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Information Systems Integration in Mergers and Acquisitions

An Enterprise Architecture Perspective

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Abstract

Information Systems (IS) integration has been pointed out is an important factor in realizing the business related synergies sought after in the complex activities of corporate Mergers and Acquisitions (M&As). To date, this area has received limited academic attention. It has been researched from a strategy perspective, addressing issues on a high level aimed at foundational long term aspects, as well as from a process perspective focusing on the integration process. No existing research perspective addresses issues regarding *what* Information Systems should be integrated *how,* in a specific M&A situation. This qualitative study proposes the perspective of Enterprise Architecture for two reasons. Firstly, as it offers a link between business and IT components and secondly for its abilities to communicate a vision.

The purpose of the study is *To create a synthesized framework from existing theory for analyzing and describing IS integration on a business activity level in an M&A context, and to empirically test the framework.* This is done by applying a research strategy consisting of two parts. To start with, a theoretically grounded framework is created, consisting of the dimensions *Business Activity Integration*, *IS Integration approach* and *Strategic view of IS*. These dimensions are conceptualized at the business activity level of analysis. The framework includes theoretically deduced relationships, visualized in a relational model in the form of a matrix. Next, this framework is tested by the means of one primary case: the acquisition of Chase-Walton by Trelleborg Sealing Solutions which builds on six interviews, and two reference cases consisting of secondary data.

The main contribution of the study is the theoretically grounded framework that addresses how business activity level integration is related to IS integration approaches. This is synthesized in a relational model in form of a matrix, visualizing IS integration approaches according to business integration needs. In this framework, the analysis level of business activity, as well as the Enterprise Architecture perspective, are key features. The results point to the conclusion that both the analysis level of business activities and the Enterprise architecture perspective are well suited to analyze and describe IS integration in specific M&A situations.

Key words: Enterprise Architecture, Mergers and Acquisitions, Integration, Information Systems, Business Activity

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1 Introduction

The integration of information systems in mergers & acquisitions consists of several distinct research fields. Individually, they offer complex and intriguing areas of research of their own. Also, these areas originate from separate research traditions – computer science, informatics and business administration. In this chapter, the area of interest is narrowed down step by step and our focus of research is explained along with our perspectives and beliefs. The core contribution of the chapter is our purpose and research questions along with the stated knowledge contribution.

1.1 Background

In the contemporary business environment, Mergers and Acquisitions (M&As) have established themselves as corporate acts that involve a considerable part of the world economy (Henningsson, 2006). During 2005, the number of M&As were some 35,000 operations at a price of 2,480 billion Euros (EC, 2006). The logic conclusion is that companies consider M&As to be effective instruments of corporate strategy (Sirower, 2003). M&A activity is employed by companies as means of rapidly achieving objectives such as: quick growth in size or across markets; the acquisition of know-how, products and technologies; or economies of scale (Stylianou et al., 1996). However, despite the promising outcomes, M&As are complex ventures where a great number of factors interplay. Although an M&A deal may have significant potential on paper, far from all become financially successful. Estimations have been made stating that only some two-thirds of all M&As reaches set out goals (Kumar, 2002; Robbins & Stylianou, 1999). Aiello & Watkins (2000) conclude that according to M&A records, the result for the acquirer often has been "dismal, at times disastrous".

Although some M&As are merely of a financial nature, such as the investment in companies to earn future stock dividends, the category of M&As that are driven by synergies related to business integration holds the greatest promise of value (Lubatkin, 1988). This category of related M&As implies the integration of the two units' personnel, business processes and information systems into one unit that will work harmoniously, effectively and efficiently. An example would be an acquisition of a supplier where the desired synergies are dependent on a close integration of the value chain. This type of business integration must be accomplished before the actual creation of value can begin (Alaranta, 2005). As Information Technology (IT) based Information Systems (IS) is a pervasive part of modern business, it is not surprising that researchers have identified IS integration to be a crucial factor impacting on the success of an M&A (e.g. Alaranta, 2005; Kumar et al., 2002; Robbins & Stylianou, 1999; Stylianou et al. 1996; Giacomazzi et al. 1997).

