is the collective learning of new practices. In summary, this approach follows the pattern of variation-selection-retention.

In the post-merger integration IT Governance plays an important role. Becker et al. [40] designed a framework that can be used to specify organizational units and their decision fields in the integration phase. This framework can be found in Figure 13. In the framework seven sub-aspects of IT governance in the post-merger integration phase are identified, which can be found in the middle of the "house". Each of these sub-aspects has its own team and all teams are coordinated by the IT Post-Merger Integration Office. The IT Post-Merger Integration Steering board makes the strategic decisions about the overall IS/IT transformation. Since the post-merger phase does not only involve IS/IT integration, there are the more general integration office and committee which are on top of the roof of the house. The IT Post-Merger Integration Steering Committees (in the figure on the right side of the house) are used for making specific IT decisions in which department levels should be involved. Finally, on the operational there are the Business Liaison Managers who form the link between the different integration teams and the different departments.

Becker et al. [40] argue that the framework can serve as a blueprint for deciding on decision rights and accountabilities, which is important in an unstable environment such as an M&A. On the other hand, the applicability might be limited for small or medium-sized organizations.

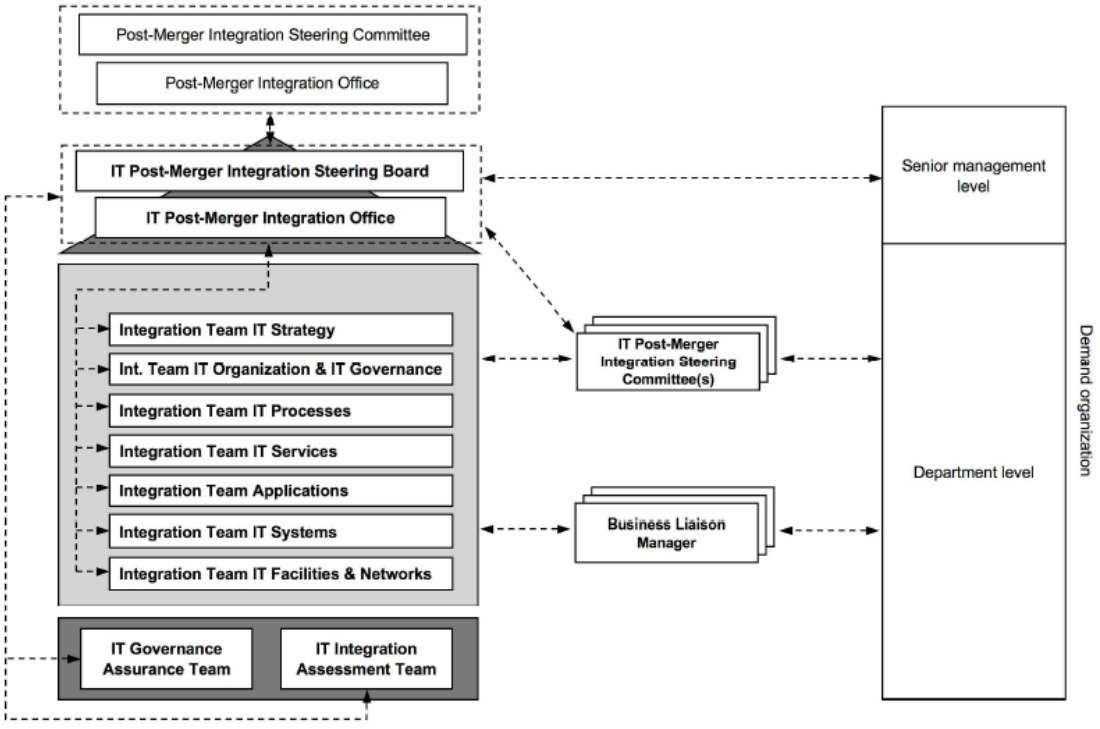

Figure 13: Framework for IT governance in the post-merger integration phase

3.4.5 MANAGING IS/IT INTEGRATION

IS/IT integration is not only a task of planning, but also requires management. According to Henningsson [2], managing IS/IT integration consists of two parts: (1) identification of alternatives and basic structural choices and (2) knowledge of the effect of these choices on the organization. Furthermore, IS/IT management in general has the task to align the IS/IT strategy to the organizational strategy.

Chang, Chang, & Wang [20] identified 26 different management fields of IS/IT integration in M&As. These management fields were linked to the different dimensions of IS/IT integration distinguished by Tanriverdi and Uysal [3] which will be discussed in section 3.4.7. An overview of the 26 management fields and their relation to the IS/IT integration dimensions can be found in Table 2. Note that the dimensions of Tanriverdi and Uysal use the term IT, however the descriptions of these dimensions reveal an IS/IT focus rather than a solely IT focus.

Table 2: Management fields linked to IS/IT integration dimension

IS/IT integration dimension	Management field
Integration of IT infrastructures	Interface integration Technology integration Standardization Customization modification
Integration of IT applications and data	Software integration Data integration Process integration Participation and evaluation of professionals Database integration System integration
Integration of IT human resource management processes	Capabilities of technical department Cultural conflicts Staff resistance Change management Employee training Faith and support of staff
Integration of IT strategy-making processes	Clear target definition Organizational resources Plan establishment System costs Communication and coordination Support of managers Use of time and cost Raising of questions Construction and system
Integration of IT vendor management processes	Continuous support of suppliers and consultants

These management fields show that there are a lot of aspects that need to be managed during the IS/IT integration process. Management fields such as cultural conflicts and staff resistance are another confirmation that IS/IT integration is not a solely technical issue.

One important aspect of IS/IT integration in M&As is managing the human side. Lee, Lee and Yang [41] examined the impact of IS/IT employees' perceived fairness on organizational commitment. The results of this study show that organizational justice has an impact on organizational commitment, job insecurity and organizational trust. Furthermore, organizational trust has a positive impact on organizational commitment. Organizational justice exists of three elements: procedural justice, distributive justice and interactional justice. Procedural justice focuses on how decision making processes are perceived by the employee in terms of fairness and transparency. Distributive justice

focuses on how rewards are awarded and distributed. Interactional justice focuses on interpersonal treatment by looking at how fairly decision-makers respect and treat their subordinates, while communicating with them.

In the light of IS/IT integration there are different situations in which organizational justice is important. For example, employees that put time and effort in the integration process expect to get compensated. Furthermore, the decision-making processes, such as negotiation about the selection of application or the distribution of hardware, need to be transparent and open otherwise employees can feel left out.

Lee, Lee and Yang conclude that if managers should pay more attention to IS/IT employees' perceived fairness of treatment if they want make an IS/IT integration project a success.

3.4.6 IS/IT INTEGRATION OBJECTIVES AND MODES

The desired level of IS/IT integration can differ between M&As. Giacomazzi, Panella, Pernici, & Sansoni [5] distinguish three main integration strategies. The three strategies are total integration, partial integration, and no integration. These three strategies can have different forms depending on the standardization level of applications and the level of centralization of the computer architecture.

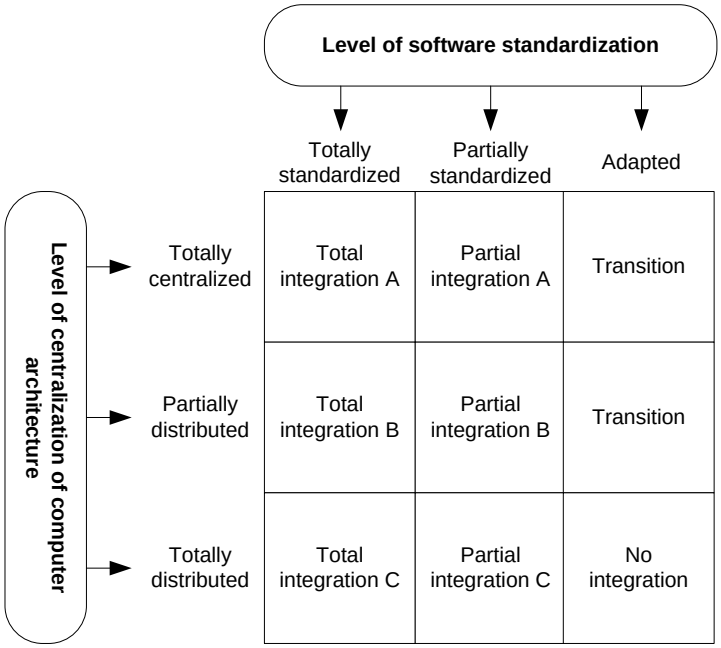

Figure 14: Possible IS/IT integration modes [5]

Figure 14 shows that the desired level of software standardization determines whether integration is expected to be total, partial or not. The level of centralization of the computer architecture only gives different variations of the integration strategy. Furthermore, Giacomazzi et al. give a decision support model that can help to select an appropriate integration variant.

Wijnhoven et al. [12] follow the same reasoning, but are less explicit about the difference in standardization of applications and the centralization of computer architecture. Based on different literature they distinguish three different integration modes. These are complete integration, partial integration and co-existence. Complete integration focuses on merging all aspects of the previously separate IS/ITs. Partial integration focuses on a limited set of processes and systems to integrate. Co-existence tries to keep the existing IS/ITs intact and only realizes bridges where absolutely necessary.

3.4.7 IS/IT INTEGRATION LEVELS AND DIMENSIONS

According to Tanriverdi [3], there are five dimensions that play a role in IS/IT integration in M&As. These five dimensions are:

1. Integration of the IT infrastructure
2. Integration of the IT applications and data
3. Integration of the IT Human Resource Management processes
4. Integration of the IT vendor management processes
5. Integration of the IT strategy-making processes

The first dimension corresponds with Iyamu and Kekwaletswe [1] refer to as IT. This dimension involves integration of computer networks, computer hardware and operations systems [3]. The second dimension - integration of applications and data - focuses on integrating the information systems, which are the applications that run on top of the IT infrastructure and which support the business processes and operations. Integration of these applications includes integrating the corresponding data. Often there are data incompatibilities and a conversion has to be made to integrate the data. Integration of the IT HRM processes entails coordination of retaining, training and motivating IS/IT talent during the M&A and recruiting new talent. Retention is considered to be a primary concern, since existing personnel has knowledge about the existing IS/IT. Vendor management is about coordinating which vendors relationships are maintained, terminated or set up based on the requirements for the new situation. Finally, from a more strategic perspective the strategy-making processes need to be integrated to enable joint actions.

Tanriverdi argues that the integration does not stop after the initial integration. The integration phase is used to create a common foundation for the IS/IT and once integrated one should ensure that this commonality is maintained. Possible means by which this could be achieved are setting common policies and standards, and using common data models [3].

The dimensions that Tanriverdi gives can be mapped to the levels of integration – strategic, organizational, information systems and IT systems – identified by Henningsson from section 3.3.5. The IT infrastructure corresponds to the IT system level. The IT applications and data can be mapped to integration at the information systems level. Integration of the IT human resource management processes take place on the organizational level. The integration of vendor management processes can occur on both the organizational and strategic level. The actual processes of are of a more organizational nature, but choosing among the vendors and setting strategic goals for the vendor relations are of a more strategic nature.

Several studies have examined IS/IT integration in M&As by looking at multiple levels at the same time. For example, Johnston and Yetton [4] studied the integration of two large Australian banks from a technical, organizational, and strategic perspective. They built on Mintzberg's typology for organizations to sketch two ideal types of IS/IT organizations configurations. The ideal IS/IT configurations are defined using the following five characteristics: strategy, structure, management processes, systems, and roles/skills. Different IS/IT organizations can be analysed using the five characteristics to identify discrepancies and compatibility. If the two organizations are both close two the same ideal configuration type, integration is likely to be easier than when they are closer to different ideal configuration types.

Table 3: Ideal IS/IT configurations [4]

Characteristics	IT in the machine bureaucracy	IT in the divisional form
Strategy	Cost focus - efficiency IT driven	Value added focus – effectiveness Business unit driven
Structure	Centralised Bureaucratic	Decentralised Professional
Management processes	Formalised Control emphasis Mechanistic Position-based rewards IT standards	Flexible Empowerment emphasis Organic Performance-based rewards IT service
Systems	Single dominant platform Common IT standards Simple architecture	Multiple platforms Incompatible systems Complex architecture
Roles/skills	Long-serving staff Internal recruitment & development Seniority emphasis	Mobile staff External recruitment & development Merit emphasis

Table 3 contains the two ideal IT configurations of Johnston and Yetton. The original framework of Mintzberg contains five different organizational forms. Johston and Yetton only derived the IS/IT of two of the five organizational forms. For the other three forms – simple structure, professional bureaucracy and adhocracy – the IT configurations were not derived because these were not considered relevant for the case studied. The simple structure is for small, young and entrepreneurial companies. The adhocracy is for fluid, dynamic and highly innovative companies. The third neglected form is the professional bureaucracy, which applies for specialist organisations.

Another important dimension at the organizational level is culture. According to Johnston and Yetton [4], culture emerges "*from the particular evolution of organisational components within each configuration*". In the case studied by Johston and Yetton, the incompatibility in culture was itself enough to inhibit actual integration. This finding in mirrored by the research of Weber and Pliskin [33], in which 69 M&As were investigated and was concluded that high culture differences - especially for highly IS/IT intensive companies - inhibit overall integration, which leads to the M&A being less effective. In other words, cultural differences need to be controlled in order to make the IS integration and the overall M&A effective.

More specific on IS/IT culture, there are three different values that play a role [42]. First, there are the group member values which reflect the beliefs about what is important to that particular group. Second, values embedded in a specific IS/IT refer to values that are assumed in the work behaviours that the IS/IT interacts with. Third, the general IS/IT values refer to those values that a group ascribes in general to IS/IT.

These different values can conflict with each other, which are the actual culture conflicts. Three forms of IS/IT culture conflicts can be identified [43]. A conflict between the group member values and the general IS/IT values is called a contribution conflict. A vision conflict occurs when the general IS/IT values conflict with the values embedded in a specific IS/IT. Finally, a system conflict occurs when the group member values do not match the values embedded in a specific IS/IT. These conflicts can occur on a subunit level, an organizational level and a national level. Figure 15 shows the relationships between the different values, levels and corresponding conflicts.

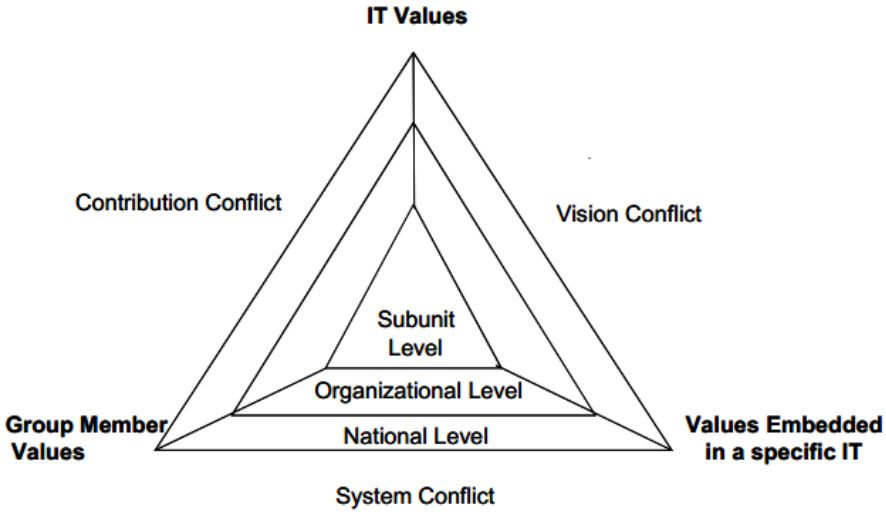

Figure 15: IS/IT culture conflicts [42]

Lin and Chao [43] have investigated the IS/IT culture conflicts that occurred when integrating two banks and found that differences in the organizational culture and the characteristics of an IS/IT platform lead to IS/IT culture conflicts. Changing the group member values and promoting shared IS/IT values helped to reduce the conflicts. The findings of Lin and Chao [43], Weber and Pliskin [33] and Johnston and Yetton [4] show that culture is an important factor that should be considered when integrating IS/IT.

3.4.8 IS INTEGRATION LEVELS AND DIMENSIONS

The previously mentioned levels – strategic, organizational, information system and IT system - of integration are quite general and can be applied to the combination of IS and IT. When limiting the scope to IS, more detailed levels can be distinguished. Integration of IS can occur on a business level, an application level or a technical level [2].

Integration at the technical level can be achieved by integrating data, objects or functions. An advantage of this type of integration is that it is relatively inexpensive. The downside of this integration type is that this integration ignores application and business logic [2].

Integration at the application level can have two forms, namely user interface integration and application interface integration. In the former one, no actual integration takes place. Actually, it presents data from multiple non-integrated systems. Application interface integration invokes application functionality and is accomplished by sharing common logic. Based on this logic the applications can be developed that can support the business processes.

The most complex, but at the same time the most beneficial integration level for IS is the business process level. Integration at the business level also considers the logic for conducting business for application integration [2].

A core decision in IS integration is choosing which systems will be maintained and which systems will be eliminated. Often this decision will be made by comparing the different alternatives and partially based on gut feeling. However, Miklitz [44] has proposed a more rational approach which is based on visualization of networks using nodes and edges. These networks can be analysed in a more or less mathematical manner. We doubt whether this approach is useful in the light of this research and application by IS practitioners, because this approach is very theoretical and does not take contextual factors into account. Therefore, we will not further discuss this approach.

An important concern of IS integration is integration of Enterprise Resource Planning (ERP) systems. Based on a longitudinal case study combined with a literature review, Alaranta [45] enhanced an existing framework for ERP implementation to make the framework fit to an M&A context. According to Alaranta, post-merger ERP integration consists of three elements: corporate level change environment, integration level change environment, and post-merger enterprise system (ES) integration management.

Table 4: Alaranta's framework for post-merger integration of ERP systems [45]

Element	Related issues
Corporate Level Change Environment	M&A factors Factors related to company expertise & resources Factors related to software & vendor
Integration Level Change Environment	Strategic initiatives Learning capacity Cultural readiness Information technology leveragability and knowledge-sharing capacity Network relationships
Post-merger ES integration Management	Change management Process management

Alaranta identified important issues in post-merger ERP and related these to the three elements. An overview of the elements and related issues can be found in Table 4.

In line with Alaranta, Myers [15] set up a model that shows which dimensions influence the ERP integration strategy and how this integration strategy relates to the business benefits. This model can be found in Figure 16. There are four dimensions that all influence each other and the ERP integration strategy. These four dimensions correspond with the dimensions and factors already discussed in this thesis. The first dimension, M&A objectives and business strategy, is about aligning the ERP integration strategy with the business strategy of the new situation. The second dimension, power and politics, is important because a more powerful acquirer will use several methods to ensure that their IS/IT systems will be used in the new situation and thus also affects the ERP integration strategy [15]. Organisational infrastructure and processes, which is the third dimension, is about the classic business-IT alignment. The organizational structure and processes need to be in line with the IS/IT. The fourth dimension, IT infrastructure and processes, refer to the entire system landscape and the degree of standardisation. The level of standardisation and the prior M&A experience can make the integration process much easier.

The benefits of the ERP integration should align with the expected benefits of the whole merger and the business strategy for new situation. These benefits can be short-term such and long-term. Often, these long-term and short-term goals conflict with each other [15]. The scope and allocation of resources should be derived from the ERP integration strategy and corresponding specified benefits.

Myer argues that selecting an ERP integration strategy involves making two main trade-off decisions [15]. The first trade-off is to choose an appropriate level of standardisation and independence of the two systems. In the case when similarities are present between the business of both companies, a higher degree of standardisation, excellent business process reengineering and change management are recommended. For the second trade off, deciding upon the speed of the entire integration project, Myer recommends a more careful and slower integration. This should go hand in hand with a comprehensive planning, an excellent communication strategy and generous retention packages for employees with important knowledge.

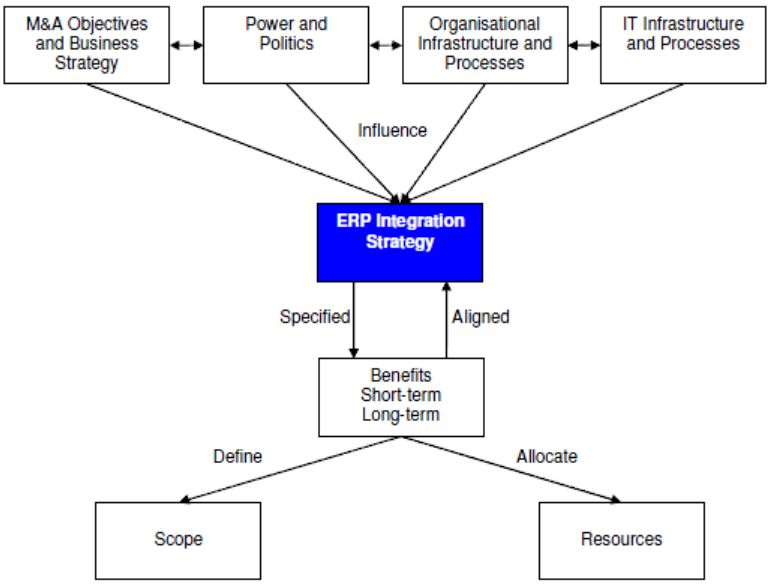

Figure 16: ERP integration model of Myers [15]

Replacing existing applications or introducing new applications often leads to employee resistance. Vieru and Trudel [46] have looked at this problem from a sociomaterial perspective. In their paper they propose an iterative process model that is based on a dialectical motor and focussed on configurable IS. The process starts with a planned post-merger integration system configuration. In general, this configuration imposes changed practices and is therefore resisted by users. Therefore, negations will be held that lead to reconfigurations of the IS. The negotiations are also used to agree upon practices. These negotiated practices lead to the emergence of new sociomaterial assemblages which lead to an adjustment of the post-merger integration approach. To summarise, the integration of information systems is not seen as a linear process. Instead, the process is assumed to be iterative and the sociomaterial assemblage differs after every iteration. The underlying assumption is of course that the IS is configurable.