1.1.1 IS Integration

IS integration on an enterprise wide level was initially aimed at utilizing the potential buried in existing non integrated 'stove-pipe' applications (Erasala et al., 2003). The IS integration evolution has paralleled

the one of computer technology and IS trends (Linthicum, 2000). In the beginning this was carried out by implementing Point-to-point (P2P) interfaces linking applications together. Although this seemingly trivial approach, the number of interfaces grows exponentially in relation to the number of applications. Aimed at addressing the complexities following P2P integration for multi-application environments, Enterprise Resource Planning (ERP) systems were marketed as "integrated suites", solving integration problems once and for all (Davenport, 1998). However, these systems only achieve local integration – bigger 'stove-pipes' - for the functions or modules that they include. ERP systems, despite the promise, did not provide the finite solution to all the IT needs of a company (Themistocleous, 2001; Gulledge, 2006). Rather, corporate information infrastructures today may consist of custom developed legacy systems and commercial off-the-shelf ERP systems, working together with eCommerce applications that meet end customers in their homes via web browsers (Gulledge, 2006).

Historically, such organically grown enterprise wide integration environments may have come about in an ad-hoc, non planned manner for a number of reasons. Examples include incremental technical evolution, short sighted departmental goals, IT competence at hand, and even the salesmanship of IT consultants with somewhat different goals than those of the purchasing organization (Erasala et al., 2003; Linthicum, 2000). The outcome is likely to be a sub-optimal enterprise wide IS integration infrastructure, consisting of a plethora of inter-application interfaces, and non compatible technologies, leading to high maintenance costs, high business/IS rigidity and poor business agility (Linthicum, 2000; Gulledge, 2006). Such colorful corporate IT infrastructures may well be facing managers responsible for post M&A integration. The influence that managers have on IS integration success have been noticed by IS researchers.

1.1.2 Managerial factors

The outcome of IS integration efforts in M&As have been concluded to be dependant on managerial factors such as the level of management support for IS integration issues, quality of merger planning and the quality of IS integration planning (Robbins & Stylianou, 1999; McKiernan & Merali, 1995). Such managerial factors are seen as controllable in nature (Robbins & Stylianou., 1999; McKiernan & Merali, 1995; Kumar et al., 2002), implying that better knowledge will provide better decisions. However, research that provides managers with useful knowledge is generally scarce (Markus, 2001) and in the context of M&As, even more so (Henningsson et al., 2006; Wijnhoven, 2006). Consequently there is little to provide guidance to managers as to how decisions regarding IS integration in an M&A are best made (Kumar, 2002).

1.2 Problem area

Decisions regarding the *technica*l IS integration choices in an M&A context may well be challenging to make depending on the size and complexity of a specific M&A. Questions that are likely to arise include: *Which* IS should be integrated between the two merging companies? Should all IS be integrated, or only a few? If so, which? *How* should these be integrated? Is an ERP solution the best option or can arguments be made for implementing P2P connections for applications where flexibility is of low priority? Should Enterprise Application Integration (EAI) initiatives be made, or should efforts move towards implementing a Services Oriented Architecture (SOA) for example? These initiatives can all be costly to put in place as well as maintain, none of them are technically trivial to implement and they may all have

organizational impact (Markus, 2000, Linthicum, 2000). The picture gets further complicated by the fact that it is entirely possible to reach technological success without achieving business success (Markus, 2000). In a nutshell:

> *"Consequently, organizations may acquire more systems integration than they need for business reasons or they may have the wrong kinds of systems integration than they need for business reasons"*. (Markus, 2001)

Concluding the above: Poorly grounded IS integration choices are likely to have business related consequences for the outcome of an M&A. If wisely made, the synergetic potential may be within reach, for a reasonable price and with only the desired organizational impact to deal with. If managerial decisions regarding technical IS integration choices is of high importance, as well as significantly challenging; how do existing problem perspectives address these?

1.2.1 Problem perspectives

Existing research concerned with managerial issues in an M&A and IS integration context is of a low maturity level; all in all there is a mere 21 articles to date addressing the topic specifically (Henningsson & Carlsson, 2006). This implies that the level of accumulated knowledge is low. Research has been carried out from a strategy perspective (e.g. McKiernan & Merali, 1995 & 1993) where focus was on the concept of a pro- respective a re-active approach to IS integration. Not surprisingly, the pro-active strategy is considered to have advantages over the re-active one. However, the concepts are used without being thoroughly conceptualized, thereby at this stage providing little knowledge. Giacomazzi et al. (1997) produced a normative model regarding criteria for choosing different strategies for post M&A IS integration on an organizational level. Although the good intentions, it can be criticized for not having a mature enough foundation theory wise to build upon in order to be normative. Such a normative approach might even prove to be a mirage in this context, due to the apparent complexity and richness of the problem area. Others have been addressing the area from a process perspective (e.g. Stylianou et al., 1996; Stylianou & Robbins, 1999) who investigated factors critical for achieving success in the IS integration process. This research perspective is analogous to the Critical Success Factors (CSF) research concerning the implementation of Enterprise Resource Planning (ERP) systems (e.g. Parr et al., 1990). Such research can provide knowledge which is useful when the process of integration is about to commence.

The perspectives mentioned above address different and important issues of the problem area. The strategy perspective is focused on understanding and defining how a company might behave on a foundational level in order to achieve success in IS integration, for example by attaining the strategic know-how necessary to reach set out goals concerning IS integration. This is also a relevant perspective for deciding on which IS infrastructure should be in place, now and in the future, to enable the integration of acquired companies. For the purpose of analyzing and describing what IS should be integrated how in a situation specific M&A, however, a strategy perspective is not optimal. On the other hand, the process or method perspective is more focused on understanding how IS integration is actually carried out and what obstacles one might face; implicitly there is an underlying belief that a better IS integration process will lead to success. However, the decisions regarding *which* IS to integrate by *what* technical approach needs to be addressed before starting the actual process of implementing IS integration. In an M&A context, there is a drawback with existing perspectives, as none deal with the situation specific analysis and communication of the vision of *what* IS should be integrated *how.* This instead leads to the notion of an *architectural perspective*.

1.2.2 An Enterprise Architecture perspective

Architecture is an ambiguous term used differently depending on who is using it and why (Jonkers et al., 2006). Fundamentally, however, it is concerned with the definition of elements and how they relate to each other, as well as the communication of such a structural vision (ibid.). In computer science and software engineering architecture have historically been used, more or less, in a technical sense. However, a mere technical perspective is inappropriate for the context of IS integration in M&As for two reasons. Firstly, since the drivers for an M&A initiative are related to synergies that build on business integration for the creation of value, a mere technological architecture is unlikely to be sufficient. Regarding IS integration in M&A contexts, Markus (2000, p 16) concludes: "Success for the business requires very close alignment between the business need and the technical solution". This line of thinking is supported by Bhatt who concurs: "Knowing how IT relates to the firm's strategic capabilities could provide an effective advantage to business" (Bhatt, 2000, p 1355). As the IS integration in M&As is intertwined with the integration of the two units' business models a relevant architectural perspective should include a business vision as well. Secondly, because IS integration is fundamentally aimed at enabling the potential from 'islands' of applications as well as business processes, the entire enterprise needs to be considered in the vision; even more so in an M&A context. Therefore, we argue that a perspective building on the ideas of *Enterprise Architecture* should be considered.

The concept of enterprise architecture builds on the amalgamation of business activities, their supporting IS and the integration of these. One essential idea behind Enterprise Architecture is to avoid local optimization, where architectures within subsets of an organization are optimal, as this may hamper enterprise wide performance (Jonkers et al., 2006). This perspective has been articulated by Zachman (1987) who created a two-dimensional framework with the purpose of ensuring that business goals were met during a process of systems development. Aimed at systems development, rather than IS integration, we consider this framework to be including more detailed than needed for our purpose. However, two aspects that are relevant for analysis and description when considering IS integration in an M&A context are included: the business model and the systems model (see Appendix C). Another articulation of Enterprise Architecture, viewed as a strategic foundation for executive purposes, have been formulated by Ross, Weill & Roberts (2006). Here, the authors use a maturity perspective on organizations moving from Business Silos, via Standardized technology and Optimized Core towards Business Modularity. A consequence of growing through these stages is the possibility of combining global flexibility with local flexibility - characteristics that may provide competitive advantages for global corporations (ibid.). In this sense, Enterprise Architecture is viewed from a strategic perspective, rather than as a lens useful for analyzing and describing a vision for M&A IS integration.