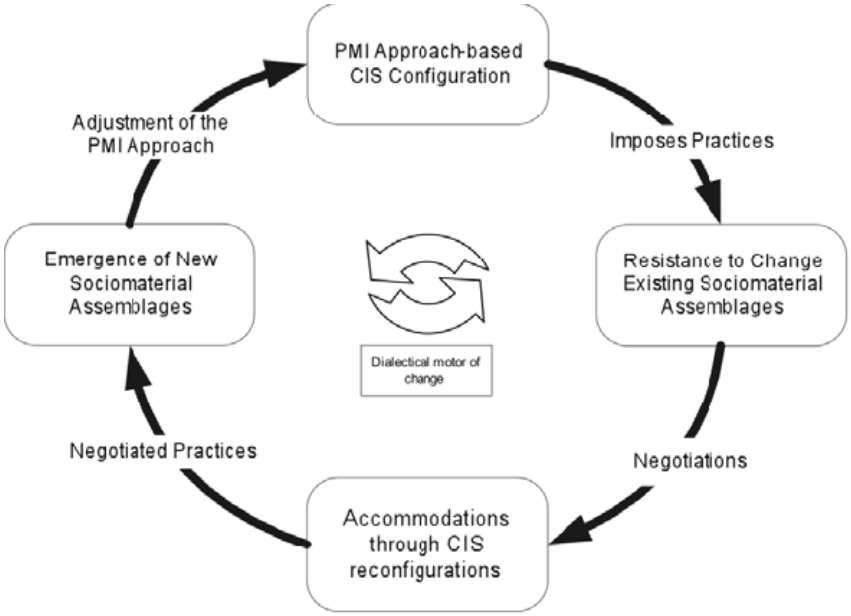

Figure 17: A process model of IS implementation [46]

3.4.9 IS/IT INTEGRATION METHODS

Existing literature reveals several methods to achieve IS/IT integration. Wijnhoven et al. [12] list four main integration methods: renewal, take-over, standardization and synchronization. Miklitz [44] identified the same four integration methods but uses a different naming: greenfield, absorption, best-of-breed and co-existence. The same applies to Baker and Niederman [21] who refer to the IS/IT integration methods mentioned by Wijnhoven et al. [12] but use the terms transformation, consolidation, combination and co-existence.

Renewal (or greenfield or transformation) refers to abolishing the IS/IT of both two companies and designing a whole new IS/IT. This is an option when the combination of IS/IT is not able to fulfil the demands for the new situation. However, this option is extremely costly and time consuming. On the other hand, it allows companies to get rid of legacy systems [44].

Take-over (or absorption or consolidation) takes the IS/IT of one of the companies to implement this at the other company. This approach has a relative low risk and low costs [4] and is suitable in situations in which the IS/IT support the processes of the other company. This approach however requires the chosen IS/IT configuration to be scalable [7]. Furthermore, this strategy might lead to resistance among the users [44].

Standardization (or best-of breed or combination) involves selecting the best elements of the IS/IT of the two companies and use this mix as the IS/IT for both companies. The main problem is that it is hard to identify the best elements. It can reasonably be expected that departments regard their own IS/IT as superior [7, 44], which might make it a political matter instead of an objective selection [4]. The recourse of external consultants is not a guarantee for an objective selection [7]. Batelaan and Veltman even argue that the best-of-breed should be avoided; they do not consider it a viable approach [7]. On the other hand, Chang et al. [20] argue that the uniqueness and the required modifications of systems should be considered, otherwise delays and disruptions may occur. They argue that take-over is not always viable, because major changes might lead to resistance.

Synchronization (or co-existence) does not result in (significant) changes to the IS/IT of the companies, it only introduces some (periodic) synchronization [12]. In general, the risks related to this approach are low and the "integration" can be achieved in a short period of time [44]. However, this approach has major downside: synergies such as economies of scale cannot be achieved using this approach.

In many cases the initially chosen integration method differs from the actual integration method [19, 21, 39]. Brunetto [39] for example identified multiple transitions between different integration methods after studying ten M&As performed by two different organizations. Often, this change is caused by issues or needs on a tactical level which where not identified in advance [21].

When narrowing the scope to integration of IS there are more specific integration methods. Based on existing literature, Henningsson [2] formed an overview of possible IS integration methods. These methods can be found in Figure 18.

Figure 18: Possible IS integration methods [2]

In the point-to-point method each application connects to every other application that needs to be integrated. This means for example that application A needs to maintain an interface for application B as well for application C and vice versa. If another application should be integrated, all applications need to create an interface to connect to this new application. At the same time, interfaces need to be created for this new application to connect to the other applications. Thus, this method requires multiple interfaces at the level of one application and creates complexities when adding applications.

The middleware method decreases the number of required interfaces. In this method, each application has only two interfaces – one ingoing and one outgoing - which are used to connect to the middleware. Instead of directly connecting to another application, all applications talk to the middleware. This middleware component then passes the call though to the corresponding application(s).

In the enterprise-wide method applications employ a shared database. This shared database makes sure that all applications have access to the same data at all times. Enterprise Resource Planning (ERP) system is a more commonly used term for systems following this method.

The meta-level method works by extracting data from existing data sources into data warehouses. Thus, this method does not actually integrate applications but instead it duplicates existing data and adds a metalayer which allows analysis. More important, the data in the data warehouse is high level due to aggregation and therefore it is not suitable for all purposes.

Finally, the Service Oriented Architecture (SOA) method is based on the concept of services. The services, which are software modules, sum up reusable business functions that are loosely coupled to other services [2, 47]. This makes business processes more flexible and it allows standardization and interoperability. SOA employs two architectural constraints to achieve the loose coupling. The first constraint is the existence of a small set o simple and ubiquitous interfaces that are available to all participating parties [48]. The messages exchanged between the parties are descriptive and constrained by an extensible schema and delivered through the interfaces [48]. That is, a message only contains *what* is desired and not *how* this should be achieved. Furthermore, the schema tells how the message should be formatted and structured and which vocabulary can be used. Henningsson [47] argues that usage of SOA eases integration of IS in M&As.

3.4.10 ALIGNMENT OF INTEGRATION IN M&AS

In the previous sections different topics such as M&A objectives, IS/IT integration objectives and IS/IT integration methods were discussed isolated from each other. However, there are some attempts made to align these topics with each other.

A significant contribution was done by Wijnhoven et al. [12]. First, they made the link between the M&A objective and IS/IT integration objective. Second, they made the link between the different IS/IT integration objectives and the different IS/IT integration methods. An overview of their findings can be found in Table 5. For absorption there are three appropriate IS/IT integration methods, whereas for symbiosis and preservation there is only one appropriate IS/IT integration method.

Table 5: Alignment of M&A objective - IS/IT integration objective - IS/IT integration method [12]

M&A objective	IS/IT integration objective	Possible IS/IT integration methods
Absorption	Complete integration	Renewal Takeover Standardization
Symbiosis	Partial integration	Standardization
Preservation	Co-existence	Synchronization

An earlier attempt was made by Johnston and Yetton [4], who linked three M&A strategies to a model of change. The naming that Johnston and Yetton use differs from the one used by Wijnhoven et al., but the links that are made are in line with the alignment modes proposed by Wijnhoven et al. Table 6 lists the different M&A strategies with their corresponding model of change. For the models of change we added (in parentheses) the corresponding naming used by Wijnhoven et al. This mapping is quite straightforward due to similar descriptions.

Table 6: Merger strategies and corresponding models of change [4]

M&A strategy	Model of change
Independent/unrelated	Co-existence (synchronization)
Rationalization/cost reduction	Absorption (takeover)
Value-added/synergy	Best of breed (standardization)

For the M&A objectives, Wijnhoven et al. use the typology of Haspeslagh and Jemison [28]. The M&A strategies defined by Johnston and Yetton are more goal oriented. However, the different M&A types of Haspeslagh and Jemison are more appropriate for achieving certain goals. Absorption implies rationalization and cost reduction is its main benefit [12] and thus maps to rationalization/cost reduction. In the same way we can map symbiosis to the value-added/synergy strategy. Preservation implies retaining organizational boundaries and a low degree of strategic interdependence, which corresponds to independent/unrelated. This shows that Wijnhoven et al. [12] and Johnston and Yetton [4] agree on the fact that some IS/IT integration methods are more appropriate for certain M&A objectives.

The contributions of Wijnhoven et al. [12] and Johnston and Yetton [4] show possible alignment modes of IS/IT integration in M&As, which can help practitioners to derive an aligned approach. This alignment of IS/IT with business objectives is often seen as a key to success in M&As [19]. However, empirical findings show that alignment itself is neither crucial nor sufficient for effective integration [21]. The sample of companies studied by Baker and Niederman [21] show that strategy, whether aligned or misaligned, is more of an emergent nature instead of being pre-determined and top-down. The nonaligned companies seemed to start with an aligned approach but changed their strategy into a misaligned one because of tactical needs. Baker and Niederman argue that holding firmly to an aligned strategy is not always preferred. Companies might run into unexpected IS/IT assets of the acquiree or other issues and shifting to a non-aligned approach might be more successful then.

The findings of Baker and Niederman are in line with those of Mehta and Hirschheim [19]. They argue that integration success is mainly determined by realizing the promised synergies in the given timeframe and alignment is a secondary issue. This implies however, that such external promises are made. We believe that there are situations in which the "Wall Street effect" is minor issue. In such situations alignment can have a more prominent role.

Even though alignment is neither crucial nor sufficient for effective integration, it does not preclude effective integration and thus is a good starting point [21].

3.4.11 IMPORTANT FACTORS

Many of the reviewed publications contain guidelines, influencing factors or success factors regarding IS/IT integration. This section will gives an overview of the most important guidelines and factors mentioned in the literature. Please note that we not consider this overview comprehensive, it only summarizes the recurring factors in the examined literature.

First of all, literature shows integration of IS/IT is not solely a technical issue. Culture is argued to be [49] and empirically verified [4, 33] to play a significant role in integration of IS/IT. In fact, culture conflicts and differences in the use and management of IS/IT should first be resolved before IS/IT integration is initiated [12]. Beside the possible culture clashes, involvement of and communication with end users [8, 34, 50] influence the success of IS/IT integration.

Most authors (e.g. [9, 12, 34, 50, 51]) agree on the fact that proper planning and setting priorities is key to success. Furthermore, support and involvement of top management also influences success [8, 34, 49]. Several authors (e.g. [8, 9, 14]) stress that early involvement of the IS/IT staff contributes to success.

Especially for companies that use M&As as a growth strategy, but also important for companies engaging in their first M&A, is preparing for the IS/IT integration. Companies should have their IS/IT platform in a state that allows integration, thus they should focus on creating a flexible IS/IT platform [9, 52, 53].

Furthermore, the M&A context influences the IS/IT integration strategy [5]. The DySIIM model [11] with its six dimensions shows how IS/IT integration relates to the M&A process. The six dimensions are (1) the synergistic potential, (2) organizational integration, (3) intentions and reactions (4) IS ecology (5) integration architecture (6) IS integration role. Each dimension has been discussed earlier in this thesis, but the DySIIM model reveals some interesting relationships between the different dimensions and can be used to explain how changes in one dimension affect another.

Another important aspect of IS/IT integration is the general context. Every company has its own unique mix of people, systems, organizational structures and technology that needs to be accounted for. Decisions made in the integration process are therefore highly contextually dependent [18, 19].

Finally, the success of IS/IT integration in an M&A is subjective. Integration of IS/IT involves different stakeholders that have their own goals that they would like to achieve [54, 55]. The goals for a CIO probably differ from those of top-management, even though these goals are aligned. A CIO generally wants to achieve technology consolidation whereas a CEO wants to achieve cost synergies or revenue synergies in general.

In summary, successful IS/IT integration depends on a lot of factors. When planning for and actually integrating IS/IT, these factors should be taken into consideration.

4. DEVELOPMENT OF THE FRAMEWORK

The performed literature review reveals that many of the existing research has focused on analysing and explaining IS/IT integration in performed M&As. This is supported by the findings of Toppenberg and Henningsson [16], who performed a literature review to give an overview of what has been studied and how it has been studied. None of the 37 articles that they examined contained theory for design and action. The majority of reviewed articles has focused on analysis, describing and exploration.

This also applies to our sample of articles. There are however some findings that could be considered prescriptive. This is particularly true for the research on aligning IS/IT integration methods with business objectives. The alignment models of Wijnhoven et al. [12], Batelaan and Veltman [7], and Johnston and Yetton [4] show which integration methods are preferred when aiming for certain synergies. Thus, these models prescribe which integration methods are appropriate in certain contexts.

What might be considered as prescribing as well are the success factors that are widely spread in the literature. These factors are useful because they show which topics require attention. However, we found that the majority of studies mentioning these critical success factors generally omit to discuss *how* to deal with these topics.

A reason for the small amount available prescriptive theory can be that the actual integration strategy is highly contextual dependent [18-20]. Seddon et al. [18] argue that key decisions remain complex as well as situationally dependent. The fact that decisions within the integration process largely depend on situation specific factors, which vary for every single M&A, might make it challenging for researchers to form prescriptive theory.

On the other hand, existing literature contains multiple concepts that can be used for analysis. In this chapter concepts from literature will be used to create a framework that can be used to analyse the current situation and plan for IS/IT integration. The subsections of this chapter discuss the steps of our framework and the corresponding theoretical concepts that are important within those steps.

4.1 STEP 0: PREPARE FOR IS/IT INTEGRATION

First of all, companies should prepare for the IS/IT integration. This includes finishing projects that are conditional to the integration [12] and, especially for companies that use M&As as a growth strategy, creating a flexible IS/IT platform [9, 52, 53].

4.2 STEP 1: ANALYZE M&A CONTEXT

The M&A context is an important starting point in the IS/IT integration process. Studying the M&A context should include identifying the strategic goals and the expected synergies. Although empirical evidence has shown that business-IT alignment is not crucial for success [21], we believe it is important to know what is expected from the integration and keep this in mind when making decisions regarding the IS/IT integration.

Furthermore, determining the type of M&A can help to put the integration in perspective. The market and product relation can give directions about how the integration should look like in general. Furthermore, the friendliness of the M&A might have implications for the integration approach, because of its correlation with employee resistance. An analysis of the power difference between the companies can give indications about the decision making structure.

Another important aspect is the desired level of organizational integration, i.e. which parts of the organization should be integrated. The integration can focus on operational integration, functional integration, or both. It might be the case that only functional integration is desired, and thus the primary process chain remains untouched. This determines which parts of the companies require analysis when exploring the IS/IT context.

Furthermore, top management probably has its thoughts about the IS/IT integration. It might be the case that top management desires full consolidation of the IS/IT departments. Another possibility is partial integration, in which only parts of the IS/IT organization are integrated, for example integration of applications and a limited set of IS/IT activities. Finally, top management might have a preference for a particular integration method such as take-over. We believe that questioning top management about these topics contributes in creating awareness and initial support.

4.3 STEP 2: ANALYZE IS/IT CONTEXT

The M&A context has a significant influence on how the IS/IT context should be studied, since it determines what should be integrated and thus determines the focus of the analysis. It is clear that full consolidation asks for a more comprehensive analysis than when the focus is on connecting a limited set of information systems. This heterogeneity of M&As makes it hard to prescribe how the IS/IT context should be studied. Therefore, this section gives an overview of what *could* be studied. For each M&A one should decide if and how much attention should be paid to the different elements.

Especially for M&As in which consolidation of the IS/IT departments is desired, both the IS/IT organizations should be analysed. This typically includes identifying how tasks and role are distributed. Furthermore, since culture has proven to play such an important role, it is important to identify potential culture conflicts.

Existing literature does not provide us with a concrete method for analysing the current IS/IT. However, Wijnhoven et al. [12] argue that it is it is important during the IS/IT integration process to keep in mind whether the desired working procedures and operations are compatible with the capacities and capabilities of the IS/IT. Therefore, we argue that the IS/IT environment is best studied from a holistic perspective that includes the working processes and procedures.

During our literature review the feeling emerged that Enterprise Architecture, and especially Enterprise Architecture Modelling, could serve as a tool to form this holistic perspective. We were surprised that none of the articles in our original sample elaborated on the use Enterprise Architecture in the M&A context. Articles within the original sample at best contained a sentence containing the concept, but did not pay further attention to it. We performed an additional literature search to see if there was indeed no specific literature about the use of Enterprise Architecture in M&As. Using the terms "Enterprise Architecture OR EA" and "Merger OR Mergers OR Acquisition OR Acquisitions OR M&A OR M&As" we found one paper ([56]) that addressed the topic of EA, or more specific EA management. This paper reveals that the role of EA management is only discussed at a very general level in literature. Furthermore, Freitag and Schulz [56] conclude that the applicability of EA management in M&As has yet to be proven.

By applying the snowball method on [2] we found a reference to the thesis of Dudas and Tobison [57], which combines the area of M&As with that of EA. Dudas and Tobison give two main reasons why an Enterprise Architecture perspective in M&As is useful. First, M&As are in general focused on achieving synergies that are business oriented. A pure technical approach is therefore is unlikely to be satisfying. Second, IS integration is about "*enabling the potential from 'islands' of applications as well as business processes*" [57]. Considering the entire enterprise is therefore advised. Besides these two main reasons, Dudas and Tobison also believe that EA is useful for communicating a vision.

We follow the reasoning of Dudas and Tobison [57] of taking an Enterprise Architecture perspective. For analysing the IS/IT, an Enterprise Architecture perspective allows linking the business processes, the

applications, and the underlying technology to each other. Simply comparing application functionality might lead to problems, since business logic and workflows embedded in the software are ignored. Furthermore, we think that especially Enterprise Architecture modelling is a promising tool to compare different environments.

That having said, EA only gives the perspective and EA modelling forms the toolbox for analysing the IS/IT. Again, the M&A context determines how the IS/IT context should be studied. As already discussed earlier in this thesis, IS/IT consists of two components: IS and IT. The desired level of centralization and integration determines how both the components should be studied. Regarding the IT component, this can vary from how to consolidate the infrastructures to how to connect the two infrastructures to exchange data.

Regarding the IS component, we propose studying existing business processes to identify the use of information systems to ensure that business logic is taken into consideration. Although EA implies the whole enterprise, we believe that the perspective can also be applied to subparts of the enterprise. The most important characteristic of EA is that it allows us to link business processes, applications and IT infrastructure to each other. Thus, if for example the focus is on the primary process only, an EA perspective can be applied to get a holistic view on this part of the enterprise.

In summary, for analysing the IS/IT context we propose taking an EA perspective and use EA modelling as a tool to make the EA explicit. By studying the business processes and the corresponding interaction with information systems business logic is taken into account.

4.4 STEP 3: IDENTIFY POSSIBLE INTEGRATION METHODS AND MODES

Once the current IS/IT contexts of both companies are studied, the options for integration can be examined. From an organizational perspective, one should identify how the new organization can be structured. This includes investigating the possible options for future role and task distribution.

As discussed earlier in this thesis, there are several possible integration methods such as take-over or renewal. It's likely that a preference for a certain integration method exists. It might turn out here that the intended integration method will be hard to achieve. Therefore, at this stage we think it's wise to keep multiple options open and investigate the applicability of different methods. In fact, in many cases the actual integration method differs from the intended integration [19, 21], because new issues occurred on a more tactical level. Sticking to the intended integration methods in such cases is expected to lead to a less successful integration [21].

Furthermore, the integration methods correspond with a certain integration mode (complete integration, partial integration or co-existence; see section 3.4.6). The analysis will tell how much effort it takes to achieve different integration modes. Again, it can be the case that the intended integration mode is infeasible with regard to the intended project size and costs.

As already discussed in the previous section, it's important to keep in mind that the new designed IS/IT should be able to support the desired working procedures and operations. If for example the intended integration method is take-over, it should be analysed whether the chosen systems suit the operations of the other company. It might be that business logic differs between the companies which makes the chosen system(s) unworkable without doing any changes. In the case of such a compatibility problem, the options for resolving the issue should be identified. This could be a change in the business processes or work flows, or adapting the software to support the business processes and workflows.

In summary, in this step several different integration options are identified. It's likely that there is not a perfect "match" between the workflows and the new IS/IT systems, thus it should be investigated which changes are required. Furthermore, the different integration modes and methods are likely to

require a different amount of effort to achieve. Hence, it's important to make a cost-benefit analysis for the different options.

4.5 STEP 4: SELECT BEST OPTION BY RELATING OPTIONS TO OBJECTIVES AND EXPECTATIONS

This step is about identifying which of the options is the most appropriate in terms of the M&A. Once the cost-benefit analyses are set up, it is possible to relate the benefits and costs to the M&A objectives and the expectations of the IS/IT integration.

For each of the options it should be explored to what extent it contributes to the M&A objectives and whether the costs and effort associated with this option do not outweigh the expected benefits. It can be that the intended integration must be achieved at all costs, but it could also become clear that concessions must be made because of integration problems on a more tactical level. Furthermore, at this point it might be decided that the IS/IT integration that will be undertaken is not aligned with the overall M&A strategy. According to Baker and Niederman [21] this is not a problem per se, since both aligned and non-aligned combinations can be successful.

Involving top management by evaluating the possible options and choosing among these options is expected to be beneficial in several ways. First, discussing possible options and limitations with top management lowers the risk of having different expectations. The analysis makes it possible to identify limitations and benefits of an option over another so that a decision can be made being well informed. Second, involving top management by discussing options and let them choose among these options has a bigger chance of getting support than fully delegating the issue to the IS/IT department. Integrating technology and information systems is one thing, achieving changes on the business side is something totally different. Since the required changes are identified for all the options, top management is aware of the required changes when making the decision. Third, instead of fully delegating the IS/IT integration issue to the IS/IT departments or managers, the actual decisions are made by people with a business background. Batelaan and Veltman [7] argue that IS/IT integration is not solely a task of IS/IT departments or managers. Instead, fundamental decisions about the issue should be made by people with knowledge of IS/IT but a business background.

4.6 STEP 5: DESIGN FUTURE IS/IT

Once the most suitable option is selected, a more detailed plan can be set up. We believe that also in this step Enterprise Architecture modelling is very usable. The EA models of both companies created in step 2 can be used to design the future IS/IT landscape. Thus, in this step the goal is to merge the two EAs.

In the EA model one can visualize the level of centralization of distribution by grouping elements based on their location in the (physical) technology layer. Based on the integration method the integrated application landscape can be designed. Redundant information systems may be removed and business processes can be linked to the substitute information systems. For information systems that cannot be standardized should be decided how these systems should be connected.

An important characteristic of EA is that is quite high-level. Therefore the EA model alone is probably not sufficient. The model however provides a good overview how the future situation will look like. The more technical details such as the interfaces between applications are not included in the EA model and thus should be documented apart. The high-level perspective of EA models should make these models very suitable for communicating the future situation among employees with different backgrounds.

For the organizational component it is important to sketch how the new IS/IT departments will be structured. Furthermore, a new (integrated) IS/IT strategy should be set up and vendor management should be integrated [3].

4.7 STEP 6: CREATE CHANGE PLAN

Having a clear view on the future situation, a change plan has to be set up to work towards this situation. Setting a good time frame and correct timing of integration activities is one of the central problems in M&As. Moreover, there is a certain paradox associated with M&As in general [21]. A too fast integration is likely to be disruptive and comes with high costs and risks. On the other hand, a too slow approach - in which a certain level of independence is maintained - destroys the opportunities for creating the intended synergies. This is caused because such a slow approach lacks a window of opportunity when employees expect changes [54]. Wijnhoven et al. [12] add that taking too much time can result in losing motivation and resources. These statements show that timing is important, but again this is quite situationally dependent [54].