This thesis is concerned with the analysis and description of how different IS components can be technically integrated based on a business integration need in an M&A context. For the above mentioned reasons, none of the existing articulations of Enterprise Architecture are applicable. Instead, we use Enterprise Architecture as an overarching perspective, a view of the situation at hand. The reasons for this are twofold. Firstly, because it provides a link between the business model and the IS of the two organizations, as well as the technical IS integration approaches and their implications for an M&A initiative. Secondly, because an Enterprise Architecture perspective takes into account the ability to articulate and communicate such a vision it is the natural departing point of our study. The above leads us to suggest an Enterprise Architecture as a perspective to describe the linkage between the business model, information systems and technologies within a business. It also implies that, as an architecture, it is made up of different building blocks. But at what level then should the business, in terms of these building blocks, be analyzed?

1.2.3 Level of analysis

Business as well as IS components can be analyzed on several different levels, ranging from the overarching enterprise wide level, down to instantiations of business rules as visualized in the Zachman framework (Morgan, 2002; see Appendix C). Linthicum (1999) argues that the business process level is essential to determine the degree of integration that is necessary to optimize specific business processes (Linthicum, 2000). However, in an M&A context with the purpose to analyze an IS integration architecture, instead we propose the level of *business activity*, for example logistics, marketing, manufacturing or similar to be a more relevant one. The reasons for proposing the business activity level are that on one hand, we assume that the corporate strategy level is too high in the sense that it will only provide general advice and guidelines, with little practical use. On the other hand, digging too deep into the business process level will have two negative consequences. Firstly, an Enterprise Architecture should provide a blueprint on a high level, with choices being open in terms of vendor specificity and technology platforms. The business process level is too finely granular to provide these high level guidelines. Secondly, time is of importance in M&A integration (Napier, 1989; Wijnhoven, et al., 2006). Analyzing minute business processes is likely to provide a poor trade off between man hours spent and information gathered.

Instead we propose the level of business activity as a good trade off, bringing with it two attractive characteristics. Firstly, it enables the comparison of business model and IS integration approach. For example whether to integrate the IS supporting marketing activities between the parties in an M&A should be dependant on the role of marketing in the actual or envisioned business model. Secondly, it does not hamper flexibility in terms of vendor specificity or technology platforms, rather it points out the business objective with a certain integration approach. Today it is common that companies have well-defined business-models or at least functional departments. Business activities are typically found within a business model, constituting the chain of activities that generate revenue for the organization. They are typically broad constructs, clusters of processes that could be similar to organizational functions. By using such existing concepts we believe that the usefulness of the framework will be enhanced by enabling comparisons between different situations. A feature that is beneficial for academics and practitioners alike for the cumulative aspects of knowledge building; the wheel does not need to be re-invented. The relevance of such practical usefulness is further understood in the light of international trends related to external factors that corporations involved in M&As are subject to.

1.2.4 International regulations

Internationally there is increasing pressure from legally binding regulations towards organizations to define governance and personal accountability, organizationally as well as IT wise. In the US, the Clinger Cohen act of 1996 command government regulations to keep an IT architecture to achieve strategic and information management objectives (Jonkers et al., 2006). The Basel II capital adequacy framework by the central bank governors in the Group of Ten (G10) countries requires banks to adhere to regulations in regards to explicit risk management, with consequences on organizational and IT systems alike (Ibid.). Finally, there is the US Sarbanes-Oxley Act of 2002 which was created post the Enron scandal with a focus on increasing personal accountability for each employee. IT systems must provide accounting information to enable audits imposed by the Act (Ibid.). Regulations such as these are requiring significant insight into the building blocks of the organizations and how these relate to each other. As many organizations are improving their architecture practice, an Enterprise Architecture perspective can aid in providing the

required knowledge needed to define organizational structures in compliance with these regulations (Ibid.).