The change plan outlines how the future situation should be achieved. This requires a clear time frame and setting priorities. A logic step would be to start with the infrastructure to enable communication between different locations. When the modifications to the infrastructure are completed, the integration and/or centralization of the application landscape can begin. The integration could be divided in phases by starting with mission-critical business processes and then moving to supporting business processes or the other way around. Furthermore, when modifications in business processes are required these should also be included in the change plan.

Although M&As are highly contextually dependent, they have in common that they generally involve (major) organizational change [18]. Therefore, the change plan should also include a plan for managing the organizational transformation. Change management is important and advise of experts on organizational transformation is definitely relevant [18].

4.8 FRAMEWORK OVERVIEW

The previous sections described each of the steps of our framework in detail. By reviewing literature important topics regarding the IS/IT integration in M&As were identified. However, it is clear that our framework is just one way of structuring the concepts and topics in existing literature for the use of analysis and planning.

Several authors agree that an extensive analysis contributes to the success of IS/IT integration. An assessment of the entire system landscape [15], the business strategy, structure and (work) procedures [12], and taking the uniqueness of the systems of both companies into account [20] increases the chance of successful integration. Therefore, our framework also pays a lot of attention to a comprehensive analysis. However, as Mehta and Hirschheim [36] argued, the presence of the Wall Street Effect can make such a time consuming analysis impossible. Nevertheless, we believe that the EA perspective can be applied in less comprehensive analyses as well.

Regarding the decision making and planning, our framework takes a more bottom-up approach, or in terms of the concepts of Brunetto [39], it follows the path of variation-selection-retention. Many of the studied integrations suffered from unforeseen problems at a tactical level. The analysis in our framework entails business processes and business logic at the tactical level. This of course does not guarantee that such problems will not arise in a later stage, but reduces the risk of taking an approach that will encounter tactical problems from beginning to end. Furthermore, a bottom-up approach is more likely to positively contribute of the IS/IT employees' perceived fairness of treatment, which is an important factor for successful IS/IT integration [41].

In short, with this framework and the accompanied description of steps we try to address the important concepts and factors mentioned in literature. An very high level overview of the steps of the framework can be found in Table 7.

Table 7: Framework overview

	Activity
0)	Prepare for IS/IT integration
1)	Analyse M&A context a. Identify goals and desired synergies of the M&A b. Identify type of M&A c. Identify desired organizational integration d. Identify desired IS/IT integration (level)
2)	Analyse IS/IT contexts a. Explore IS/IT organizations and cultures b. Explore IT infrastructures (using EA modelling) c. Explore IS landscapes (using EA modelling)
3)	Identify possible integration methods and modes a. Organizational integration options b. IT infrastructure integration options c. IS landscape integration options
4)	Select best option by relating options to objectives and expectations in liaison with top management
5)	Design future IS/IT a. IS/IT organization i. Organizational structure ii. Design future IS/IT strategy iii. Integrate vendor management b. IT infrastructure (using EA modelling) c. IS landscape (using EA modelling)
6)	Create change plan a. Proper time frame b. Organizational transformation plan

4.9 FRAMEWORK APPLICATION

In the next chapter we will discuss the application of the framework to the Company X-Company Y case. The designed framework is a means for our empirical analysis and diagnosis step of the BPS project. The analysis was applied by following the steps of the framework, but the results of these steps are presented following the structure of a BPS project. For clarity we therefore include Table 8, which shows in which section of this thesis a certain step is discussed.

Table 8: Framework steps related to thesis sections

	Activity	Thesis section
1)	Prepare for IS/IT integration	5.3.2
2)	Analyse M&A context	5.3.3 - 5.3.5
3)	Analyse IS/IT contexts	5.4 & 5.5
4)	Identify possible integration methods and modes	6.1.2
5)	Select best option by relating options to objectives and expectations in liaison with top management	6.1.3
6)	Design future IS/IT	6.1.4
7)	Create change plan	6.2

5. ANALYSIS AND DIAGNOSIS

The derived framework will now be applied to the case of Company X and Company Y. This chapter describes the analysis and diagnosis step that was performed at the two companies and covers step 1 and 2 of our framework. The chapter starts with justifying the need for the intended IS/IT integration. Next, the M&A context will be discussed followed by the current situations at both companies. Theoretical concepts and the developed framework from literature from the previous chapters are used to perform the analysis.

According to van Aken et al. [22, p. 63] the analysis step is used to validate the business problem, to explore and validate causes and consequences of the problem, and to develop preliminary ideas about alternative solutions. Three approaches should be combined to produce a diagnosis. First, there is the empirical analysis in which symptoms, their potential causes and their potential consequences have to be identified and validated. Second, there is theoretical analysis which should strengthen the empirical analysis. Third, there is process-oriented analysis which supports the analysis of the business problem and its causes. This chapter entails all these three analyses.

5.1 DATA COLLECTION TECHNIQUES

A large part of the analysis and diagnosis step of the BPS project is concerned with collecting and analysing data. For this BPS project we used several data collection techniques for different purposes. First, we held semi-structured interviews with stakeholders from the strategic level, which are the managing directors of the two companies in question and a co-owner of the overarching group. These interviews were held to gather information about the M&A context and to retrieve the reasons for the intended IS/IT integration. The interview questions are based on concepts identified in literature. The interview structure for these interviews can be found in Appendix B.

Second, we also held semi-structured interviews with the IS/IT managers of both companies. The goal of these interviews was to retrieve how they perceived the need for an integrated IS/IT. Furthermore, we asked them what their vision was about an integrated IS/IT to identify possible solution directions in this early stage of the research. For the interviews with the IS/IT managers we used a subset of the questions for top-management.

Important to note is that we interviewed only a small group of persons, which resulted in a small data set. This has to do with the fact that there are only few persons within the organization that have knowledge about the covered topics. Although that we collected a small set of data, we do not have the feeling that information is missing. This might have to do with the questions asked. Although that the interviews were semi-structured, the questions were specific by focussing on a certain theoretical concept. This allowed us to analyse and code the different answers by relating them to the theoretical concepts.

For analysing the current situation of the two companies, which is the analysis on the more tactical level, observations were performed. The goal of the observations was to obtain a picture of the processes of the two companies. According to Wijnhoven et al. [12] it is it is important to keep in mind whether the desired working procedures and operations are compatible with the capacities and capabilities of the IS/IT. In order to asses this compatibility we mapped the current business processes of both companies. Employees responsible for the different processes were observed to create an initial model. This model was then validated by the employees and improved where necessary. Comparing the processes of the two companies in the next step allows us to determine whether there are significant differences that could lead to problems when integrating the IS/IT.

According to Zikmund et al. [58] observations can be used as a scientific tool when four conditions are met. These conditions are 1) that it should serve a formulated research purpose, 2) that it is planned systematically, 3) that it is recorded systematically, and 4) that is checked on validity and

reliability. For our observations the research purpose was to map the current business processes, which can later be used to identify bottlenecks. The observations were planned such that they followed the logical flow of information within the organizations. Furthermore, actors that performed the observed processes were explained in advance what we were expecting from the observation and in which type information (data processing using the information systems) we were particularly interested. The observations were recorded by listing the activities of the processes on a sheet of paper. To ensure reliability we produced BPMN models of the processes and returned to the actors to validate these models. The BPMN modelling language was chosen because it is specifically targeted at modelling processes. By observing all steps of the processes, validating the models and following the BPMN language we should be able to produce valid models of the processes. It should be noted however that the level of detail of this models remains a design choice.

For the analysis of the IS/IT landscapes we used EA models, as recommended in our framework. The modelling notation Archimate is about enterprise modelling which allows us to link the technology infrastructure, IS landscape and business processes to each other. These models were derived by questioning the IS/IT employees and external parties, and collecting useful documents such as spreadsheets that contained a list of the used servers and technical specifications of the used IS. These models were designed in an iterative manner. Parts of the landscape were designed and then validated with the IS/IT personnel. Finally, when the model was complete it was validated by the IS/IT managers and the rest of the IS/IT personnel.

5.2 JUSTIFICATION OF THE NEED

For this research, the problem is given by the organization and is defined in terms of a desired future state. In such cases there is no need for a diagnosis, but only for a further analysis and the justification of the need for the desire [22, p. 80]. The justification is important, because it verifies whether the given problem is a real problem and not a perception problem. For justification of the need we focused on the strategic level as well as the more tactical IS/IT level.

5.2.1 STRATEGIC LEVEL PERSPECTIVE

The interviews with stakeholders on the strategic level were held to identify the motive and expectations for the intended IS/IT integration. During the interviews it became clear that the motive for the intended IS/IT integration is twofold.

First, top management considers the IS/IT situation at Company Y outdated compared to the IS/IT situation at Company X. The information systems at Company Y provide less information and insight than the information systems at Company X. One example mentioned by top management is that gaining more insight into productivity of employees and improving the linkages and translations of information by the system to other departments is desired. Thus, initially the benefits should be achieved at Company Y itself by improving information provisioning.

Second, regarding the actual integration the focus is mainly on achieving information sharing at the operational level. According to the interviewees, sufficient information about is available at the strategic level to compare the performance of the companies and make decisions. On the operational level however, there is limited information sharing between the two companies. For example, sales persons at the two companies do not have access to each other's stock levels which might lead to situations in which customers might be turned away while these customers actually could be served by using stocks of the other company.

A part of the strategic level perspective was removed due to confidentiality reasons

Finally, the integration of the IS/IT was already on the agenda of the two companies, but the upcoming retirement of the IS/IT manager of Company Y forced the companies to think about the

future. The interviewees mentioned that appointing a single IS/IT manager for Company X as well as Company Y - instead of attracting a new manager or promote someone at Company Y - is seen as a step that should enable and ease the integration.

5.2.2 IS/IT LEVEL PERSPECTIVE

From the perspective of the IS/IT managers an integration of IS/IT is seen as a logical and inevitable step. Both acknowledge that it should be possible to support the operations of both companies in an integrated manner. From a development and maintenance perspective they merely see benefits in having "one system" for both companies, in contrast to of the diversity of applications that currently exists.

For the future IS/IT manager integration is an important item, but more in terms of consolidation. To avoid managing two different IS/IT landscape, he sees the need to create a standardized IS/IT landscape for both companies. This vision is more or less shared by top management, who see the deployment of LOOP at Company Y as a good opportunity to create integrated information provisioning. Furthermore, the impression is that deploying LOOP at Company Y would improve the information provisioning at Company Y at the same time.

5.2.3 CONCLUSION

The integration of the IS/IT between Company X and Company Y serves several goals. First, there is the need to upgrade the information systems at Company Y. Of course this could be achieved by updating the IS/IT at Company Y without considering the current IS/IT at Company X. However, there is also a need to create a more integrated situation in terms of information sharing. This integration seems inevitable, because this integrated information provisioning is more or less a demand from the industry. For the two companies in question creating an integrated IS/IT - presumably using LOOP - is seen as a possibility to kill two birds with one stone.

Niederman and Baker [54] and Lin and Shang [55] already argued that different stakeholders have different goals. This is also reflected in the need for integration. At the strategic level integration of the IS/IT between Company X and Company Y and upgrading the IS/IT at Company Y is a necessity. For the IS/IT manager the consolidation is an important item, but this is a goal on a more tactical level.

In summary, the integration is definitely a necessity. The intended consolidation is a logical consequence of the decision that makes the current IS/IT manager of Company X the IS/IT manager of two companies. Furthermore, the integration should also be able to take the IS/IT of Company Y to a higher level, which is also an issue that should be solved.

5.3 M&A CONTEXT

5.3.1 GENERAL BACKGROUND

In 2009 the Holding Z announced the desire to acquire the Holding A, the parent company of Company Y. The takeover however faced some resistance. Competition regulators from several European countries started an investigation to find out whether the acquisition would lead to unhealthy competition. It was more than two years later when the last competition regulator gave green light for the acquisition under the condition that the Holding Z stopped with certain activities in the country of the competition regulator. The Holding Z agreed upon this condition so that the merger could start in 2011. Now, three years after the start of the M&A, steps are being made regarding the IS/IT integration. This means that the "window of opportunity" in which employees expect changes as discussed by Niederman and Baker [54] has already passed. This might make it harder for the companies to achieved desired changes.

5.3.2 PREPARATIONS FOR THE IS/IT INTEGRATION

Although there are no specific plans for the IS/IT integration yet, there are already some steps made regarding the IS/IT integration. One of these steps is the realization of a redundant point-to-point glass fibre connection between the two companies, which is not yet in use due to network incompatibilities. This glass fibre connection could support a centralized IS/IT infrastructure in the future. A second step is implementing virtualization technology at Company Y to make their platform more compatible with that of Company X. These steps are however only infrastructural steps. There are no real substantive steps made regarding the integration.

5.3.3 M&A TYPE

For the Holding A, the takeover came at the right moment. The group as a whole was in a poor financial situation by suffering losses several years in a row. Therefore the takeover by the Holding Z was not unwelcome. From that perspective, the takeover was quite friendly by rescuing the Holding A. On the other hand, the companies had been competitors for many years which of course had its effects on attitudes. Initially, an "us versus them" mentality prevailed, but this has become less over the years. However, the rivalry has not completely disappeared as we will see later on.

Regarding the size and the power of the different companies, Company X is definitely the bigger and more powerful company. The production capacity of Company X is roughly twice the capacity of Company Y. Furthermore, the fact the current IS/IT manager of Company X will also be become the IS/IT manager of Company Y will definitely have influence on decision making. It's likely that the IS/IT vision that is present at Company X will dominate decision making in the integration process.

The takeover of the Holding A by the Holding Z was a takeover of multiple companies, including Company Y on which is the focus in this thesis. As already mentioned, before the M&A the companies were operating as competitors by focusing on the same products and markets. Both companies are manufacturing companies that in principle perform the same operations. Thus, when limiting the scope to the Company Y and Company X case, the merger can be classified as a horizontal merger in terms of the framework of Larsson [31]. A horizontal M&A such as that of Company X and Company Y generally allows achieving many synergies compared to other types of M&As [10]. This is particularly true for the so-called technical economies.

5.3.4 EXPECTED SYNERGIES AND DESIRED INTEGRATION

First of all, the organizational structure of the Holding Z and the corresponding relationships between the companies requires some explaining. The group consists of more than 25 companies that have been acquired over the years. Although being part of the same group, each company remains quite autonomous. This preserved autonomy seems contradictory to the idea of creating synergies using IS/IT. Therefore, one of questions in the interview held with top management concerned this perceived autonomy.

Top management explained that maintaining the autonomy is a conscious decision. The autonomy has the form that each company is expected to stand on its own two feet and has self-responsibility for its financial situation. The rationale behind this decision is that top management believes that this way the companies keep trying to outperform themselves and the other companies of the same group. This way the companies remain competing with each other. Of course, the situation is not as black and white as it is being presented. For example, companies within the group regularly meet to see whether they can learn things from each other.

The mentality of the Holding Z corresponds most closely with the preservation approach of Haspeslagh and Jemison [28]. It could be questioned whether the need for autonomy is indeed legitimate, since Haspeslagh and Jemison argue that one in principle should not deviate from the

task of transferring capabilities to create value unless removing boundaries destroys strategic capabilities. However, in the eyes of the Holding Z maintaining the autonomy should result in continuous improvement.

As already mentioned, the boundaries are not as strict as might look like. In terms of the theory of Haspeslagh and Jemison, there is some transfer of functional skills and some resource sharing. Also there is the general management of the Holding Z. From that perspective the situation has some resemblances with the symbiosis approach. A characteristic of symbiosis however, is that the two organizations become increasingly interdependent. This is not exactly the vision of the Holding Z, since they expect each company to be self-reliant. In summary, the approach of the Holding Z tends most to the preservation approach combined with some elements of the symbiosis approach.

With regard to the expected and desired synergies it is also important to look a bit further than just Company X and Company Y. The Holding Z have acquired a lot of companies during the last years. These companies are all active in different parts of the production chain which results in the Holding Z having control over an integrated production chain. Besides, the group has a market share in the industry of approximately 70 percent in The Netherlands and 28 percent in Europe. The integrated production chain combined with the large market share puts the group in a very strong position. Although not explicitly mentioned in the interviews, one could deduce that the Holding Z is striving for monopoly and monopsony synergies. It's clear that the followed strategy has put the group in a position in which they can benefit from these synergies. Since Company Y was a big competitor of Company X, the Holding Z strengthened their position by acquiring Company Y and therefore contributes to achieving the pecuniary synergies.

The preservation strategy that prevails in the group does not allow benefiting from all of the technical economies (or scale economies). This is largely true for the marketing, production and banking synergies. Again, the situation is not as black and white as presented. For example, in the area of marketing a foundation has been established to promote the products. However, the sales departments of the companies act separately for the largest part. The situation within the group does allow taking a look at each others firm sites which results in benefiting from the experience synergy. Furthermore, because the group consists of all different parts of the production chain, it is possible to benefit from scheduling benefits. Finally, there are also the diversification economies. Again, the integrated production chain allows benefiting from these economies. However, since the production chain entails one market, these benefits are not as great as in conglomerate M&As.

It is clear that the situation of Company X and Company Y cannot be seen in isolation from the history and overall strategy of the Holding Z. The acquisition of Company Y was part of the acquisition of the Holding A, which included multiple companies that are all of different value for the Holding Z. Therefore, the intended synergies for the acquisition of Company Y are not that easy to specify. Furthermore, one of the interviewees mentioned that the reason for the takeover of the Holding A is probably one that you could not find in text books. He argues that the Holding Z is steered by business instinct instead of explicitly looking for synergies that exist in literature when making such decisions. However, it is quite safe to say that the takeover of competitor Company Y contributes to achieving pecuniary synergies.

5.3.5 IS/IT INTEGRATION VISION

During the interviews top management and the IS/IT managers of both companies were also questioned about how the future IS/IT should look like. Top management argued that they do not have a clear vision for the IS/IT integration, but they would like to see a centralized IS/IT department in the future. The ERP system of Company X is seen as a candidate with potential, but it is not a requirement per se. In terms of the framework of Giacomazzi et al. [5] the future situation should have the form of "Total integration A" or "Partial Integration A". According to the decision support model of Giacomazzi et al. both of these possibilities are suitable for companies active in the same business

and country. The vision of top management aligns with these two possibilities; the only difference is the level of standardization of software.

As already mentioned earlier, the focus of the IS/IT integration should be on better information provisioning in and between the two companies. Top management stated that cost reduction is not a primary goal.

Furthermore, top management sees the integration as a task for the IS/IT manager who will become manager of both IS/IT depart, who will become the IS/IT manager for both companies. According to Batelaan and Veltman [7] this is an undesirable situation, which might lead to many problems. Especially in the situation when two separate IS/IT departments together have to decide about the future there are many potential problems mainly caused by a political play.

One of the members of top management mentioned that he does not demand that the integration should be finished in the short term. Rather, he sees the integration as a gradual process that might lead to an integrated and more centralized IS/IT department in the coming years. According to the interviewee the first priority should be on getting acquainted with the current IS/IT of Company Y. A next step would be to think about which synergies are achievable. Furthermore, there is no pre-arranged budget set for the integration. According to Wijnhoven et al. [12] IS/IT integration requires a proper budget, time frame and IS/IT policy. For the intended IS/IT integration between Company X and Company Y none of these elements are set yet, although this might have to do with the fact that there is no specific plan available at the moment.

In summary, the vision of top management is to have one IS/IT department for the two companies in the future. There is however no clear vision about what the IS/IT landscape should look like. Furthermore, currently there is no time frame, budget or IS/IT policy set.

5.4 CURRENT IS/IT CONTEXT OF COMPANY X

5.4.1 IS/IT ORGANIZATION

The IS/IT organization of Company X is a small organization that consists of two domains. First, there are the two system administrators who deal with the IS/IT infrastructure. Second, there are two programmers who develop and maintain the ERP system. The IS/IT manager who leads the department also does programming work for the ERP system.

For analysing the IS/IT organization we use the two ideal IS/IT configurations of Johnston and Yetton from section 3.4.7. To start with, the focus of Company X's IS/IT organization is on adding value to the company as a whole. In the vision of the IS/IT manager the IS/IT organization should aim to devote the majority of its time to development and innovation. This way the IS/IT organization can continue with adding value to organization. There is regularly contact with other business departments about possible improvements or new functionality of the ERP system. Within the IS/IT department there is a lot of knowledge about the processes, which allows personnel to think along with employees of other departments about how they can service the needs of the different business units.

The structure of the organization is quite decentralized and professional. Most of the decisions are made on a team basis and there is very little bureaucracy within the organization. The management processes are flexible and the focus is on empowerment by thinking together about problems. Although there is specialization within the department, employees work together on a team basis most of the time. Within the team tasks are coordinated, which reflects an organic structure. Although that the management processes have much in common with the divisional configuration, the organization differs from this ideal configuration by working with position-based rewards.

When focussing on the systems element of the configuration, the IS/IT organization of Company X behaves more like the ideal bureaucracy configuration. The personnel focuses on keeping the IS/IT landscape maintainable by using a single dominant platform and using a simple architecture. This is reflected by the use of a single ERP system that supports all processes. When enhancements should be made to the ERP system, the developers usually first discuss how they can fit this in the current architecture. For changes regarding the IS/IT infrastructure the employees also discuss together how these changes can be made without disturbing the current architecture.

The IS/IT department has a long-serving staff, but sometimes hires external staff for specific expertise. The recruitment and development for IS/IT employees is performed internally. Within the department the emphasis is on merit and not on seniority.

The full overview of the IS/IT configuration of Company X can be found in Table 9. The table shows that in terms of the strategy, structure and management processes the IS/IT configuration of Company X is almost similar to the divisional configuration. In contrast, the systems en roles/skills elements show more similarities with the bureaucracy configuration. The IS/IT organization of Company X is thus a mix of the two ideal configurations.

Table 9: IS/IT configuration of Company X

Characteristics	IT in the machine bureaucracy	IT in the divisional form	Company X
Strategy	Cost focus - efficiency IT driven	**Value added focus – effectiveness** **Business unit driven**	Value added focus – effectiveness Business unit driven
Structure	Centralised Bureaucratic	**Decentralised** **Professional**	Decentralised Professional
Management processes	Formalised Control emphasis Mechanistic **Position-based rewards** IT standards	**Flexible** **Empowerment emphasis** **Organic** Performance-based rewards **IT service**	Flexible Empowerment emphasis Organic Position-based rewards IT service
Systems	**Single dominant platform** **Common IT standards** **Simple architecture**	Multiple platforms Incompatible systems Complex architecture	Single dominant platform Common IT standards Simple architecture
Roles/skills	**Long-serving staff** **Internal recruitment & development** Seniority emphasis	Mobile staff External recruitment & development **Merit emphasis**	Long-serving staff Internal recruitment & development Merit emphasis

We believe that the configuration of the IS/IT organization is affected by the role that IS/IT has within an organization. The managing director of Company X is quite IS/IT minded and sees it as an instrument that can strengthen the company. As an example he mentioned the flexibility that the internally developed ERP system offers. The trend in the market is that customers are becoming bigger and have more demands. Without the functionality that the ERP system offers it would be much harder - if not impossible - to serve those customers. In fact, the managing director argued that in terms of the alignment model of Henderson and Venkatraman [35], Company X follows the *technology transformation* perspective. This reinforces our perception that IS/IT takes an important place within the organization.

The pro-active role that IS/IT has within Company X allows a more flexible IS/IT organization configuration. In contrast, when IS/IT would be solely considered as a supporting mechanism and cost center, the organizational configuration is likely to be different. In such cases the strategy would automatically be on efficiency and control.

5.4.2 IT INFRASTRUCTURE

Discussion of the IT infrastructure was removed due to confidentiality reasons

A simplified version of the IT infrastructure of Company X can be found in Figure 19. For simplicity this figure considers only a few virtual servers. General in the figure implies that there are multiple instances of these entities.

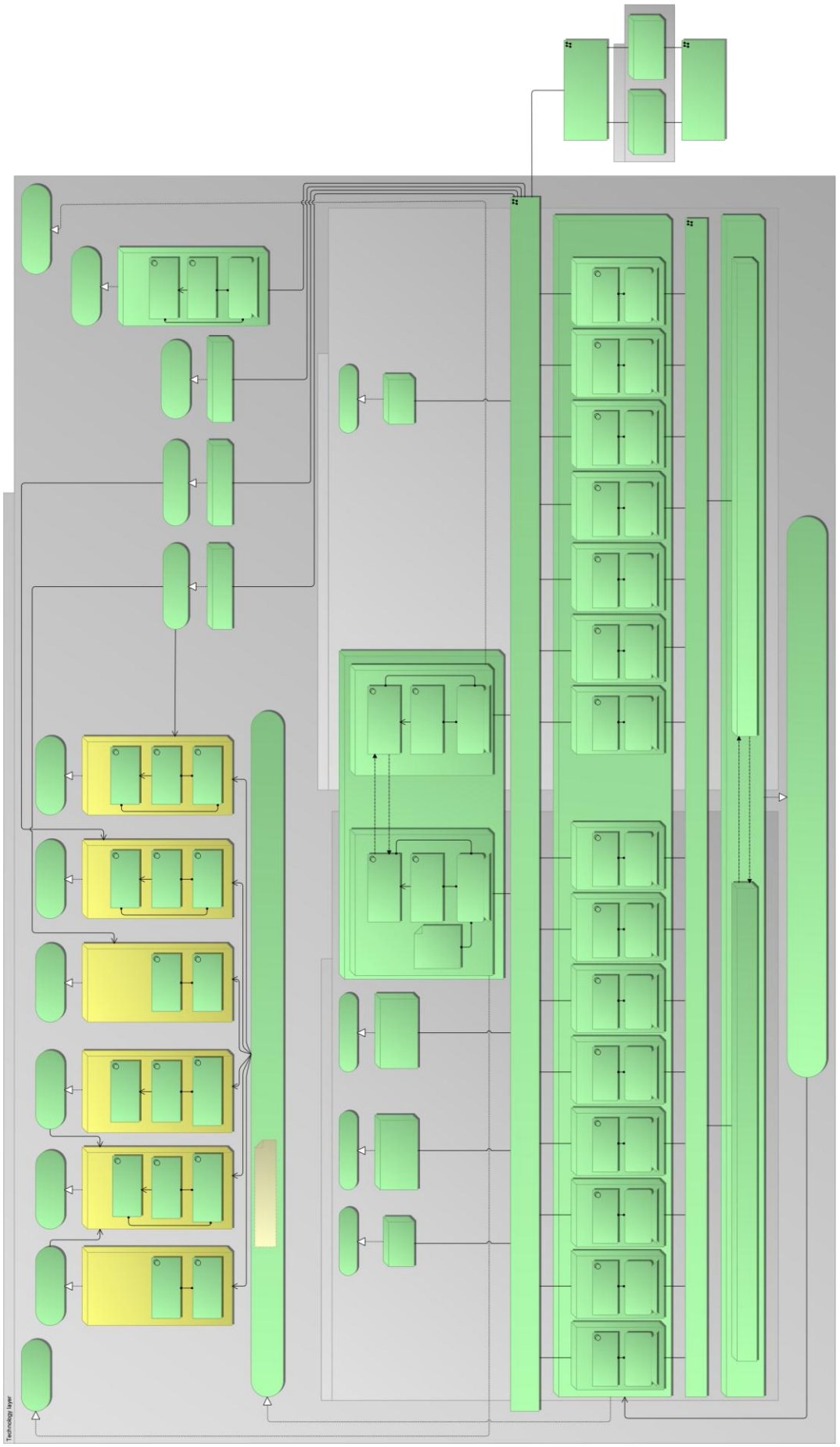

Figure 19: IT infrastructure of Company X

5.4.3 IS AND DATA LANDSCAPE

Process-based analysis

For analysing the IS and data landscape we proposed a process-based approach in our framework. A process-based approach also considers business logic instead of application functionality only. By mapping the processes of the companies it should be possible to analyse gaps between the companies. The results of this comprehensive analysis of the processes can be used in a later stage to assess whether the new IS/IT landscape is compatible with the existing working procedures, which is argued to be important by Wijnhoven et al. [12]. We believe that an in-depth analysis of the processes and IS interaction (which is an analysis on a more tactical level) allows making well-informed decisions and makes companies aware of implications of their decisions. Currently, many IS/IT integrations suffer from problems on a tactical level, which forces companies to change their integration method [19, 21]. By including the tactical level in decision making we hope to prevent this.

We started our process-based approach with identifying the different processes within the organization. For each process we observed an employee performing this process and asked questions when things were unclear. After observing the process a BPMN model was designed which represented the process. This model was then validated by the employee responsible for the process. If necessary the model was improved and validated again. This iteration went on until a satisfactory BPMN model was delivered. Of course, the level of detail of the models is a design choice. For example, we did record all the manual steps within a process. Rather we focused on the steps in which an application is invoked to process information and only discuss the manual steps that are crucial for understanding. Due to time limitations of this research, the main focus is on the operational flow. Functional activities such as bookkeeping are not analysed.

Observing all the different processes was done for several reasons. First, by following the information flow and the flow of goods it is possible to get an understanding of business logic. Second, by observing the processes we could identify the different IS used in the processes. Third, observations allowed us to identify the processed information and the reuse of this information in other processes. Fourth, the BPMN models make it possible to identify major differences in performing business, which can be used to asses the compatibility of processes with new IS/IT.

The detailed BPMN models of the processes of Company X can be found in Appendix C1. The reason for not discussing the models in this chapter is not because the models are of less importance, but because we do not want to make this chapter too long-winded. In this chapter we only present a high level overview of the processes of the companies.

A BPMN model of the overall process of Company X can be found in Figure 20. This model was verified by several employees within the organization. We start with discussing the core process of Company X.

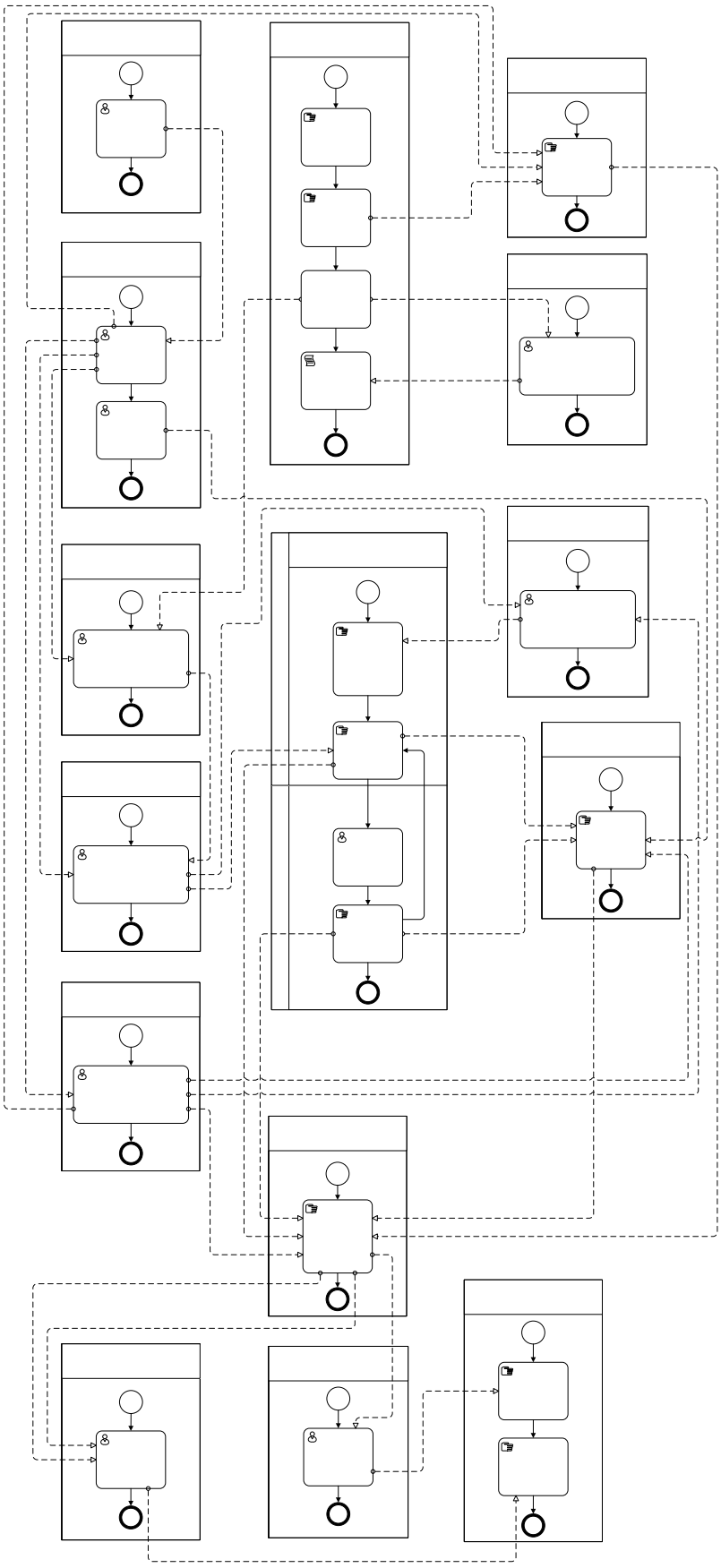

Figure 20: Overall process of Company X

Discussion of the overall process was removed due to confidentiality reasons

EA model

Based on the BPMN models we extended our EA model of the infrastructure with the IS and business processes. Because of limited space this thesis only includes a simplified diagram, i.e. a model that is a subset of the actual EA model and only contains the business processes and IS. This model can be found in Figure 21.

The IS landscape of Company X is very simple. Throughout the whole company the internally developed ERP system is used. The system is used in the office for planning the production as well as in the production itself to enter and update information. The use of a single database has the benefit that users have access to all relevant information and work with the same information. The availability of real-time data makes it also possible to monitor the processes and act upon it.

The EA model of the business process and IS of Company X is therefore also quite simple. There is one main IS which is used in all the different business processes. The IS is composed of several components that have their own functionality but sometimes use functionality of other components. Next to these user-oriented components there are also automated (server) components present in the ERP system. The OPC server translates OPC messages into business logic and visa versa. The process and cyclus servers pick up these translated messages and act upon this messages. The label server prepares the labels with the correct information and sends this as a print job to the label printers.

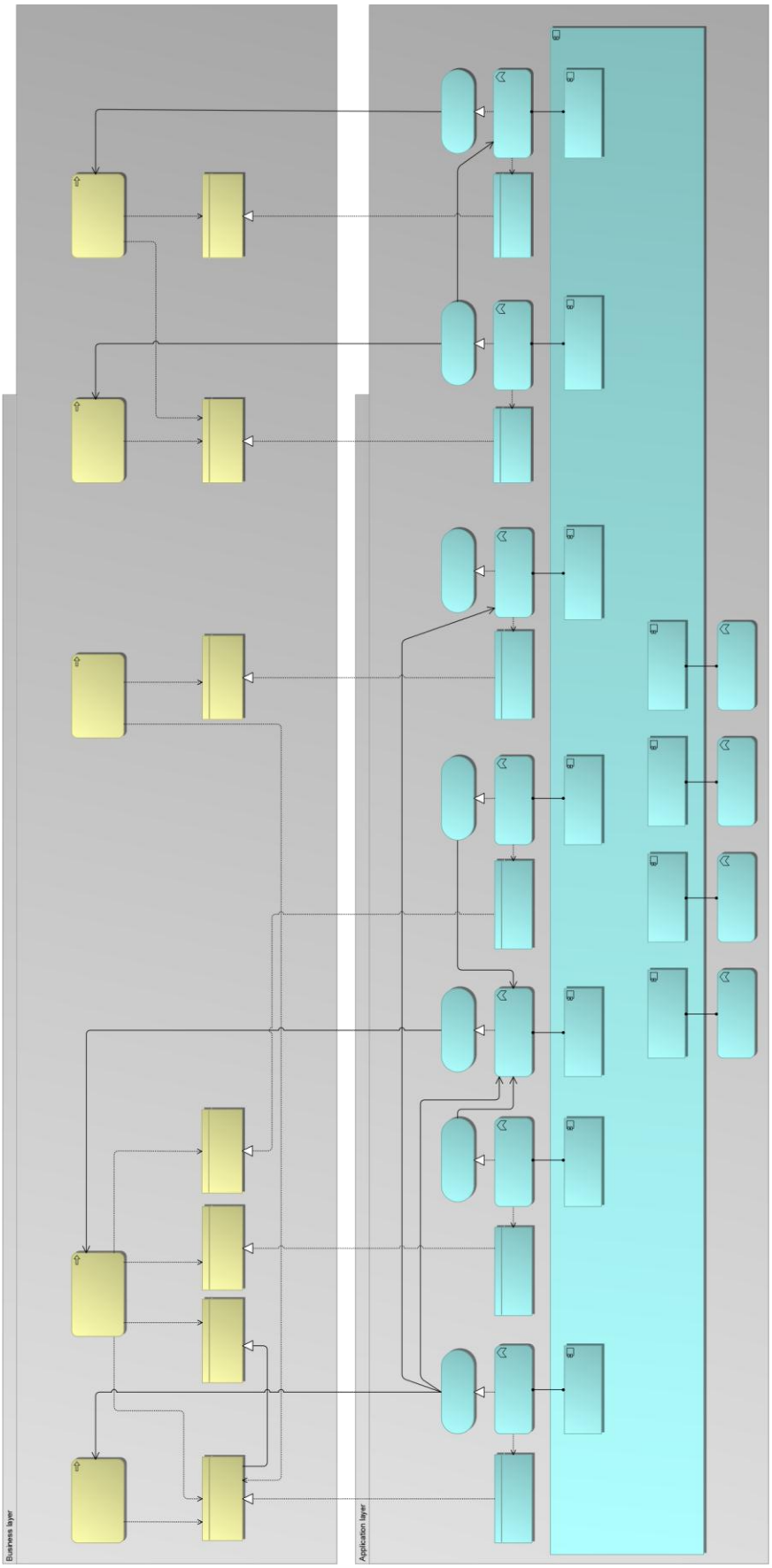

Figure 21: IS landscape of Company X

5.5 CURRENT IS/IT CONTEXT OF COMPANY Y

5.5.1 IS/IT ORGANIZATION

The IS/IT organization of Company Y is also a small organization. There is one IS/IT manager who will retire in the coming years. Furthermore there are two system administrators and one software developer that maintains the COBOL based ERP system. Company Y also has external software developers for maintaining other applications.

Using the two ideal IS/IT configurations of Johnston and Yetton [4] we analysed the IS/IT organization of Company Y. Table 10 contains the IS/IT configuration of Company Y. The table shows that the IS/IT organization of Company Y is a mix of both ideal configurations. The strategy of this IS/IT organization is more cost focused than that of Company X. We believe this has to do with the history of the company as a whole. The company was in bad financial times and this had its influence on the IS/IT strategy. The IS/IT organization had only a small budget and had to be creative to not exceed this budget. Although times have changed, this mentality is still part of the strategy. The IS/IT organization is very business oriented and business driven. The IS/IT manager is somebody with much knowledge about the different business processes and translates this to IS/IT.

The structure of the IS/IT organization is quite centralised. The IS/IT manager of Company Y is a true manager. He is the central point of contact for decisions regarding the IS/IT. Compared to the IS/IT organization of Company X, the organization of Company Y is quite bureaucratic although not exorbitantly. For example, the organization relies much more on written plans and agreements.

The management processes are more formalized and the emphasis is on control. Decisions are made by the IS/IT manager and tasks are then delegated to the different IS/IT employees which reflects a more mechanistic structure. Of course this is not the case for daily pursuits but it applies to projects. The IS/IT organization can be considered a real service oriented organization. The users of the system can consult the IS/IT organization for all their operational IS/IT related problems and the employees will help them to solve the problems.

Company Y has a complicated IS/IT landscape. There are multiple platforms in use and there is little uniformity. For example there is a Linux (before Linux it was Unix) terminal server for the ERP system, because this ERP system was written in COBOL and requires a Unix based system to run on. Furthermore, the IS landscape consists of many applications which were developed by different persons. Special applications were developed to make it possible to exchange data between these systems. For outsiders, but sometimes also for insiders, it is hard to understand how all these systems are connected.

The IS/IT organization of Company Y has a long-serving staff, but also makes use of a mobile staff which are the external software developers that are hired for maintaining applications. Recruitment and development is performed internally and in the organization the emphasis is on merit.

Just as at Company X we also looked at the role of IS/IT within the organization. During our interviews we asked the managing director and IS/IT manager of Company Y how they experience the role of IS/IT within the organization. Both described the role of IS/IT as the *technology transformation* perspective of Henderson and Venkatraman [35]. The perspectives of Henderson and Venkatraman is about the alignment of business strategy and IS/IT strategy which is an alignment on a more strategic level. During our research however we perceived that daily pursuit of the IS/IT personnel at Company Y is quite different from that of IS/IT personnel at Company X. At Company Y, IS/IT personnel spends much more time in helping users by serving as a helpdesk for operational IS/IT issues. For example, many employees make use of Excel sheets and question the IS/IT personnel when they encounter problems with these sheets.

Table 10: IS/IT configuration of Company Y

Characteristics	IT in the machine bureaucracy	IT in the divisional form	Company Y
Strategy	**Cost focus - efficiency** IT driven	Value added focus – effectiveness **Business unit driven**	**Cost focus - efficiency** **Business unit driven**
Structure	**Centralised** **Bureaucratic**	Decentralised Professional	**Centralised** **Bureaucratic**
Management processes	**Formalised** **Control emphasis** **Mechanistic** **Position-based rewards** IT standards	Flexible Empowerment emphasis Organic Performance-based rewards **IT service**	**Formalised** **Control emphasis** **Mechanistic** **Position-based rewards** **IT service**
Systems	Single dominant platform Common IT standards Simple architecture	**Multiple platforms** **Incompatible systems** **Complex architecture**	**Multiple platforms** **Incompatible systems** **Complex architecture**
Roles/skills	**Long-serving staff** **Internal recruitment & development** Seniority emphasis	Mobile staff External recruitment & development **Merit emphasis**	**Long-serving staff** **External recruitment & development**

5.5.2 IT INFRASTRUCTURE

Discussion of the IT infrastructure removed due to confidentiality reasons

The EA model of the infrastructure of Company Y can be found in Figure 22. This model was validated by the IS/IT personnel of Company Y and improved where necessary.

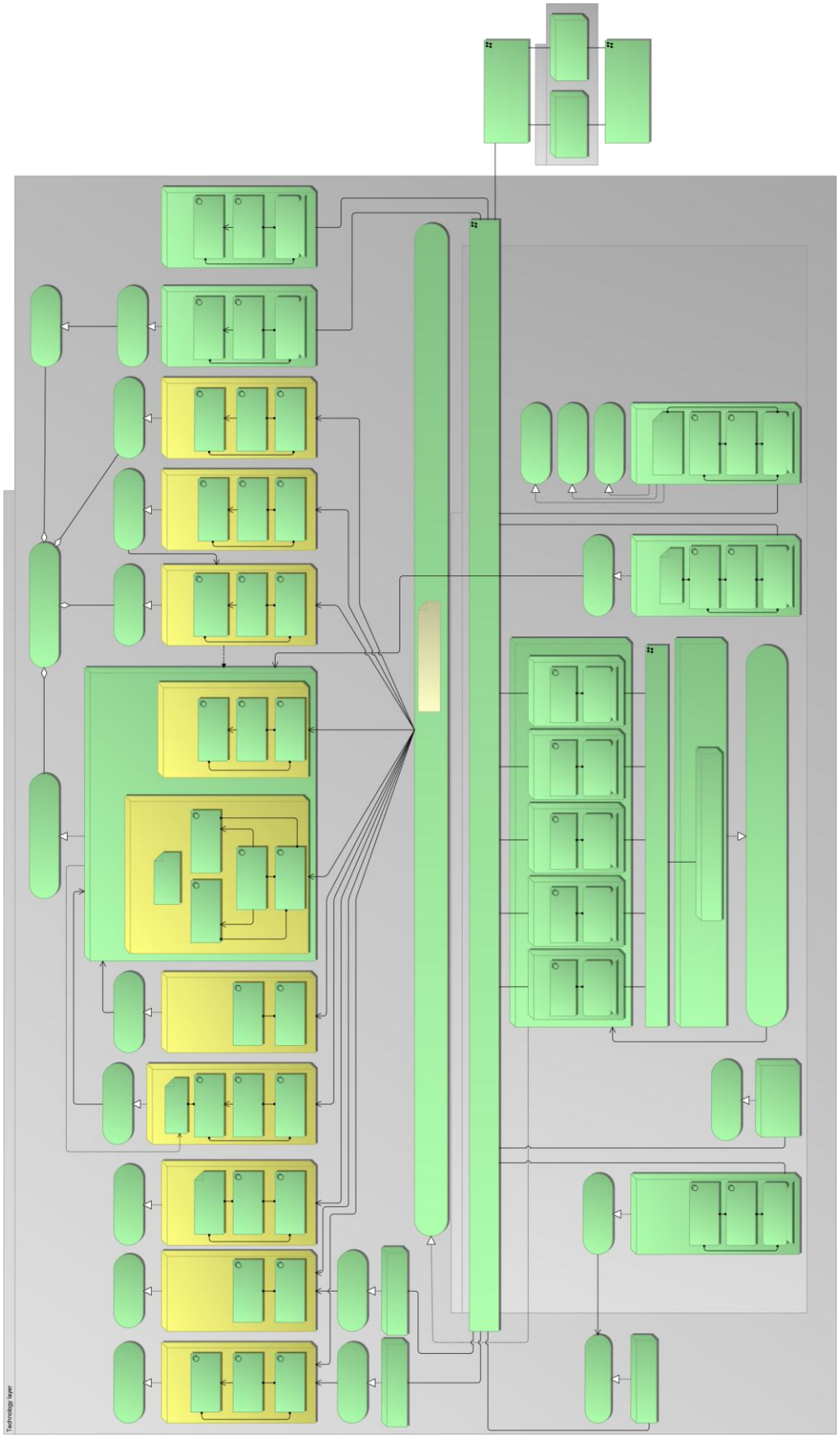

Figure 22: IT infrastructure of Company Y

5.5.3 IS AND DATA LANDSCAPE

Process-based analysis

We performed the process-based analysis at Company Y in the same way as we did at Company X. The detailed BPMN models of the processes of Company Y can be found in Appendix C2. Because the processes of the two companies have many similarities we will not use this section to discuss the processes of Company Y in detail. Rather, we use this section to point out the similarities and differences in the business processes of the two companies. The high level overview of the processes and the information and product flows between these processes can be found in Figure 23.