1.3 Knowledge contribution and purpose

As a means to deal with the complexities and lack of business / IT alignment in modern IS research, the concept of Enterprise Architecture can provide a link between the business model and the IS supporting it (Ross et al., 2006; Morgan, 2002; Zachman, 1987). The above mentioned strategy, process and enterprise architecture perspectives (see 1.2.1) are interlinked and view the area of interest from different vantage points. Although there is research from strategy and process perspectives, as far as the authors know, it is seemingly non-existent from an enterprise architecture perspective. We have found two preceding papers that overlap our problem area. Giacomazzi et al. (1997) have made an attempt to conceptualize how an enterprise wide post merger integration architecture can be systematically dealt with. The outcome is a suggested framework for analyzing appropriate overarching strategies for IS integration on an organizational level. Wijnhoven et al. (2006) have in a similar sense delivered knowledge related to the mapping of integration objectives to IT integration strategies, this as well on an organizational level.

However, in an M&A context there may well be different IS integration needs as a result of an acquisition, depending on what business activities that are affected and to what extent. Building on Markus (2000) conclusion that it is entirely possible to end up with more, as well as inappropriate, IS integration for the business need, instead we believe that each of these integrations initiatives should be considered and evaluated on the individual business activity level. For example, how to integrate the IS supporting the marketing activity within an acquired company. Although the enterprise architecture perspective holds promise as an appropriate lens for viewing this particular area of interest, this has not yet been done.

It is here that the major knowledge contribution of this study lies; to develop theory for analyzing and describing IS integration from an Enterprise Architecture perspective in an M&A context. This is done by amalgamating existing knowledge from three strands of research: business and strategy theory related to M&A objectives and value creating, IS theory related to competitive advantage, and technical IS integration theory. The outcome is a theoretically grounded framework that is empirically enhanced by testing it against an empirical case of an actual M&A.

We recognize that there are factors outside the scope of this thesis, such as prior IS investments or vendor relations, that on good grounds hold weight when making decisions. Although, such contextual factors influence managers involved in making the actual decisions regarding IS integration in an M&A context, the enhanced understanding of the problem area, may well improve the grounding of possible choices. When decisions are made, the consequences of the involved trade offs are likely to be more foreseeable. With increasing regulatory pressure on organizations regarding explicit definition on governance and architecture this is of high relevance for practitioners. For academics, on the other hand, the combination of a novel perspective on a more finely granular level than before may provide further insights into a complex subject matter, not least depending on the relative immaturity of this research field. The explicit purpose of this thesis is:

To create a synthesized framework from existing theory and for analyzing and describing IS integration on a business activity level in an M&A context, and to empirically test the framework.

The outspoken focus of the framework is the communication of a vision - an enterprise architecture - built on the analysis of how different IS components can be integrated based on their business integration need on a business activity level. This is done by synthesizing existing theory, going out into the field to explore a case of IS integration in an M&A, review the framework and finally test this once more against reference cases with entirely different characteristics.

In order to evaluate the study in light of its purpose, the criteria set out is the ability of the framework to analyze and describe real-life cases of IS integration in M&As from an Enterprise Architecture perspective. These criteria are revisited in *chapter 11: Discussion*, where an explicit evaluation is carried out based on the findings from the analysis and description of three cases.

With the stated purpose in mind, we see the two following research questions as valuable to answer. The first is on an aggregated, organizational level. In order to answer this, the second research question is on a business activity level:

- *How does the business model integration in M&A relate to Information Systems Integration?*
- *How does the integration need on a business activity level relate to the characteristics of different IS integration approaches?*

1.4 Research context

This master thesis is carried out as a part of a greater research project which consists of a collaboration of Lund University and Trelleborg AB. Trelleborg has over the last decade carried out some 50 acquisitions (Henningsson & Carlsson, 2006). This is a part of their business strategy and they aim to grow by another 5-10 acquisitions yearly (ibid.). Trelleborg recognizes that IS integration is crucial in achieving the value related to the sought after synergies, as well as the fact that the matter is far from trivial. They are therefore providing funding for a PhD student to research the field of IS integration and M&As. This work is carried out by Stefan Henningsson over an estimated period of four years. His work aims at the development of a "theory that explains the dynamic between IS integration and the general M&A process" (Henningsson, 2006). A secondary purpose is also to design artifacts that may assist decision makers in this context. The dissertation will be empirically based upon four case studies. This master thesis has gathered data that will form one of these case studies.

The current status of Henningsson's research is a framework that consists of six dimensions. These dimensions shed light on relevant areas for explaining the dynamic of an M&A on a whole. Our research, however, concerns the developing of theory that explores the relationship between three related but not identical areas: *Business integration*, *IS integration approaches* and a *Strategic view of IS*. These are categories that are in fact spawned from three of Henningsson's categories; Level of *Organizational integration, Integration architecture* and *IS Type*. As our analysis level is the sub-organizational business activity level, as opposed to the organizational level, this thesis acts as a more detailed sub-component of the framework proposed by Henningsson.

1.5 Method in brief

This research took its starting point in the theoretical studies of *Business Activity integration in M&As*, *IS integration* and a *Strategic view of IS*. The description of how these relate to each other in the perspective of communicating an enterprise architecture led to a theoretical framework. Following, the framework was then tested upon and consequently elaborated by the means of a primary case study.

The primary case was chosen for its relevance to develop and deepen our understanding of the problem area as well as our framework. The case consists of the acquisition of a small production-based company by a business area within the Trelleborg group: Trelleborg Sealing Solutions (TSS). TSS has grown considerably by means of acquisitions over the last couple of years. The acquisition of Chase-Walton was chosen by the project steering committee at Trelleborg AB in cooperation with us. As TSS has extensive experience with M&As, as well as a clearly defined corporate strategy, the case suited this study well. The case was studied as a single-embedded case study due to the complexity and descriptive nature of the research.

The reference cases, on the other hand, consist of secondary data gathered in other studies; one by our mentor, the other found in an academic journal. The cases differ significantly from the primary case in regards to their business models, drivers behind the acquisitions, as well as their enterprise architectures. The reference cases are used to discuss the applicability of our framework with the aim of furthering its theoretical generalizability.

1.6 Concepts and definitions

Business activity

A combination of several business processes which together make up a business activity, such as marketing or manufacturing. These in turn make up a business model (see 6.5. The business model concept).

Business integration

Business integration is defined by Markus (2000) as "the creation of tighter coordination among the discrete business activities conducted by different individuals, work groups or organizations, so that a unified business process is formed." Hence, it simply involves the integration of business processes.

Business process

A business process is defined here as the chain of actions that are enacted to deliver a certain result. Processes are generally well defined units that have a specified input and output.

Information Systems

Our definition builds on Langefors (1993) who defines an Information System as a collection of interrelated entities that use knowledge to construct useful information out of pieces of data. Although the definition may sound unnecessarily abstract it implies that it is not the information technology per se that constitutes the system but the way that it is used to construe and use meaningful information from data. We will return to this at a later point to further investigate the importance of this definition but for the time being it is important to keep in mind that

information systems are larger that the actual information technology that they rely on and are built around.

Integration

Integration in its widest sense is described as "a blending together of organizational components" (Mehta & Hirscheim, 2004). We would however like to add to this definition that it is an implicit goal in all integration that the two entities that were blended will work in the same way. Chenhall (2003) offers a similar definition of integration as when there is congruency in terms of organizational goals between organizational units.

IS Integration Approach

Describes how different IS are integrated based primarily on the scope of their exchange of information. Langefors (1993) argues that integration must exist between organizational units that share information. However, the integration can focus on data or information. Later, these concepts have been developed, as we shall see, to include further dimensions. Today, three principally different options exist: Point-to-point, Middleware or ERP.

M&A

The term mergers & acquisitions denote two separate corporate activities. These have however been combined into a single research topic (Henningsson, 2006) as they share a number of distinct features. Even though our object of study is an acquisition we will use the term M&A throughout the study.

1.7 Basic assumptions

Throughout this thesis, we have maintained a set of views that act as a foundation of our reasoning and argumentation. To help the reader understand this, we will present some basic assumptions that we have made about the situation of study:

Inseparability of IT and business process

The traditional view of IT states that it is a tool that supports the organization in everyday operations (Langefors, 1993). As the world changes we believe that today IT is such a pervasive part of most businesses that it is inseparable (Walsham, 2001) and the value of IT is dependent on the resource it is supporting (Powell & Dent-Micallef, 1997)

Business perspective on integration

Our main belief is that the ultimate goal of all integration is value creation. Unless value is generated in excess of the cost of integration, there is no need to integrate. Furthermore, we view the technological aspects of integration as being tools to achieve these business objectives of value creation. The technological aspects are however, in accordance with the previous assumption, critical to achieve the sought after business objectives.