Discussion of the model removed due to confidentiality reasons

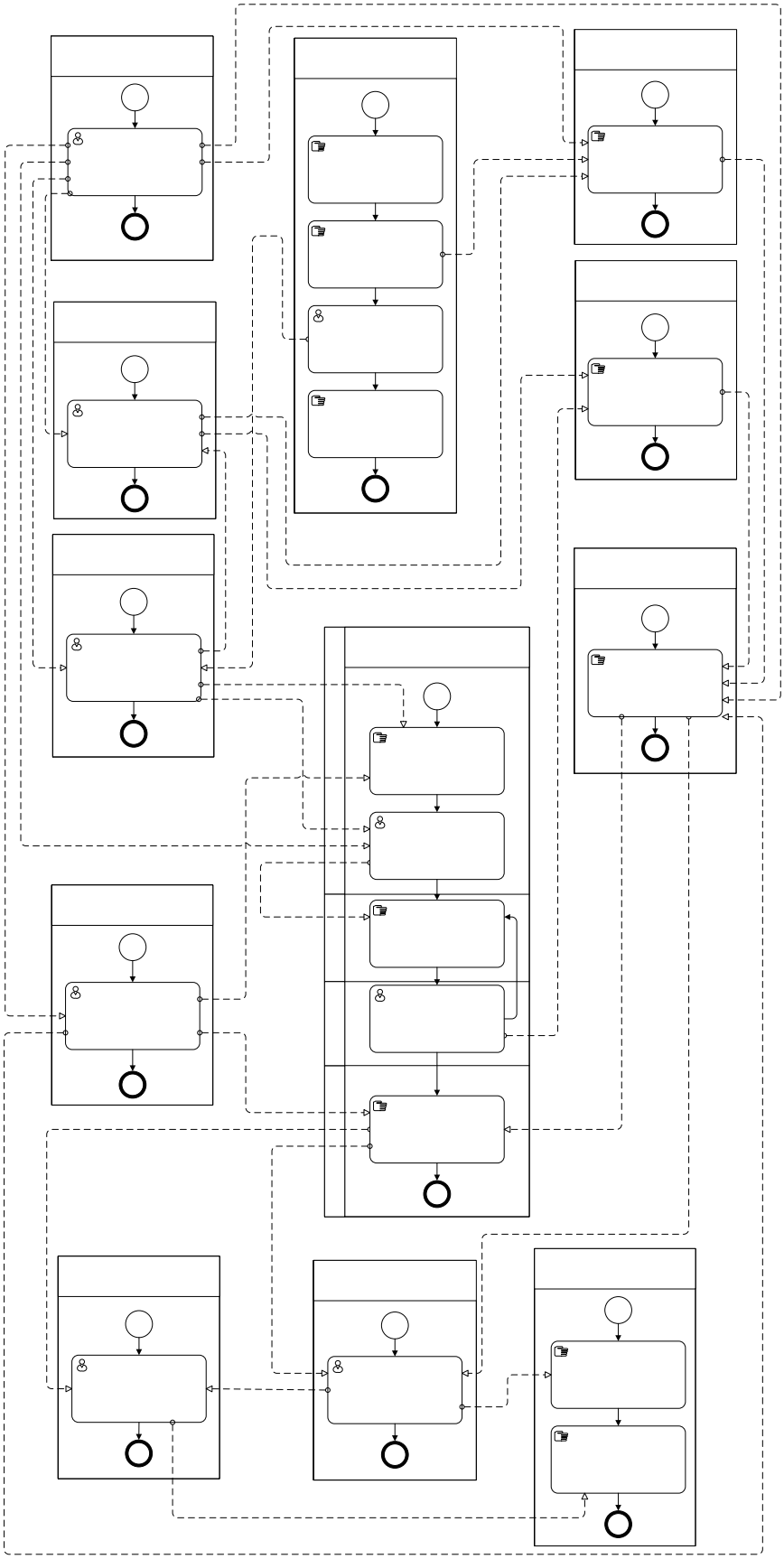

Figure 23: Overall process of Company Y

EA model

Based on the process-based analysis, in which we also identified the used applications, we extended the EA model of Company Y. Compared to the EA model of the IS landscape of Company X, the EA model of Company Y is more complex. There are many different applications with dedicated functionality that exchange data.

Discussion of the EA model removed due to confidentiality reasons

The EA model of the business processes and the IS of Company Y can be found in Figure 24. Note that we used a slightly different modelling approach in order to model the data exchanges. That is, we modelled the databases used by the different IS as data objects. In the EA model of Company X this was not necessary because of the use of a single database. Finally, because of space restrictions only a subset of the business processes and IS are included in the model.

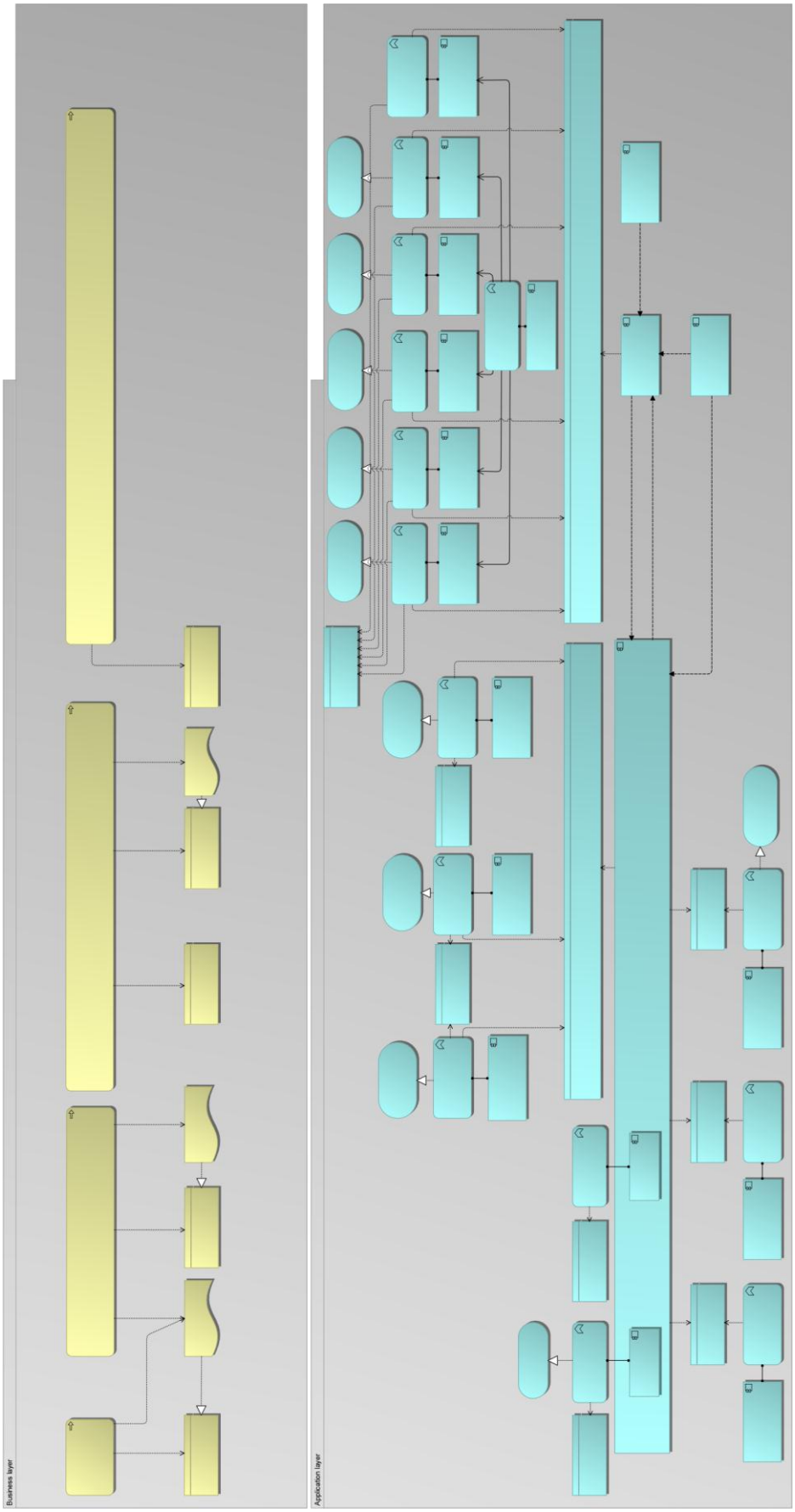

Figure 24: IS landscape of Company Y

6. PLAN OF ACTION

The analysis and diagnosis step is followed up by plan of action step. In this step the solution for the problem should be designed. Ideally, one uses solution concepts from existing literature when designing a solution [22, p.14]. Furthermore, a solution design should be accompanied with a change plan. This change plan should describe how the solution design should be realized. This chapter starts with the solution design and then discusses the change plan.

6.1 SOLUTION DESIGN

6.1.1 SPECIFICATIONS

During the analysis and diagnosis step we derived the objectives for the IS/IT integration. We will now use these objectives as specifications for the solution. First, the integration should lead to an improvement in information provisioning at Company Y. Second, the solution should make it easier for the two companies to exchange information. Third, the solution should contribute to IS/IT consolidation. Currently the IS/IT landscapes are completely different and isolated from each other. To keep the IS/IT landscapes maintainable for one IS/IT manager in the future, the solution should therefore focus on consolidation.

Please note that the first two specifications are not very specific. Improvement of information provisioning and easing information sharing are quite broad concepts. We believe however that these specifications are sufficient for choosing a solution direction.

6.1.2 POSSIBLE SOLUTION DIRECTIONS

Literature provides us with several solution directions, which were discussed in chapter 3. Four main integrations methods were identified, namely renewal, take-over, standardization and synchronization. We will use the information collected in the analysis and diagnosis step to determine the applicability of these different methods.

Renewal refers to abolishing all current IS/IT and designing a whole new integrated one. Such a new design typically includes a (re)design of processes and activities. A reason for choosing this method is when the current IS/ITs are not capable of supporting "the new organization" [12]. In our case, there is not really a new organization. Both companies will continue to exist and therefore we should question whether one IS/IT can support the operations of both companies. During our analysis we found out that the business processes of both companies are very similar. Of course, how the processes are performed in detail differs between the companies but by and large the processes are the same and the same information is processed within the companies. Or put differently, we did not encounter major differences in processes which require drastic changes and thus believe that it should be possible to have one IS/IT for both companies. Another main reason to choose for renewal is when *both* companies have an outdated IS/IT landscape. We believe that this does not apply to our case. The IS/IT of Company X (especially the ERP system, which forms the largest part of the IS landscape), is perceived as very powerful and functional by both parties. That having said, renewal remains a possible option for the Company X-Company Y case. Application of this method will however require a time-consuming redesign which in turn might lead to changes in the business processes of both companies.

The second possible method is take-over. In this method the existing IS/IT of one company is used to support the new organization, or in our case both companies. A prerequisite for this method is that that the chosen IS/IT is scalable [7]. Take-over might lead to high resistance but may be appropriate under some circumstances [12]. One of these circumstances mentioned by Wijnhoven et al. is when the IS/IT of one of the companies is considered superior to that of the other. This definitely applies to

our case, in which the ERP system of Company X is considered superior. Application of this method would then result in implementing the ERP system of Company X at Company Y as well. As mentioned earlier, based on the business processes analysis, we would like to argue that the ERP system of Company X can support the business processes of Company Y. This ERP system however also steers the production (equipment) of Company X and thereby relies on the production infrastructure. To make the take-over method possible, there are two possible options. The first is to adapt the ERP system such that is suitable for the production infrastructure of Company Y. The second is to change the production infrastructure such that it matches the structure of the ERP system. The latter is however much more expensive and therefore the take-over method will require adaptions to the ERP system. In our analysis we did not focus on the used equipment (PLCs etc.) in the production. An additional analysis is required to determine how compatible the current infrastructures are and which adaptions to the infrastructure are necessary.

The third possible integration method is standardization. In the standardization approach parts of both IS/ITs are used to form the new IS/IT. Although that this "best-of-breed" approach sounds like a very nice solution, it turns out to be very hard to realize in practice [7]. From a technical perspective this method requires building interfaces between all the different applications, which is complex but generally not impossible. The real problem lies in what is called synergy; a whole that is greater than the simple sum of its parts. Often the value of an application landscape is formed by the set of applications and interrelations as a whole. When taking out one or two applications these interrelations are gone and the value decreases. Based on our analysis we argue that this also applies to our case. If we consider the ERP system of Company X, which is considered superior, we would argue that the power of that IS comes from its integrated nature. We believe that mixing up the application landscapes - by taking parts of this ERP system to use them at Company Y - will not allow the companies to exploit the full potential of this system.

The fourth possible integration method is synchronization. In this method only little integration is achieved because it only entails developing 'bridges'. This means that the IS/IT landscapes are connected such that they can exchange information and thus synchronise information. Actually, this is what is currently the situation between Company X and Company Y. The two companies are already exchanging the most crucial information which requires a lot of data conversions. Although the synchronization may be extended, this method will not lead to much more integration because separate IS/ITs will remain to exist.

The methods discussed above are concerned with the IT infrastructure and the IS landscape. Our framework also entails determining the options for organizational integration. The vision of top management is to have a single IS/IT department for both companies. Besides, once an integrated and consolidated IS/IT landscape is realised, it makes no sense to have two separate IS/IT departments. Thus the direction for the organizational integration is clear. The details for the organizational integration will be discussed in the next section.

In section 3.4.6 we discussed the different integration modes, namely complete integration, partial integration and co-existence. The four mentioned integration methods are suitable for achieving different integration modes. For example, renewal, take-over and standardization are suitable for complete integration whereas synchronization is the only suitable method for co-existence [12]. The M&A of Company X and Company Y is a horizontal M&A and has many resemblances to a preservation approach. Following Wijnhoven et al. [12], such an approach corresponds with a co-existence IS/IT integration objective. The IS/IT integration objective formulated by top management and especially by the IS/IT managers has however more resemblances with the complete IS/IT integration objective. This means that when taking the formulated IS/IT integration objective for granted, the M&A objective and IS/IT integration objective are not aligned. This is not a problem per se, as empirical evidence showed that non-aligned strategies can also be successful [21]. As mentioned, there are no major differences that prevent complete integration.

6.1.3 CHOOSING A SOLUTION DIRECTION

Now that we have a list of possible integration methods we will relate these methods to the specifications that are based on the analysis of the M&A context.

Before discussing the contribution of the different methods we want to relate these methods to the desired integration mode, which is complete integration. Complete integration can be achieved using different integration methods. According to Wijnhoven et al. [12] these are renewal, takeover and standardisation. Synchronization is only suitable for co-existence, which is not desired by the organizations and will therefore not be discussed.

It is easy to see that renewal will contribute to the specifications. When designing a new ERP system for both companies, one can include the specifications for information sharing and information provisioning. Furthermore, such a single ERP system will contribute to consolidation of the IS landscape. The costs of designing and developing such a new system are however likely to be out of proportion to the objectives.

Implementation of the ERP system of Company X at Company Y (take-over) will bring the information provisioning of both companies on the same level. Because the organizations then use the same data structures it should be easier to exchange information. Furthermore, it results in consolidation of the IS/IT landscapes. In short, the benefits of renewal and take-over are roughly the same. The renewal method is however expected to be much more complex, risky and time consuming compared to the take-over method. Adapting the ERP system to the production infrastructure of Company Y will require some time, but is expected to be much cheaper and less time-consuming than redesigning the whole ERP system.

In theory, standardization should contribute to improving the information provisioning and information sharing. But Batelaan and Veltman [7] already argued that the results of a best-of-breed project are hard to predict, because in many cases the mixture of applications goes not as planned and often introduces gaps and overlap. This makes us believe that it will not lead to full consolidation, but may even lead to a more complex IS landscape.

In a meeting with the managing director of Company Y and both IS/IT managers the options for the future of the IS/IT were discussed. The outcome of this meeting was that the focus should be laid on the take-over method. Therefore, we will take the take-over method as the starting point for our solution design.

6.1.4 SOLUTION DESIGN

In our framework we distinguished three main elements of a solution design, namely the IT infrastructure, the IS landscape and the IS/IT organization. We will start this section with discussing the IT infrastructure. The EA model of the integrated IT infrastructure can be found in Figure 25.

IT infrastructure

During our analysis we observed that the IT infrastructures of the two companies are quite similar. Both organizations use the same virtualization techniques to host their servers. In addition there is a big overlap in the virtual servers in terms of infrastructure software and services. This should make the integration much easier than a situation in which completely different and incompatible infrastructures exist.

Discussion of the IT infrastructure removed due to confidentiality reasons

The integration on the infrastructure level allows achieving synergies by consolidating infrastructure nodes and services. For example, there is no need to maintain two separate Citrix environments, file

servers or print servers. This consolidation will result in a decrease of virtual machines and should make maintenance less time consuming. Of course there will be virtual servers that are dedicated to one of the organizations. The OPC servers are a good example of this. The two organizations should compare all the virtual machines that they have running to determine whether these can be consolidated. This is however out of scope for this research.

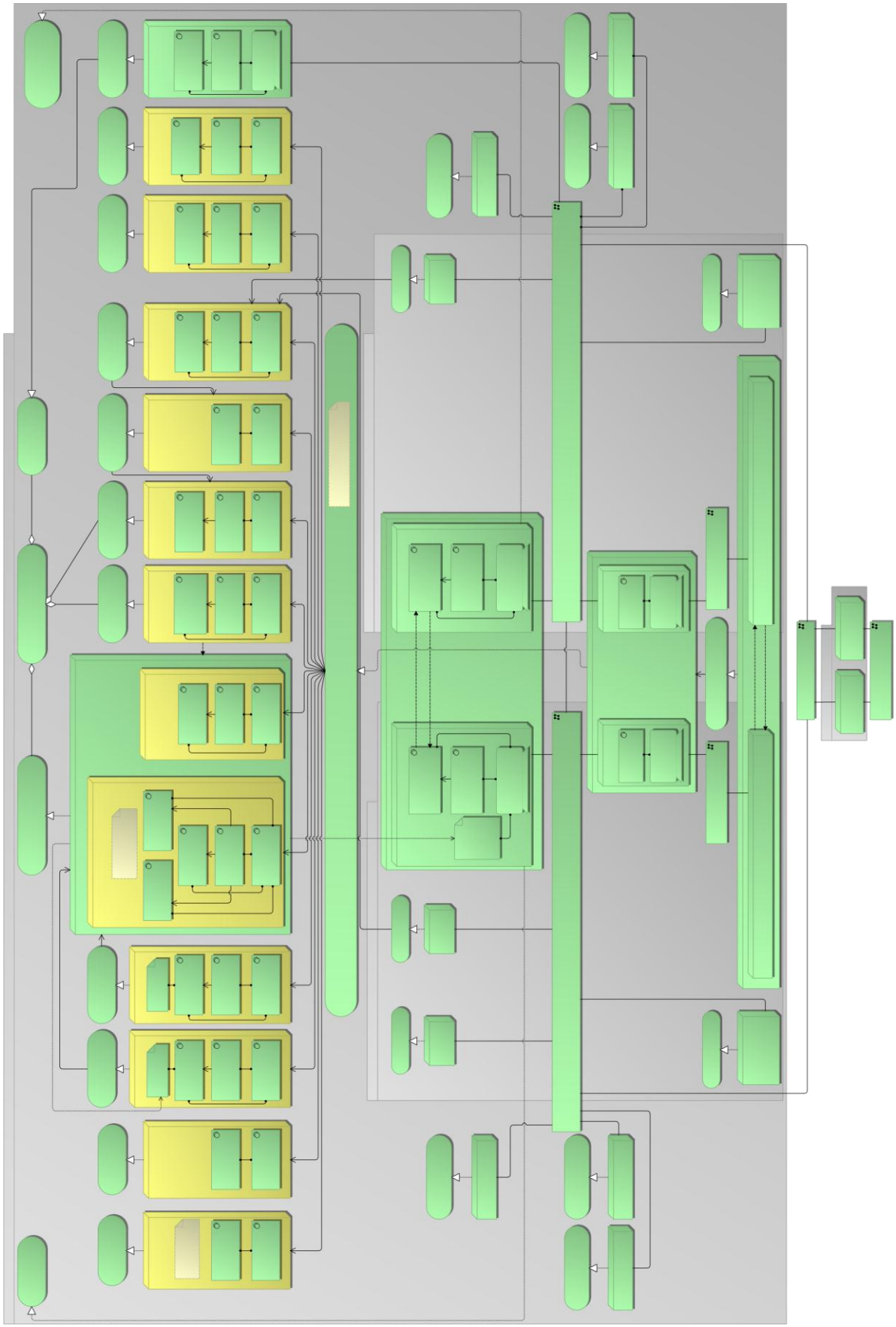

Figure 25: Integrated IT infrastructure

IS and data landscape

For the IS landscape the changes are more substantial. These changes will mainly affect the IS landscape of Company Y because of the take-over method. Therefore, the focus of this section is on the IS landscape of Company Y.

First of all, based on our process analysis we would like to argue that there are no major differences in the workflow of both companies. Of course some tasks are performed a bit different but by and large the workflow and information flow of the companies is the same. Therefore we believe that it should be possible to have one ERP system that supports the operations of both companies. As discussed in the previous section the solution design focuses on the take-over method using the ERP system of Company X.

This ERP system is however actually a combination of an ERP system and a Manufacturing Execution System (MES). The relationship between these different type of systems can be found in the automation pyramid in Figure 26. The lowest level levels – the control systems and sensors levels – are the more hardware related levels where simple control actions are done. An example with respect to Company Y and Company X are the PLCs that steer a product within the production. The highest level is the ERP level which entails strategic and tactical planning as well as sales- and business-related functions [59]. That is, at this level the whole supply chain is considered and coordinated. Between these levels there is the MES layer, which has the purpose to fill the gap between the other layers. This layer translated the business targets to the production level [59]. Harjunkoski, Nyström and Horch [59] argue the levels are not fully standardized and that distribution of tasks over the levels might differ between organizations.

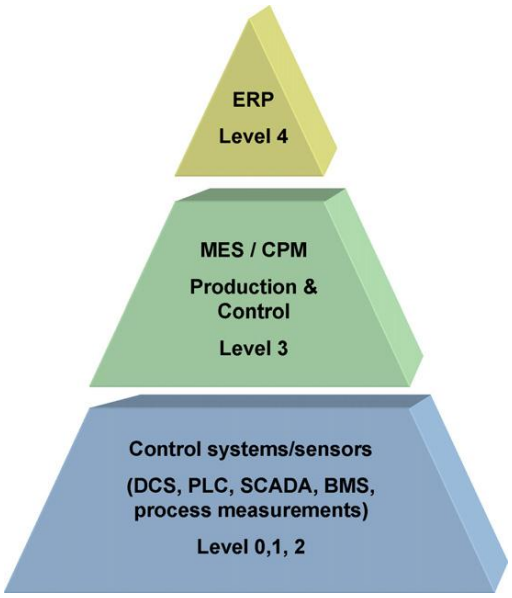

Figure 26: Automation pyramid [59]

As mentioned, the ERP system used at Company X acts on the ERP level as well as the MES level. For example, the same system is used for entering orders as well as communicating with the PLCs to make the product go left or right. We do not foresee unresolvable issues for porting the ERP part of the system - which is the more office oriented part - to Company Y. The problem lies in the MES part of the system, which gathers information from the production and at the same time steers the production. This part of the system is tailored to the used equipment and logistical infrastructure which is quite different at both companies. Transferring the MES part of the system requires a lot of changes to software and/or equipment and logistical infrastructure. Therefore was decided - in

consultation with the IS/IT manager - to design a solution that takes the ERP part of the system and connects this to the existing MES software at Company Y. In this solution the MES software retrieves information from the ERP system and provides the ERP system with the results of the production. Important to note is that this way the ERP system does not loose its integrated characteristic but is only supplied with data in a different way. The ERP will still steer the production, but only via the MES software instead of directly interacting with the lowest layers. Thus, the to be designed solution will not be a full take-over approach. Instead, the take-over method is used as the starting point and applied where possible. Where it is impossible or very hard (requiring a lot of effort) to implement the new ERP system, interfaces will be built to communicate with the existing MES software. As mentioned, this will only apply to applications used in the production environment.

We used EA modelling to design the new IS landscape for Company Y. This design should be considered as a high-level design. The EA model shows which IS should be connected and how these IS can be connected. These choices are based on the type of information that is processed by the different IS. A next step in the design, which is out of scope for this research, would be to determine how to deal with data conversion and possible incompatibilities. We will not discuss the whole model in detail, since this would require a lot of explaining regarding the different applications and information, but approach the model from a high level.

Discussion of the EA model removed due to confidentiality reasons

The EA model of the new IS landscape of Company Y can be found in Figure 27. As mentioned, this is a high level and simplified design. Because of space restrictions we only included some of the business processes and omitted the business objects. For the same reason we did not draw all the components and functionality of the ERP system. The application layer is however complete, i.e. it contains all the IS that are required in the new situation.

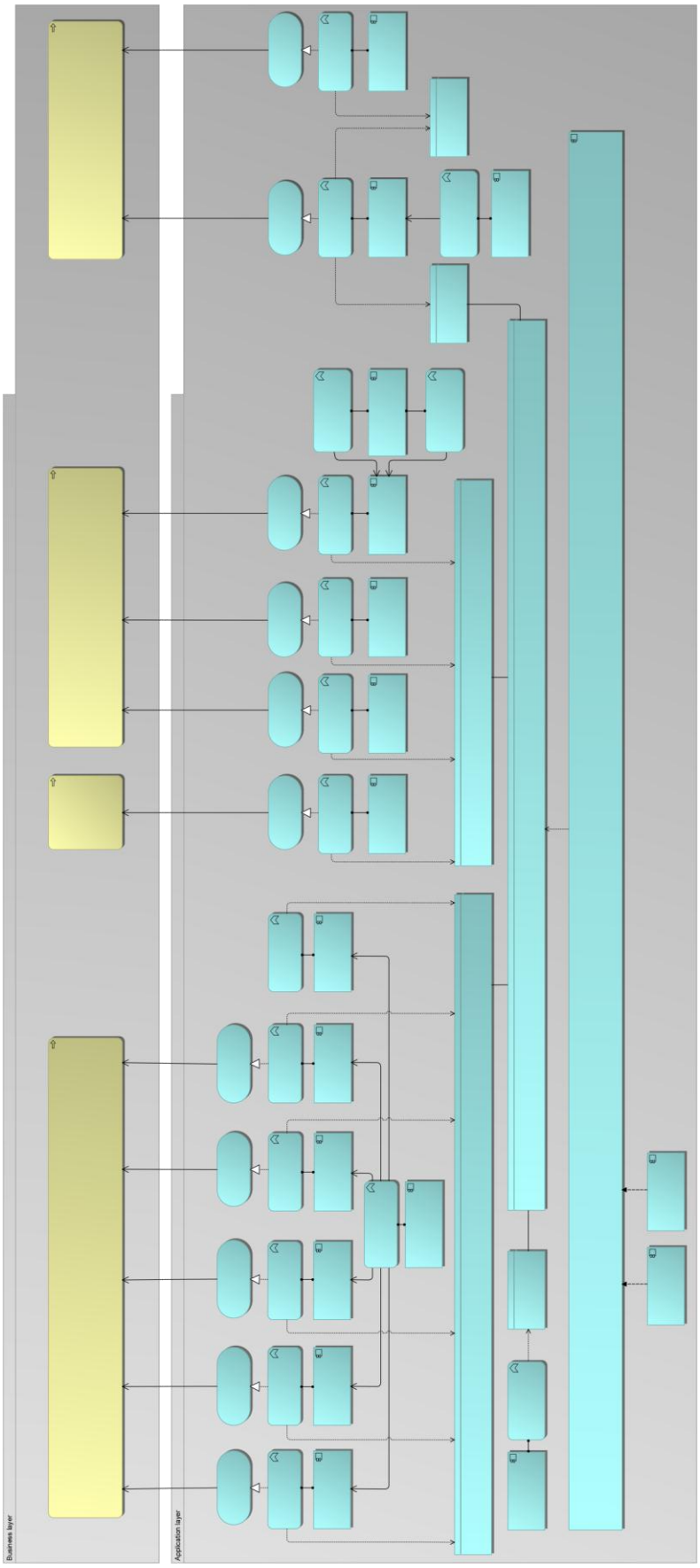

Figure 27: New IS landscape of Company Y

IS/IT organization

Our framework also entails the integration of the IS/IT organizations. In our framework we distinguished three important elements with respect to organizational integration. These are the organizational structure, the IS/IT strategy, and vendor management.

During our analysis and diagnosis we also paid attention to the IS/IT organizations by comparing the organizations to the ideal configurations of Johston and Yetton [4]. The outcome of this analysis is that both IS/IT organizations are mixtures of the two ideal configurations. More important is that these mixtures are quite different. Especially the discrepancies in strategy, structure and management processes need to be resolved as soon as possible to avoid conflicts such as contribution conflicts (see section 3.4.7). Lin and Chao [43] found that changing the group member values and promoting shared IS/IT values may help to reduce such conflicts. Therefore, we would like to advise to arrange a meeting with all IS/IT employees to discuss the future and vision of the new IS/IT organization.

We analysed the IS/IT organizations as a whole. This means that we do not have detailed information about the capabilities and interests of each employee and we will therefore not decide upon role and task distribution. However, we would like to make some recommendations with regard to the organizational integration. Currently the two companies have their own IS/IT departments which work closely with different business units. This close relationship allows joint development of software which is a very good characteristic of both IS/IT organizations. Integration of the IS/IT organizations is a logical decision, but it would be unwise to have all employees in one office at one of the two companies. Such a centralized IS/IT department is likely to have a negative effect on the close business-IS/IT relationship that currently exists in the companies and might make the new IS/IT organization less effective.

The second important element of the organizational integration is the future IS/IT strategy. We already mentioned that this strategy should be discussed with all the employees as soon as possible. Such a strategy should be formulated by the IS/IT manager in liaison with top management. We want to make one important recommendation regarding the IS/IT strategy. A choice should be made regarding the role that IS/IT has within the organizations, or more specific how employees within the organizations use the IS/IT departments. We perceived a difference in this usage, and this might lead to conflicts when there is a centralized IS/IT department.

Finally there is the issue of vendor management. In the current situation the two companies already share many vendors for buying hardware equipment and hiring external consultants. The main difference is that Company Y currently hires several external software developers whereas the 'vendor' for software at Company X are the employees of the IS/IT organization. In the designed solution, there will be one external party that will be the vendor for the MES software for Company Y. The software developers of the integrated IS/IT organization will be the vendors for the ERP system that will be used in both companies.

6.2 CHANGE PLAN DESIGN

According to van Aken et al. [22, p. 100] a change plan consists of several components. First of all, a change plan should include a specification of the redesigned business system and the corresponding performance. Second, a change plan should include the objectives of the change process as well as a 'delta-analysis' which outlines the major differences between the current situation and the designed situation.

Based on these major differences one should specify the required actions to realize these changes and by whom these actions should be performed. In addition the change plan should include a design of the change organization, which is the temporary structure in which employees work to achieve the changes.

Finally, an intervention strategy should be part of the change plan. For designing this strategy one has to start with a final stakeholder analysis and a resistance analysis. Based on the expected resistance the intervention strategy can be developed, which focuses on the organizational aspects of the change process. The final element of a change plan is a communications plan that specifies how and when the various stakeholders are informed about the project itself and the process.

6.2.1 REDESIGNED BUSINESS SYSTEM

In section 6.1 we elaborated on the redesigned business system and use this section to summarize this solution. The solution consists of several elements, namely an integrated IS/IT organization, IT infrastructure and IS and data landscape. The IS/IT organizations should be integrated such that the employees share the same vision and together can support the two companies in the future. The integrated IT infrastructure makes the companies connected and results in better resource deployment because of shared infrastructure services. Finally, the integrated IS and data landscape, in which both companies use the same ERP system, should result in improved information provisioning at Company Y and at the same time should ease information sharing between the two companies.

6.2.2 CHANGE PROCESS OBJECTIVES

The change processes has multiple objectives. First, there is the realization of the integrated IT infrastructure, IS and data landscape, and IS/IT organization. Second, there is a training objective. Especially the major changes in the IS landscape will affect the users of the IS/IT. Although that the high-level workflow is not changed radically, users will have to work with a totally different system. To make sure that users of the system are able to work with it, the change process should include making the users acquainted with this system.

6.2.3 DELTA ANALYSIS

Based on our designed solution we now identify the major changes for each element of this designed solution. For the IT infrastructure a major change is the move to three MERs instead of two MERs. A minor change is upgrading the hypervisor software at Company Y such that both organizations can make use of common virtualization service can be deployed. Once this is achieved, the IS/IT employees can start with consolidating IS/IT infrastructure services which can be considered a major change as well.

For the IS and data landscape we consider all changes major. Many applications will be removed and connections between the existing MES software and the new ERP system need to be built. Luckily, this MES software currently is in the same role as in the new situation. The legacy ERP system provides information to the MES software, which at its turn acts upon this information. In the new situation the roles of the ERP system and MES software will be the same. The changes in the

application landscape are not solely a technical issue since they affect many users within the company. Although that the business processes do not require significant modification, the tasks will be performed using a different system. For the users this move to a new system can be perceived as a major change.

Finally, for the IS/IT organization the major change will be the integration of the strategy, management processes and structure. Currently, these elements differ somewhat between the organizations. The IS/IT employees already know each other because IS/IT personnel of Company X has already provided support to the IS/IT employees of Company Y several times.

6.2.4 ACTIONS AND CHANGE ORGANIZATION

Now that we have listed the major changes we can specify the actions to realize these changes and assign them to persons.

An important action that should be taken is getting the IS/IT employees on the same page. We believe this is a task for the IS/IT manager(s) and top management. We propose to set up a meeting with all IS/IT personnel to discuss the future of the IS/IT organization in terms of structure and strategy as well as the role of IS/IT within the organization. Of course, this meeting should also cover the intended integration solution. Such a meeting, or possibly multiple meetings, should get the IS/IT employees on the same page.

Another organizational aspect is preparing for the IS/IT integration. Currently, the integration is treated as any other IS/IT project that is on the to-do list. However, we believe that the integration is a large project for which time and resources should be reserved. Or put differently, no new projects should be set up and other projects need to be finished or put on hold once the organizations start the integration project. This way the IS/IT personnel can devote sufficient time and resources in realising the planned changes and resolving issues once the solution is put into operation.

Furthermore, there are actions required to realize the actual integration. One task is the integration of the IT infrastructure. As mentioned, the solution prescribes two MERs. This requires a redistribution of hardware over the locations and might require acquiring additional hardware to make each MER powerful enough. Thus, before starting with a redistribution the IS/IT personnel needs to investigate whether the current hardware is powerful enough or that additional hardware should be acquired. Furthermore, the hypervisor software for the virtualization service should be brought to the same version such that a shared pool can be created for the virtual servers. Once this is achieved, the IS/IT employees should start with investigating which infrastructure services can be consolidated and which services should be kept redundant.

The software developers should take care of the integration of the IS landscape. Our solution design of the application landscape contains several linkages between the MES software and the ERP software. To realise these linkages the software developers need to contact the external party that is responsible for the MES software to discuss the details about the data exchange, such as the type of information and data format. The development of all the interfaces should be performed while the old IS landscape remains untouched. During this phase the new ERP system is installed but only used by the software developers to test the linkages between the MES software and the ERP system. Once all interfaces have been developed the ERP system is ready to be put into operation.

The new ERP system should however not be put in operation before all users are acquainted with it. We propose to set up meetings with employees of Company Y and Company X that perform the same business processes. The employees of Company X know the ins and outs of the relevant parts of the ERP system and can show the employees of Company Y how they work with this system. Letting the employees of Company Y work with the system at Company X is expected to be a good training. We advise to make the IS/IT integration project manager part of these meetings for unforeseen problems. For example, when an employee thinks that the ERP system is not suitable this is can be

picked up by the project manager such that it can be investigated and resolved. We believe that this meetings should not be arranged to early in the integration process, but should be scheduled when significant progress is made. If there is a significant period of time between the learning and the actual use of the system, the employees might be a bit rusty on the use of the ERP system.

In our framework we also mentioned that setting a time frame is important. The proposed solution is however quite high level and requires some further investigation, for example about the details of the interfaces between the ERP system and the MES software. Therefore, it is unfeasible to set a realistic time frame for the integration. Once the details about the integration are known it should be possible to asses how much time is required for the different elements of the integration. Based on these findings the project manager should set a time frame and plan.

6.2.5 FINAL STAKEHOLDER AND RESISTANCE ANALYSIS

First of all, a company wide IS/IT integration affects the whole organization. More important are the stakeholders that are directly affected by the changes. In our final stakeholder analysis we will therefore restrict ourselves to the direct stakeholders and discuss the expected resistance.

We identified two main groups of stakeholders. The first group of stakeholders is formed by the IS/IT employees that are subject to the organizational integration. The second group consists of the employees of the different departments that are affected by the changes in the landscape. Using our EA models we can tell that the employees who perform the business processes *Sales*, *Planning*, *Logistiek, ..*, *Facturatie* and *Portier* are affected by the changes in the IS landscape.

For these stakeholders we will now try to assess the expected resistance. Van Aken et al. [22, p. 101] mention five different sources of resistance. The first source of resistance is a lack of understanding. We do not expect that this will be a source of resistance. The IS/IT employees are aware of the fact that the IS/IT manager of Company Y will retire and we have the feeling that they understand the choice of management to create a centralized IS/IT department. For the employees of the affected business process we do also expect low resistance from this source. During the analysis and diagnosis we had many conversations with these employees and they mentioned their selves that their IS could be improved.

The second potential source of resistance is formed by differences in opinions. Although that stakeholders understand the problem, they might disagree with the solution. We find it hard to asses whether the IS/IT employees fully agree upon the idea of a centralized IS/IT department. We believe that they do not disagree about the organizational integration in general. Our perception is however that the employees are mainly wondering what the integrated IS/IT department will mean for them. Radical changes in the organizational structure and task and role distribution may lead to serious resistance from the employees. To minimize this risk the companies should pay attention to perceived fairness of the employees, as argued by Lee, Lee and Yang [41]. We expect that the implementation of the ERP system of Company X at Company Y will receive support from the employees of the affected business processes. Many employees know the system by name and heard about its functionality and wanted to know how the system actually worked. Or in other words, the system has a good reputation within Company Y and therefore we expect not much resistance.

A lack of trust in the members of the change organization is the third potential source of resistance. This lack of trust can be based on the intentions or the competences of the change organization. First of all, the actual change organization will be formed by employees of the organizations. This integration project will probably be led by the IS/IT manager of the new IS/IT organization who already works many years for Company X and is a well known person within the two organizations. We do not believe that employees of the organizations have doubts about his competences, but they might have doubts about the intentions of the integration. This applies to the employees of the IS/IT organizations and to a lesser degree to the employees of the other affected business units. An

integration might be perceived as threatening because it may lead to redundancy in jobs or processes. However, top management argued that the intentions for the integration are not cost reduction or job elimination. Because of the followed preservation approach, both companies will remain separate organizations and the organizational integration will be limited to the IS/IT organization. I.e. the analysed business processes will not be centralized but will only be performed using the same information systems. To reduce the risk of resistance caused by a lack of trust in intentions, the actual intentions should be communicated to the employees.

Low willingness to change is the fourth potential source of resistance. As mentioned, we believe that the IS/IT employees do not oppose the idea of an integrated IS/IT department in general. During this research the IS/IT employees were informed about the goals and the topic of the research, which is the intended IS/IT integration. The employees were found to be very helpful by supplying information about the current IS/IT situation. We believe that if these employees were resistant to changes this cooperation would be much lower. Thus, we see this as an indicator that the employees are not resistant to changes in general. This also applies to the employees of the affected business processes. After the observations and validation of the models of the business processes, several employees of Company Y asked whether the processes differed between the companies because they had the feeling that some tasks could be further automated. This shows that these employees are not unwilling to change.

The last potential source of resistance is formed by conflicts of interest. With regard to the integration of the IS/IT organizations this might be a source of resistance. Currently, the employees of the IS/IT organizations have their own tasks and roles and corresponding responsibilities. In a new integrated situation this may all be different which may conflict the interests of the employees. For the employees of the affected business processes this resistance is expected to be much lower. There will not a reorganization within these business units but the change for them lies in the use of the new ERP system. In fact, we expect that the new ERP is beneficial for the employees because they will have access to more information.

6.2.6 INTERVENTION STRATEGY

The required actions and expected resistance will now be used for developing an intervention strategy. Van Aken et al. [22] propose that the organizational change processes should follow the TPC model of Tichy [60] and distinguish three types of interventions. The first is the technical intervention, which is typically a report that spells out the problem and solution. The second type of intervention is the political intervention which refers to a formal order. The third type of intervention is the cultural intervention in which stakeholders are invited to participate in the project. For each of the required organizational changes we will propose one or more of these types of interventions.

We would like to emphasize once more that before making any interventions the two companies should prepare for the IS/IT integration. Thus, no new IS/IT projects should be instantiated and current projects need to be finished or put on hold.

In the previous section we made an assessment of the expected resistance. Based on this assessment we would say that the integration of the IS/IT organizations forms the major source of potential resistance. According to Batelaan and Veltman [7] one should be organized before starting automation activities. Therefore, the two companies should start with minimizing the resistance from this source. We propose to set up a meeting with all IS/IT personnel to discuss the future of the IS/IT itself, the IS/IT organization in terms of structure and strategy as well as the role of IS/IT within the organization. We believe that this meeting should have a technical as well as a political character. The presentation itself, which is best given by the IS/IT manager, forms the technical part of the intervention. To give the meeting a political character, both directors as well as the retiring manager should take part in the meeting. Of course, the outline of this meeting should be prepared in liaison with the managers and directors to make sure that everyone is well informed and agrees upon the

contents of the presentation. This meeting will serve two major goals. The first goal is to take care of employees' perceived fairness. Currently the employees are aware that things will change in the future but what exactly will change is unknown to them. The meeting should take care of this uncertainty and give the IS/IT employees insight in the decisions and the reasons for these decisions. The second goal of the meeting is aligning the group members values and promote shared IS/IT values in order to prevent future conflicts. During our analysis we identified some differences between the IS/IT organizations and this meeting can be used to create a shared view on for example the IS/IT strategy.

As mentioned, the integration will affect employees outside the IS/IT department as well. Although that we held conversations with employees of all departments within Company Y about the integration topic, we think that it's wise to make a technical intervention in the form of a company wide email to all employees which announces the integration and the steps that will be taken. Important here is to mention that employees of the relevant business units will be invited to the training sessions in a later stage.

From this moment the IS/IT employees can start with integrating the IT infrastructure. Once the integration of the IT infrastructure is finished the employees can continue with the IS landscape by setting up the test environment and building the required interfaces. As mentioned, these interfaces should be built in liaison with the external party which is responsible for the applications used within the production.

Once serious progress is made with the integration of the IS landscape meetings should be arranged and held with the affected users. Thus these users should be contacted to make an appointment for these training sessions which will be attended by a member of the IS/IT integration team.

After the training has been finished and the IS/IT landscapes are fully integrated it is time to take the new IS landscape into production. The IS/IT employees now have to be prepared to deal with unforeseen issues and questions from the users.

6.2.7 COMMUNICATIONS PLAN

A good change plan should also include a communications plan which spells out the ways and timing of informing the stakeholders about the nature, timing and progress of the change plan [22, p.100]. In the previous section we already proposed such of those communications:

- Communicate the details of the solution and change plan to the IS/IT employees by arranging one or more meetings with the IS/IT personnel
- Communicate the intended integration company wide by sending an email with the announcement accompanied with a notion that users will be invited to training sessions in a later stage
- Invite the users of the new IS landscape for a training session by directly contacting them

In addition we want to propose regular meetings to monitor of the progress of the project. First of all the progress of the integration should be monitored by the IS/IT department itself. This could be done in weekly meetings. Furthermore we think that it is important that the IS/IT managers should discuss the progress with top management on a weekly basis as well. This way top management will stay involved and can help to decide upon unforeseen issues.

6.2.8 SUMMARY

Based on our designed solution we outlined the required changes for the IS/IT integration. It is clear that the IS/IT integration will be a costly undertaking which requires a big change process. In terms of the IT infrastructure and business processes there are a lot of similarities between the two

organizations. The IS landscape however requires a lot of modifications. These changes will demand a lot of time and effort from the software engineers. The organizations should realize that this will have an effect on other projects. Also from an organizational perspective there are some differences. The two IS/IT organizations differ in strategy, structure and management procedures. Resolving these differences is very important, but might not be as easy after all.

6.3 SOLUTION JUSTIFICATION

To evaluate our solution and change plan we organized a focus group. According to Tremblay et al. [61] focus groups are very useful for evaluating a design. The participants of the focus group were both IS/IT managers and managing directors participated. Unfortunately the managing director of the overarching group was unable to attend the focus group session. The focus group started with a presentation in which the research was discussed. We discussed our approach, the designed framework, the major empirical findings, how these findings led to our solution and change plan, and of course the solution and change plan itself.

We started with putting the focus on the approach and framework. The participants of the focus group believed that the developed framework was comprehensive enough to perform a good analysis and make a well informed decision. They did not have the feeling that the framework omitted important aspects. One of the participants however had one point of criticism which had to do with the application of the framework. Our framework entails a cost-benefit analysis and the participant argued that such a cost-benefit analysis is an important aspect which could have been more detailed. The other participants agreed that this cost-benefit analysis is important, but there were also two participants who argued that it would have been unfeasible for this research to make such a detailed cost-benefit analysis because of the size of the project. They believed that his should be part of a further investigation in which all details were worked out to make a valid cost-benefit analysis. It is however clear that the cost-benefit analysis is an important aspect which should receive sufficient attention. To summarize, the approach and framework itself were well received but the cost-benefit of the analysis itself could have been more detailed.

A second focus was on the use of EA models. The participants were very positive about these EA models. All participants found the models to be intuitive and they argued that they made the topic more tangible. One participant mentioned that especially the layers of the EA models helped him to gain a better understanding of the coherence within IS/IT landscapes. The solution design contained many existing elements which were recognised by the participants and they argued that the models helped them to understand what the solution means to the landscapes.

In the next part of the focus group the focus was put on the actual evaluation of the solution design and change plan. We had several questions for determining how well the solution contributes to the goals. One of these goals is improving the information provisioning at Company Y. The majority of input came from the managing director and IS/IT manager of Company Y. They argued that the changes are such widespread that it is hard to predict whether this information provisioning is improved at all places within the organization. One participant mentioned that he expects that there will be places in which the integration might have a negative effect on the information provisioning but company-wide speaking the information provisioning will definitely be improved. Another goal is to make it easier for the companies to exchange information. After bringing up this topic, the participants mentioned many examples of current problems. The participants shared the opinion that the designed solution forces the organizations to process and record information in the same way, which would allow them to make it easier to exchange this information and this would eliminate many of the existing problems. The participants expect that this standardization of information processing and recording will not be easy but they acknowledged that this is unavoidable and should be undertaken in order to make information sharing easier. One of the participants mentioned that using the same ERP system is probably the best way to ensure data compatibility and he argued that the choice for a single ERP system as proposed in the solution was therefore the only right

choice. Another goal was achieving consolidation of the IS/IT. There were no criticisms or suggestions for alternatives regarding the technology infrastructure and the participants believed that the designed solution will definitively contribute to consolidation. For the IS landscape there was one participant who argued that the consolidation might be taken a step further. He proposed that consolidation should also be achieved at the MES layer by streamlining the production environment and equipment. Another participant agreed that further consolidation should be a goal, but argued that the proposed solution on this further consolidation should once the proposed solution has been realized.

The last part of the focus group was about finding out whether the participants found the solution and change realistic and whether they were willing to put the solution and change plan in practice. There was no participant who found the designed solution and change plan unrealistic, but several participants argued that the details of the solution should be worked out such as calculating the required capacity and equipment for the integration. At the end of the session one of the participants concluded that the designed solution should form the basis of the integration. All other participants shared this opinion. We believe that this session thereby led to organizational support for the designed solution. The focus group was actually the first meeting in which all these persons together discussed the issue of the IS/IT integration. Therefore we believe that this focus group session was also valuable for the organizations because it led to a decision regarding the IS/IT integration.

In summary, the solution and change plan were well perceived by the participants of the focus group. The major criticism was about the cost-benefit analysis, but at the same time the participants acknowledged that it would have been impossible to make such a detailed analysis because the details of the plan are not worked out. The focus group ended with the participants making the conclusion that the proposed solution should form the basis for the actual integration. This makes us believe that we derived a solid solution.

7. EVALUATION

The evaluation step is the final step of a BPS project. According to Van Aken et al. [22, p. 113] there are four objectives in the evaluation step. First, the evaluation step should evaluate the BPS project in terms of results and further improvements that need to be made. Second, the evaluation step should be used for learning from the BPS project for future problems. Third, this step could be used for advancing scientific knowledge. Fourth, evaluation should serve as a means for personal and professional development of involved persons. This chapter discusses the evaluation step in terms of the four objectives.

Before we discuss the evaluation step we would like to make an important remark about this BPS project. From the start of the project it was clear that the project would not include an implementation of the solution (the intervention step) due to time restrictions. The absence of this intervention step disables us to determine the end results of this BPS project. Nevertheless, the we will evaluate the BPS project as far as possible. Besides, the evaluation step does not solely focus on the project-oriented evaluation but serves other objectives as well.

7.1 PROJECT-ORIENTED EVALATION

Project-oriented evaluation removed due to confidentiality reasons

7.2 LEARNING FOR THE FUTURE

Learning removed due to confidentiality reasons

7.3 SCIENTIFIC REFLECTION

We will use the scientific reflection to discuss the scientific contributions of this project and make an attempt to assess the quality of this research.

7.3.1 CONTRIBUTIONS

According to van Aken et al. [22] there are four ways in which a reflection on a single case can contribute to existing literature. The first type of contribution is innovation, which refers to the development or discovery of something new. The framework that was developed during this BPS project can be considered as innovative. As observed by Toppenberg and Henningsson [16] existing studies have focused on analysis, describing and exploration of the subject. We developed the framework because we did not encounter (comprehensive) theory that prescribes how to analyse the current situation and design an integrated landscape and a corresponding integration strategy. With the framework we aimed at developing an approach that uses existing knowledge in a systematic way, which should contribute to more deliberate decision making regarding the future IS/IT and the integration strategy.

The framework, which has the form of step-by-step approach that can be used as a guideline, is based on concepts from literature. We extended the framework by proposing an EA perspective and the use of EA modelling. For forming the EA models we proposed an analysis of the business process, which is an analysis on a more tactical level. Other IS/IT integration studies often ignore this level of analysis, but we included the tactical level because many integrations suffer from problems that arise on this level [19, 21]. Considering the tactical level in an early phase of the integration is likely to reduce the risk of being confronted with unforeseen (major) tactical problems in a later stage.

We are a bit cautious in determining the contributions of the framework. In this BPS project the framework proved to be of added value. It allowed a systematic analysis of the current situation and

design of a future IS/IT. However, the designed solution has not been implemented yet. Therefore it is impossible to determine whether the framework indeed contributed to a solid solution. Furthermore, the framework was only applied to a single case which makes it impossible to make real conclusions about its value. Although that we believe that our framework is a good first attempt, it requires further testing by applying it to other cases. The usability of the framework in other cases will be discussed in section 7.3.4.

The second type of contribution is elaboration on existing designs and theories. What can be considered as elaboration is the performed systematic literature review. This literature review gives an in-depth overview of existing knowledge in the field and relates findings of multiple studies to each other. This elaboration on existing knowledge was useful for framing this research, but can also be used by other researchers to identify what and how has been studied before.

The third type of contribution is confirmation of verification of existing knowledge or claims. This research verifies multiple claims. To start with we would like to confirm the claim of Batelaan and Veltman [7] who argue that the task of IS/IT integration should not be fully delegated to IS/IT managers. Put differently, involvement of top management is important for success [8, 34, 49]. This case shows that delegating the job the IS/IT managers and indecision at the strategic level slows down the integration process. The IS/IT departments continued with their daily pursuits and only small steps were made during the BPS project. Setting a proper time frame and IS/IT policy, as recommended by Wijnhoven et al. [12], is likely to reduce the risk of creating a never ending project.

Finally, this study reinforces the claim that different stakeholders in an IS/IT integration have different goals. From a business perspective the goals were improving information provisioning and sharing. The IS/IT manager was mainly looking for consolidation to prevent maintaining two different and isolated IS/IT environments in the future.

The fourth and last type of contribution is falsification. Falsification is about findings that contradict claims in the existing literature. We can be short about this type of contribution, since none of our findings contradict existing claims.

7.3.2 CONTROLLABILITY

A first requirement for achieving inter-subjective research agreement on research results is controllability [22, p. 157]. Controllability is about revealing how the study was executed. In this thesis we included the details of our research methodology and data gathering methodologies and how these methodologies were applied. For example, we included the details of our literature research such as the search phrases and the used search engines. For the interviews and focus group we included the questions and structure of these sessions. We also outlined how we performed the observations and how the results of the observations were validated.

7.3.3 RELIABILITY

Another important aspect of a scientific research is the level of reliability. Reliability is about the replicability or repeatability of results or observations [62]. With respect to reliability there are four potential sources of bias: the researcher, the instrument, the respondents and the situation [22, p. 158]. We will discuss for each of these potential sources how it applies to this research.

The first potential source of bias is the researcher. In unreliable researches the research results are dependent on the person who conducted the study [22, p. 159]. This research was conducted by a single researcher and is therefore more sensitive to a bias. Coding, for example, was done by one person. To make the results of coding more reliable, multiple researchers should independently perform the coding [22, p. 159]. This allows comparing the different code results two ensure *inter-rater reliability*. Furthermore, this research has been conducted by a master's student. Van Aken et al. [22,

p. 11] argue that a students presence generally is not experienced as disruptive by the organization, in contrast to a consultancy firm. Students are therefore more likely to be able to collect in-depth information and retrieve the real story. This research, which depended to a large extent on retrieving information from employees, could yield other results when it is conducted by a researcher with a different background. After all, integration remains a delicate subject.

Another potential source of bias is formed by the used instruments. In this research we started with a rigorous literature review following the methodology of Wolfswinkel et al. [23]. This methodology uses Grounded Theory to systematically review the literature by identifying concepts. We discussed how the methodology was applied, for example we discussed how we formed the search terms. This should make it possible for other researchers to reproduce our search. We discussed the literature and the development of the framework by referring to the literature. Of course, the design process remains a creative leap and other researchers might have delivered a different framework. By discussing the development of the framework we hopefully made clear how *we* established the framework.

For the empirical part of our research, which was the application of the framework to the Company X-Company Y case, we relied on semi-structured interviews, observations and a focus group. Reliability can be increased by triangulation which refers to using multiple research instruments. Although that we made use of different research instruments this should not be fully considered triangulation. The different research instruments were used to gather different data. For example for the analysis of the M&A context we made use of interviews, whereas the observations served for analysis of the business processes as part of the IS/IT context. We selected the research instruments based on what we thought was suitable for the object of study. The reason for omitting triangulation has to do with the number of available respondents, which will be discussed in the next paragraph. In short, there were only few relevant people we could interview or observe for the different topics in this research. Triangulation of research instruments would have resulted in approaching the same employees and taking even more time of them. At the same time we had to take into account the time constraints for this research and the proposed triangulation would make the analysis phase even more time consuming than it was now.

The third potential source of bias concerns the respondents. The main problem during this research was that we could only target a small set of people for the different topics within this research. For example, for analysis of the M&A context and the companies' strategies we depended on the managing directors of the two companies and the overarching group. This also applied to the observations, because these were focused on a certain business process which was only performed by a small number of employees. Finally, for evaluation of the solution we depended on the managing directors and IS/IT managers because only they had sufficient knowledge about the topic. We tried to reduce the bias by employing triangulation where possible. For the M&A context analysis the managing directors were asked the same questions to get a clear view or at least an inter-subjective view. The models created based on the observations were validated with an other employee than the employee who was observed if this was possible. It is however clear that we were very dependent on the input of the respondents and a small set of respondents may have led to a bias.

The fourth and final potential source of bias is formed by the circumstances in which the research was performed. We believe there were no specific circumstances that led to unreliability. Of course, our case has its characteristics which may be different for other cases. These characteristics will be discussed in the next section when we look at the external validity of this research.

To summarize, the researcher and the limited number of relevant respondents (and thereby the lack of triangulation of research instruments) may have led to less reliable results. This however mainly applies to the case specific results and only to a limited extent to the framework.

7.3.4 VALIDITY

Another quality criterion of scientific research is validity. Research results are valid when the way to this results is justified [22, p.163]. We will discuss the three types of validity as mentioned by Van Aken et al.

Construct validity

The first type of validity is construct validity and refers to the quality of the operationalization of a concept. Or put differently, it questions whether the measure of a construct sufficiently measures the intended concept [63]. Van Aken et al. [22, p. 163] argue that construct validity is achieved when two requirements are met. First, the concept should be completely covered. Second, measurements should have no components that do not fit the meaning of the intended concept.

The definition of construct validity uses the term measurements, but according to Van Aken et al. the concept of internal validity can be interpreted broadly. We will use this section how we identified and operationalized the concepts.

We started with the comprehensive literature review and developing the framework. For developing the framework we combined knowledge of many studies to create a comprehensive overview of concepts that are relevant to IS/IT integration in M&As. We believe that this has contributed to the first requirement of construct validity. The concepts were operationalized in the empirical part of our research. The first phase consisted of analysing the M&A context. We did this by interviewing the managing directors of both companies and the overarching group. The interviews were semi-structured interviews in which we included all relevant concepts for the M&A context and tried to stay as close to the identified concepts as possible to ensure that relevant questions were asked. In the second phase we made an analysis of the IS/IT context. For analysing the IS/IT organizations we chose to use the ideal IS/IT configurations of Johnston and Yetton [4]. These configurations consider different elements that together form the IS/IT organization. The research of Johnston and Yetton showed that a comparison of configurations is a good way to identify differences and explain culture conflicts. We believe that this also applied to our case and that these configurations helped us to sufficiently analyse the IS/IT organizations. The analysis of the IS/IT context started with observing all the business processes to create a model of these processes and to identify the used IS. For these models we used the BPMN language which is specifically aimed at modelling business processes. The actual operationalization of the IS/IT landscape was performed using EA models. The used modelling language, Archimate, was specifically designed to model the interaction between business processes, applications and technology which makes it very suitable for modelling the IS/IT landscape.

We would like to note that we performed a lot of member checking during this research. All the models created in this research were validated by members of the organization. The answers and input from the interviews and focus group were summarized at the end of theses sessions to make sure that the there were no misunderstandings. This was done to validate our findings.

Internal validity

A second type of validity is internal validity. This type of validity concerns the conclusions about the relationships between phenomena. This research does not include many of these conclusions. The major conclusion that we *would like* to make is that our framework contributes to a systematic approach and deliberate decision making. Although that we have the feeling that the framework definitely contributed in designing a solid solution and change plan, we cannot underpin this relationship with empirical evidence. Because there was no implementation step we cannot say that use of our framework resulted in a solution and change plan that in turn led to a seamlessly integration. Even if we had results of this implementation, such a conclusion would be unfounded since it is based on a single case study.

External validity

The third and final type of validity is external validity. External validity refers to the generalizability of research results. One way of generalization is generalization by similarity [27]. Ghaisas et al. [27] argue that generalization by similarity can be achieved in three steps. First, one should outline the architecture of a case. The second step is to identify mechanisms created by this architecture and explain it in terms of the architecture. The last step is to asses whether a target case has the same mechanisms and a similar architecture.

In this thesis we already discussed the details of the case and we will now focus on the parts of which we believe that they introduced mechanisms which led to certain effects. Our case was a quite friendly horizontal M&A of two manufacturing companies. The actual M&A took place already some years ago and the IS/IT integration was postponed until now. Or put different, there was no Wall Street effect that required hasty decision making regarding the IS/IT integration. Furthermore, because the IS/IT is very intertwined with the production processes and equipment it was even more important for the manufacturing companies to make a well informed decision.

During the application of our framework we found out that applying the framework is quite time consuming. The architecture of the case however allowed this. First, because the IS/IT integration was not a urgent issue and there was no Wall Street effect there was no need for hasty decisions regarding the IS/IT integration. At the same time the companies were very aware that the decision for the integration must be well informed because the production of the companies might be seriously disrupted in the case of a bad decision. These characteristics allowed us to take our time for the analysis.

Another important characteristic of our framework is that it requires a lot of information gathering on different levels. In our case the actual M&A took place already some years ago. During an M&A employees generally face a lot of uncertainty which may have an impact on organizational commitment. Because the actual M&A took already place some years ago this uncertainty did not really apply to our case except maybe for the IS/IT employees. Furthermore, the M&A was quite friendly and during the years the relationship between the two companies became even better. We believe that the friendliness and the fact that the M&A took place years ago had a positive effect on the cooperation of the employees. This allowed us to gather all the required information.

We believe that these particular mechanisms made the case suitable for our framework. The architecture of our case is however expected to be quite unique: especially the postponing of the IS/IT integration for several years is something that might not apply to other cases. However, based on the assumed mechanisms we would like to reason upon the applicability of the framework to other cases. We believe that the framework is particularly useful for cases in which there is sufficient room, time and support for a in-depth analysis, because application of the framework is quite time consuming. I.e the framework is expected to be less useful in cases in which a Wall Street effect is apparent or in which other considerations require a quick decision with regard to the IS/IT integration. In such cases a high level decision might be taken and the details of the integration would be formed during the execution of this decision. Furthermore, because the application of the framework required a lot of cooperation from different employees the framework might be less useful for M&As in which resistance is expected. The cases that are expected to have the described mechanisms are likely to be suitable. The concepts within the framework are quite generic and apply to any M&A.

Our generalization by similarity should not be considered proof that the framework is always suitable for the cases that have the described mechanisms. Or put different, our generalization is fallible. Further research in which the framework is applied to such cases is the only way to see whether the framework is indeed of value. On the other hand, such research could also focus on cases of which we think the framework is less useful to see whether our assumptions are correct.

7.4 PERSONAL AND PROFESSIONAL DEVELOPMENT

The last, but important element of the evaluation step is evaluation on personal and professional development. To start with, I think that this research topic was a perfect match with my study. The research combined the business and IS/IT domains, which forms the core of my study at the University of Twente. That having said, it was also a very educational experience. First of all, it was the first large research for me. It turned out that performing such a research and writing a thesis about it is not that easy. This research learned me that there is a gap between theory and practice, but more important is that it made me deal with this issue. In this research I had to be creative to make the translation between theory and practice, which was definitely a useful experience but this was not always easy. On the other hand, it was nice to see how I was able to use the knowledge gathered in my study to solve a practical problem.

Another element of this research project of which I believe that it was very valuable for me is of a more practical nature. During the research I spent a lot of time at the companies at which I had my own work place. This more or less gave me insight in the ins and outs of an IS/IT organization and I think this will be very valuable for my further career. At the same time this research project allowed me to operate in an organizational context which will be useful for my further career as well.

8. CONCLUSION

8.1 RESEARCH QUESTIONS

This research focused on the issue of IS/IT integration within M&As. The reason for this study was the intended IS/IT integration two manufacturing companies which are active in the same market. During our literature review we found that existing literature did not provide us with a method for a systematic approach towards an IS/IT integration strategy. This formed the basis for our central research question:

How can organizations deal in a more systematic manner with the issue of IS/IT integration in an M&A context?

We developed several sub questions that should help us to answer the central research question. The sub questions of this research were:

What is the relationship between M&As and IS/IT integration?

What approaches exist for integration of IS/IT in M&As?

What are the critical success factors for IS/IT integration in M&As?

How can we use existing knowledge from literature to form a framework that contributes to designing a suitable IS/IT integration strategy?

The first sub question focused on the relationship between M&As and IS/IT integration. The task of IS/IT integration is found to be very important in an M&A context. Companies nowadays depend to a large extent on IS/IT, which makes integration of IS/IT a crucial task in M&As. Several researchers argue that IS/IT integration is critical for the overall M&A success and there are empirical findings that support these arguments. It is clear that organizations with a superior capability in IS/IT integration have a competitive advantage over those that stumble on IS/IT integration.

There is however more to say about the relationship between M&As and IS/IT integration, which has to do with business-IT alignment. An M&A is generally aimed at achieving synergies and thus has business goals. Alignment of the IS/IT integration with these business goals is considered an important issue. Each of the IS/IT integration methods is suitable for achieving certain levels of integration and thus should be investigated which of the available methods contributes to achieving the set business objectives. Although that alignment is an important starting point, empirical findings show that alignment is not crucial (nor sufficient) for success. When the aligned strategy turns out to be infeasible shifting to a non-aligned approach might be more successful than firmly holding to the initial strategy.

Our second sub question focused on the different possible approaches for IS/IT integration. Literature distinguishes four main IS/IT integration approaches. Renewal abolishes existing IS/IT of both two companies and entails designing a whole new IS/IT. The take-over approach takes the IS/IT of one of the companies which will be used for both companies. In the standardization approach the best elements of both IS/ITs are combined to form the new IS/IT for both companies. Finally, the synchronization approach leaves the current IS/ITs the same to a large extent, but includes the development of 'bridges' between these IS/ITs such that data can be exchanged. As mentioned, each of these approaches is only suitable for certain levels of integration.

The third sub question of this research focused on critical success factors for IS/IT integration in M&As. The performed literature review showed that there are many influencing factors that are of importance for IS/IT integration in M&AS. Most important is that each M&A is different and has its own

unique mix of elements which makes decisions highly contextually dependent. Which factors are crucial for success therefore depends on the M&A characteristics. There are however some general factors that should be considered. Organizations should prevent culture conflicts and involve top management in the decision making. Preparation for the integration is important as well as creating a proper and setting priorities. Finally, involvement of and communication with end users increases the chance of success.

The last sub question of this research focused on how the gathered knowledge could be used to form a framework that contributes to designing a suitable IS/IT integration strategy. For developing this framework some creativity was required since the majority of the existing knowledge is of a more explaining nature instead of being prescribing by providing theory for design and action. The existing literature provided us however with many concepts and points of interest that are relevant for IS/IT integration. We chose to structure the framework as a process approach in which each step focuses on one or more of these concepts while paying attention to the critical success factors. We believe we succeeded in making the translation from existing knowledge to a systematic framework that contributes to designing a suitable IS/IT integration strategy.

This framework was applied to the Company X-Company Y case to see whether it contributes to a systematic approach and leads to a suitable and solid integration strategy. During the application of the framework we found that the two organizations are very similar in terms of business processes and IT infrastructure. There is however a big gap between the current IS landscapes. Furthermore, there are several differences with regard to the IS/IT organization. The two organizations differ in terms of strategy, management procedures and structure; differences that need to be resolved in an early stage of the integration. Our analysis gave us however no reason to believe that it would be impossible to have a single ERP system for both organizations. Therefore, the take-over approach was chosen as a solution. This means that the ERP system of one of the organizations will be transferred to the other organization as well. It is clear that this will be a very costly undertaking. Additional hardware might be required, but also building the interfaces between the different IS will require a lot of time and effort from the software engineers. Furthermore, users will need training to get acquainted with the new ERP system. In short, the integration will be costly and require a lot of time from the IS/IT personnel. This implicates that other IS/IT related project such as adding new functionality to the ERP system might be put on hold. The integration will of course also come with benefits. First of all, the information provisioning will be improved at Company Y and the take-over approach should allow easy data interchange. Having a single IS/IT landscape will also result in lower maintenance and development costs. Adding new functionality to the ERP system for example needs to be done only once to make both organizations benefit. This of course also applies for the IT infrastructure services. A IS/IT integration such as the one of Company X and Company Y comes with many costs and benefits. A cost-benefit is therefore an important part of the integration plan, but was only performed on a high level because it would have been impossible to determine all costs and benefits within this research.

For our case we found the framework to be very useful and it helped us in systematically analysing the current situation and working towards a solution. Also the IS/IT managers and top management had the feeling that the used approach led to a well informed solution. The designed solution was well received by the two companies and will form the basis for the actual integration. It should however be noted that this single application of the framework does not provide proof that the framework will yield satisfactory results in other M&As as well. Furthermore, it should be noted that the solution has not been implemented yet which makes it unable to conclude that the application of the framework indeed let to a solid solution.

This brings us back to the central research question. This question focused on how the approach towards IS/IT integration can be made more systematic. We believe that our developed framework is a good first attempt towards a more systematic approach. The framework is built upon existing literature and outlines the important aspects of IS/IT integration in M&As. The framework is structured as a systematic step-by-step process, but can be considered as a set of guidelines. Each M&A has its

own peculiarities which should be accounted for by the integration team and our framework can serve as a 'template' for an approach. Based on the application to our case we would like to say that our framework enables organizations to take a more systematic approach towards IS/IT integration, but it is clear that applicability needs to be tested in equivalent and different settings.

8.2 CONTRIBUTIONS

This research makes several contributions. From a scientific perspective the performed literature review is a contribution. The exhaustive overview of literature can be used by other researchers in the field to explore the domain of IS/IT integration in M&As. Furthermore, this research confirms the following claims of previous studies:

- The task of IS/IT integration should not be fully delegated to IS/IT managers but requires involvement of top management

In the case that was central in this research, the IS/IT integration was delegated to the IS/IT managers. No substantial decisions were made on the strategic level which resulted in the IS/IT departments continuing with their daily pursuits. This also led to the situation in which the issue of the IS/IT integration was given low priority. We believe that interference and decision making by top management could have prevented this situation.

- Setting a proper time is important

Furthermore, because there were no substantial decisions made regarding the IS/IT integration there was also clear time frame set for the integration. This lack of a time frame allowed the IS/IT managers to give the issue of IS/IT integration low priority. We believe that when a proper time frame was set for the IS/IT integration, the IS/IT managers would have been forced to deal with the IS/IT integration. In our case however, the integration was put on a back burner because other (operational) projects were given priority.

- Different stakeholders in an IS/IT integration have different goals

Our case also reinforces the claim that different stakeholders have different goals within an IS/IT integration. From a business perspective the goals for top management were improving information provisioning and sharing. The IS/IT manager, who will be responsible for the centralized IS/IT organization, was mainly looking for consolidation to prevent maintaining two different and isolated IS/IT environments in the future.

The most important contribution of this research is however the developed framework. The aim of this framework is to help organizations to approach the issue of IS/IT integration in M&As in a more systematic manner. The framework is based on concepts from literature and was extended with EA modelling. The main difference with other studies is that we aimed at providing a holistic perspective on IS/IT integration in M&As. Our framework focusses on different levels (strategic as well as tactical) within an organization and tries to align these levels. Especially the tactical level is often ignored, which in many cases leads to problems in a later stage of the integration. Our perception is that the designed framework indeed contributes to a systematic analysis of the current situation and design of a solution and strategy. This perception is however based on one case study and therefore it is clear that the framework requires further testing to prove whether it indeed contributes to a systematic approach and suitable integration strategy.

Also the introduction of EA modelling in an M&A context can be seen as a contribution and proved to be of value. It allows detailed modelling of the current situations and the future state and is very suitable for communication with stakeholders.

This research has also made contributions from a practical perspective. The framework was applied to M&A situation of the two companies in question and led to an IS/IT integration plan. The focus was on a performance improvement, namely the integration of two IS/IT departments and their corresponding IS/IT. The design solution and change plan which should realize this integration were well received by the managing directors and IS/IT managers and will form the basis for the actual integration.

8.3 LIMITATIONS AND FUTURE WORK

This research focused on the design of a framework that should help organizations in taking a more systematic approach towards IS/IT integration in M&As. In the second stage of this research the framework was tested by applying it to a case. The framework turned out to be very usable and contributed to a systematic analysis and solution design for this specific case. Although that the designed solution was considered a sound solution by the IS/IT managers and top management of the involved companies, the solution has not been implemented yet. Thus, we are unable to confirm that the framework indeed contributed to a sound solution. Therefore, is it impossible to draw definite conclusions about the usability and effectiveness of the framework. In future research the framework should be tested by applying it to other M&As to see whether the framework is of added value. These applications could be cases with a comparable context, but it would be interesting to see whether the framework is of use in totally different types of M&As.

The framework was developed because we believe it can help organizations in taking a more systematic approach towards IS/IT integration in M&As. Our assumption is that a systematic approach will lead to well informed decision making and thereby leads to more successful integration. Future research could focus on this assumption. Does following our systematic approach indeed leads to a more successful integration? Furthermore, we believe that more input from other business and IS/IT managers can strengthen our framework. Future research could focus on how these persons perceive our framework and whether they have something to add to it, based on their experiences.

Finally, there is one very important aspect of IS/IT integration of which we believe that it has not received enough attention: the change process. IS/IT integration generally introduces drastic changes throughout the whole organization. How should the IS/IT integration change process be planned and managed? It might be interesting to compare historical cases, successful and not successful, to determine how to orchestrate a successful change process.

APPENDICES

APPENDIX A LITERATURE OVERVIEW

Scopus / Web of Science	Authors	Title	Included
Yes/Yes	**Alaranta, M., Henningsson, S.**	An approach to analyzing and planning post-merger IS integration: Insights from two field studies	Yes
Yes/No	**Alaranta, M., Henningsson, S.**	Shaping the post-merger information systems integration strategy	Yes
Yes/No	**Baker, E.W., Niederman, F.**	Integrating the IS functions after mergers and acquisitions: Analyzing business-IT alignment	Yes
Yes/No	**Baro, G.A., Chakrabarti, A., Deek, F.**	Organizational and information systems factors in post-merger technology integration	No, same research as that of Morsell et al.
Yes/No	**Becker, J., Pöppelbuß, J., Stolze, C., Asgarian, C.**	Developing a framework for IT governance in the post-merger integration phase	Yes
Yes/No	**Benitez-Amado, J., Ray, G.**	Introducing IT-enabled business flexibility and IT integration in the acquirer's M&A performance equation	Yes
Yes/Yes	**Brunetto, G.**	Information systems integration during mergers: integration modes typology and integration paths	No, unable to retrieve
Yes/No	**Brunetto, G.**	Integrating information systems during mergers: Integration modes typology, prescribed vs constructed implementation process	Yes
Yes/Yes	**Chang, S.I., Chang, I.C., Wang, T.**	Information systems integration after merger and acquisition	Yes
Yes/No	**Chao, R.D., Lin, F.R.**	A multiple case study on post-merger IT integration with IT culture conflict perspective	No, same research as next entry
Yes/Yes	**Chao, R.D., Lin, F.R.**	Post-merger IT integration: An IT culture conflict perspective	Yes
Yes/Yes	**García-Canal, E., Rialp-Criado, A., Rialp-Criado, J.**	IT unification and integration processes in horizontal mergers and acquisitions	No, Spanish article
Yes/Yes	**Giacomazzi, F., Panella, C., Pernici, B., Sansoni, M.**	Information systems integration in mergers and acquisitions: A normative model	Yes
Yes/No	**Henningsson, S.**	Strategic value of IS integration in M&A - The relation between IS integration and M&A as a tool for corporate strategy	Yes

Yes/Yes	**Henningsson, S., Carlsson, S.**	The DySIIM model for managing IS integration in mergers and acquisitions	Yes
Yes/No	**Henningsson, S., Svensson, C., Valien, L.**	Mastering the integration chaos following frequent M&As: IS Integration with SOA Technology	Yes
Yes/No	**Henningsson, S., Yetton, P.**	Managing the IT integration of acquisitions by multi-business organizations	No, specifically focused on multi-business organizations
Yes/Yes	**Homburg, C., Bucerius, M.**	Is speed of integration really a success factor of mergers and acquisitions? An analysis of the role of internal and external relatedness	No, not focused on IS/IT integration
Yes/Yes	**Johnston, K.D., Yetton, P.W.**	Integrating information technology divisions in a bank merger: Fit, compatibility and models of change	Yes
No/Yes	**Klempa, M.J., & Britt, J.A.**	Managing information technology - an acquisition diffusion contingency-model integrating organization culture, organization learning, and knowledge sharing	No, not focused on M&As
Yes/Yes	**Kromer, G., Stucky, W.**	The integration of IT-resources in mergers and acquisitions	No, German article
Yes/No	**Lee, C., Lee, J.H., Yang, J.I.**	The impact of is employees' perceived fairness on organizational commitment in post-merger information systems integration	Yes
Yes/No	**Lin, S.P., Lo, S.H., Yang, H.L.**	Information system integration after merger and acquisition in the banking industry	Yes
Yes/No	**Lu, Q.**	Is the speed of post-acquisition integration manageable? Case study: post-acquisition integration of HSBC with the Mercantile Bank, 1959-84	No, not IS/IT related
No/Yes	**McDowall, R.D.**	Chromatographic data-acquisition systems and LIMS: Is integration possible?	No, not IS/IT related
Yes/Yes	**McKiernan, P., Merali, Y.**	Integrating information systems after a merger	Yes
Yes/Yes	**Mehta, M., Hirschheim, R.**	Strategic alignment in mergers and acquisitions: Theorizing IS integration decision making	Yes
Yes/No	**Mehta, M., Hirschheim, R.**	A framework for assessing IT integration decision-making in mergers and acquisitions	Yes
Yes/No	**Miklitz, T., Buxmann, P.**	IT standardization and integration in mergers and acquisitions: A decision model for the selection of application systems	Yes
Yes/Yes	**Montgomery, R., Carpenter, S.**	Merger offers IS managers flexibility & less stressful integrating, downsizing, & outsourcing. Interview by Bill Childs.	No, unable to retrieve
Yes/No	**Morsell, G.A., Deek, F.P., Chakrabarti, A.**	Post-merger technology integration: Influential organizational and information systems factors	Yes
Yes/No	**Nathanael, D., Vassilakopoulou, P.**	Integrating quality-in-use in the IS acquisition process: An activity perspective	No, specifically focused on acquiring certain IS

Yes/No	**Niederman, F., Baker, E.W.**	Integrating management information systems following organizational mergers or acquisitions	Yes
No/Yes	**Pett, M.R., Alazawi, W., Dowen, S., Roberts, I., Stanley, M.A., Coleman, N.**	Acquisition of high-level genomic instability is associated with integration of HPV16 in cervical keratinocytes	No, not IS/IT related
Yes/Yes	**Pett, M.R., Alazawi, W.O.F., Roberts, I., Dowen, S., Smith, D.I., Stanley, M.A., Coleman, N.**	Acquisition of High-Level Chromosomal Instability Is Associated with Integration of Human Papillomavirus Type 16 in Cervical Keratinocytes	No, not IS/IT related
Yes/No	**Reddy, R.**	The path to M&A success: A metrics-driven approach to IT integration	No, unable to retrieve
Yes/Yes	**Robbins, S.S., Stylianou, A.C.**	Post-merger systems integration: The impact on IS capabilities	Yes
Yes/Yes	**Schrah, G.E., Dalal, R.S., Sniezek, J.A.**	No decision-maker is an Island: Integrating expert advice with information acquisition	No, not IS/IT related
Yes/No	**Seddon, P.B., Reynolds, P., Willcocks, L.P.**	Post-merger IT integration: A comparison of two case studies	Yes
Yes/No	**Shang, S.S.C., Lin, M.H.**	An examination of the success of post-merger IT integration	Yes
Yes/Yes	**Stylianou, A.C., Jeffries, C.J., Robbins, S.S.**	Corporate mergers and the problems of IS integration	Yes
Yes/No	**Swanekamp, R.**	Wall Street is buzzing once again about convergence of the natural-gas and electricity industries. The financial gurus are focused on corporate mergers, but convergence can refer to the two industries' technological integration as well	No, unable to retrieve
Yes/Yes	**Tanriverdi, H., Uysal, V.B.**	Cross-business information technology integration and acquirer value creation in corporate mergers and acquisitions	Yes
Yes/No	**Toppenberg, G., Henningsson, S.**	An introspection for the field of IS integration challenges in M&A	Yes
Yes/No	**Vieru, D., Rivard, S.**	The dilemma of integration versus autonomy: Knowledge sharing in post-merger is development	No, French article
Yes/No	**Vieru, D., Rivard, S.**	Mind the gap: Positioning information systems/information technology within the process of post-merger integration	No, no specific contribution
Yes/No	**Vieru, D., Trudel, M.C.**	Too much or not enough: Information systems integration in post-merger context - A sociomaterial practice perspective	Yes
Yes/Yes	**Wijnhoven, F., Spil, T., Stegwee, R., Fa, R.T.A.**	Post-merger IT integration strategies: An IT alignment perspective	Yes

APPENDIX B INTERVIEW STRUCTURE

Interview initiation

- **Introduction of interviewer and respondent**
- **Inform respondent about research background, interview topics and goals**
- **Ask permission for recording**

Actual interview

- **The overarching group engaged in many M&As and currently consists of more than 25 companies. All these companies seem to be very autonomous and there seems to be little integration. Are there specific reasons for maintaining autonomy of the companies?**
  Following the understanding of Haspeslagh and Jemison [28], organizational autonomy should be kept intact if removing the boundaries will lead to the destruction of strategic capability. The decision to keep organizational boundaries intact is a strategic issue: "The manager should not deviate from the strategic task – transferring capabilities to create value – unless the argument for autonomy corresponds to a real need for boundary protection". At first sight, the M&A approach of the overarching group looks to be a holding approach: there seems to no intention of integrating and creating value through anything except financial transfers, risk-sharing or general management capability. Is this perception right and if so, are there specific the reasons for keeping the companies at arm's-length from each other? These reasons may have implications for the level of IS/IT integration.

  Main concepts in this question:

  Level of strategic interdependence: does capability sharing occur? (create value together which is impossible to create when having two separate units)

  Sharing of resources (human, machines) – functional skills – general management capability

  Is there indeed a real need for a high level of autonomy?

- **What are the main synergies that are expected from the M&As? Do these differ for the different M&As performed, or are there specific synergies expected for, for example, the M&A of Company Y?**
  The different types M&A strategies as defined by Haspeslagh and Jemison are suitable for achieving different synergies. Adopting the holding approach for example is unlikely to yield synergies because there is no consolidation. This question is included to relate the M&A objective to the IS/IT integration in a later stage.

  The theoretical foundation of these questions is the formed by the synergies identified by Lubatkin [10]. Synergies can be grouped in technical economies (economies of scale), pecuniary economies (market power) and diversification economies (risk sharing and port). The overview of synergies may be used as a fallback when no satisfactory answer is given.

Synergy group	Synergy	Description
Technical economies	Marketing	Scale economies in marketing and branding
	Production	More efficient production of larger quantities
	Scheduling	Occur in vertical mergers when two levels of production are joined
	Experience	Reduction in cost that come with accumulated experience with a common technology
	Banking	Reduction in outstanding cash balances as consolidation reduces banking relationships
	Compensation	Consolidation can lead to savings per employee for offerings such as health and life insurance
Pecuniary economies	Monopoly	Ability to force buyers to accept higher prices
	Monopsony	Ability to force suppliers to accept lower prices
Diversification economies	Portfolio management	Consistency of assets which markets' development are negatively correlated with each other
	Risk reduction	Lower transaction costs to stakeholders

- **In what kind of role do you see IS/IT within the organization? Is IS/IT considered on the strategic level?**
  McKiernan [6] argues that IS/IT can have two different roles in M&As. The role of IS/IT can be pro-active when it is seen as a possibility to achieve competitive advantage or as a driver for organizational change. On the other hand it can fulfill a reactive role when it is expected to conform to operational decisions and support these.

- **There are plans to integrate the IS/IT of Company X and Company Y. What is the incentive for this integration?**
  This question is included because we want to understand why IS/IT integration of Company X and Company Y became a point of interest. This is a rather general question and we will be more specific using the following sub questions:

  - **What are the expected synergies (See synergies table from earlier question)?**
    These can be technical economies like reduced costs that can be achieved by consolidation of the IS/IT departments and standardization of software and centralization of hardware. However, it could also be that cost reduction is not a main goal, but instead the goal is to improve sharing information.
  - **Is further integration a goal as well?**
    This implies however breaking the existing organizational boundaries, which is in contradiction with the perceived holding approach.
  - **What level of integration is exactly desired?**
    According to Giacomazzi et al. [5] integration can vary between total integration, partial integration and no integration. In other words: is full consolidation the objective, or is the objective to integrate only some of the applications?
    - **Is the assignment of a single IS/IT manager for the two companies part of a plan for full consolidation of the IS/IT departments?**

- **How and by whom should decisions be made regarding the planning and execution of IS/IT integration? Is this a job of the IT managers, or do you think this should be controlled at the strategic level?**
  There are several authors, such as Batelaan and Veltman [7], who argue that (planning) IS/IT integration should not be a task of IT managers. In many cases IS/IT managers are considering their own applications as superior, which makes the discussion a political matter rather than an objective selection of applications.

Concluding the interview

- **Summarize key points provided by respondent**
- **Is there something the respondent would like to add, or thinks that something is not discussed but considered important?**
- **Ask whether respondent is interested in end result of my research**
- **Thank respondent for his time**

APPENDIX C PROCESS MODELS

APPENDIX C1 PROCESSES OF COMPANY X

The detailed process models and discussions of these models were removed due to confidentiality reasons. An example of the process analysis and models is given instead.

Sales

Before continuing with discussing how the raw materials are further processed we would like to discuss a parallel information flow. This information flow starts at the sales process, of which a model can be found Figure 28. Sales persons enter orders into the ERP system. This is also a straightforward process. A sales person selects the customer and delivery location and can enter the requested products. There is also a list available of frequently sold products to this customer. The sales person enters information such the product and negotiated price, quantity, desired product quality, packaging type and delivery date. It's is remarkable how many variations of each single product can be ordered. In fact the overall process can be characterized as mass customization. The majority of products sold are not standard products. Each customer can for example request its own label design and foil.

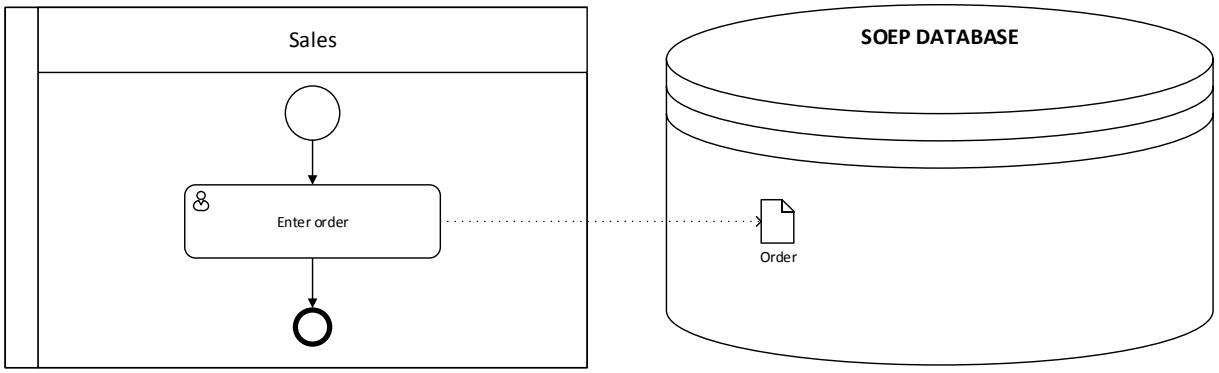

Figure 28: Sales overview (Company X)

APPENDIX C2 PROCESSES OF COMPANY Y

Removed due to confidentiality reasons

APPENDIX D FOCUS GROUP STRUCTURE

The focus group session started with a presentation. In this presentation we discussed the structure and content of the research. The main focus of this presentation was on the framework and the designed solution and change plan.

After the presentation we started with the actual focus group. The focus group was moderated by the writer of this thesis who also did the presentation. Furthermore, the session was recorded and only keywords of statements were recorded on a piece of paper to make sure that the moderator could concentrate on moderating the session.

We started with informing the participants about the goal of the research, which is the evaluation of the framework, solution and change plan. Then we asked several predefined questions which we now will discuss.

1. **Are there any unclarities with regard to the followed approach, the framework, the solution or change plan?**
   This question should be considered an engagement question. At the same time this question should make sure that every participant understands the followed approach, the developed framework and the solution and change plan. Otherwise, such questions might arise during the actual discussions which may turn the moderator into a source of information. This is undesirable because it may disturb or prevent rich discussions.

2. **What do you think of the developed framework?**
   This question is meant to get the opinion of the participants about the developed framework. We want to know whether they believe that our framework is of added value and helps in making a well-informed decision. This question is made more specific using the following sub questions:

   a. **Do you think that the framework covers all important aspects or are there elements missing?**

   b. **Do you think that the framework contributes to making a well-informed and solid decision?**

3. **Are the EA models which where used and presented of added value? If so, why?**
   In our framework we proposed the use of EA modelling because this allows creating a holistic perspective. With this question we want to determine how useful these models are for the participants.

4. **To what extent do you think that the designed solution contributes to the goals of the IS/IT integration?**
   The solution was designed with several goals in mind. With this question we want to determine if and to what extent the participants think that the designed solution contributes to these goals. We defined a sub question for each goal:

   a. **To what extent does it contribute to improving the information provisioning at Company Y?**

   b. **To what extent does it contribute to exchanging information between the two companies?**

   c. **To what extent does it contribute to consolidation?**

5. **What do you think of designed solution in general?**
   With this question we want to determine what the participants think of the solution in general.

It could be the case that there are certain characteristics on which the participants disagree or of which are believed to be unfeasible. This question is quite unspecific and we create a narrower focus with the a sub question:

   a. **Do you think that the designed solution and change plan are realistic and feasible?**

      The second sub question goes a bit further by asking the participants whether they would give approval for the integration following the designed solution and change plan.

   b. **Do you think that the designed solution and change plan should be used for the actual IS/IT integration?**

6. **Are there any other comments or remarks that you would like to make with regard to the framework, solution or change plan?**
   This question should be considered as an exit question. The asked questions should have covered the evaluation of the framework, solution and change plan but it could be the case that the participants have anything to add.

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