Acquirer perspective

We take a strong position in terms of viewing the integration as a process that should benefit the acquirer. Consistent with the assumption that integration creates value, we therefore seek to

maximize value on behalf of the acquiring, or integrating, part. This perspective is largely due to the fact that it is the acquirer that is seeking to realize synergies by integrating rather than the acquired part.

Case representativeness

Being aware of the complex nature of M&As, we believe that the framework, theories and results of this study are somewhat generally applicable across the whole range of M&As. Although they have been developed in light of a very specific acquisition the concept of business models is widely used in general practice. This notion of generality across the range of M&As is supported by previous researchers who regard the whole field of M&As somewhat homogenous (Giacomazzi, 1997; Mehta & Hirscheim, 2004)

Giacomazzi et al. (1997) even states that it is only legislative aspects that differ between mergers and different kind of acquisitions. Although this can be challenged on good grounds, we do not relate these differences to our research questions, reasons being the immaturity of the research field and the similar levels of accumulated knowledge. As this study is concerned with IS integration architecture in relation to business models, we agree for the sake of simplicity.

Choices regarding integration are situation specific

There is no one best way to integrate IS enterprise wide, but rather options that bring different consequences to different enterprises and different M&A operations. Having this said it is important to view our research as a theoretical platform that should be used when conducting an evaluation of an Enterprise Architecture.

1.7.1 Delimitations

Departing from Henningsson's framework, we have chosen to delimit our study to certain aspects. Our primary interest is in the managerial decisions regarding choice of IS integration approach in M&As. With Henningsson's framework, this effectively removes some of the dimensions. *Intentions and reactions, role of IS* are only covered briefly as they surface later in the analysis but are not a part of our extended framework. This is due to their limited, or no, relation to the integration architecture (Henningsson, 2006). Even though McKiernan & Merali (1995) concluded that a reactive approach is more likely to transform existing systems rather than replacing them, we believe that this is out of our scope as it concerns more of the actual process of planning and carrying out an integration.

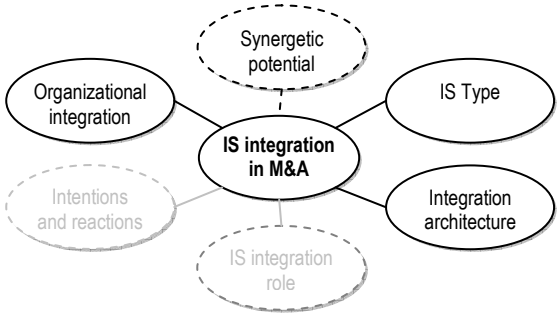

Figure 1.1. Delimitations in Henningssons framework (from Henningsson, 2006)

Markus (2001) argues in a contemporary comment on ERP integration issues, that integration architecture needs and rationale should be split into strategic and techno-economic issues. Strategy should focus on the alignment of business and IS while the techno-economic view is concerned with maintenance costs and resource utilization. We believe that these factors can be attributed to the remaining dimensions of Henningssons (2006) framework. The dimension of *synergetic potential* is covered in part as it is a major determinant of *organizational integration* (Haspeslagh & Jemison, 1993; Henningsson, 2006). Further on, the models and theories presented are in no way universal and we recognize the fact that a multitude of factors affect the actual decisions regarding an integration architecture. Trautwein (1990) discusses the many ways by which one could choose to explain M&As and concludes that the actual driver is most likely a combination of many explanation models.

Some of the factors influencing decisions regarding choice of IS integration approaches are external, such as legislative regulations imposed on organizations that call for compliance. Although these may be well influenced choices regarding IS integration, for example the compliance of an ERP system with accounting regulations in a geographic region, this is outside the scope of the framework developed in this thesis. Instead such considerations are to be taken outside the analysis and description that our framework is aimed at.

Regarding the choice of IS integration approach in an M&A, there are also numerous factors that need to be considered which lie outside the scope of our thesis. Just as synergies are the dominant explanatory model for M&As, techno-economic and strategic benefits are the dominant for IS integration issues (Markus, 20001). Having said that, it is likely that there will be a number of other contextual factors that must be assessed on an individual basis. Mehta & Hirscheim (2004) proposes several ways to view the IS-related decisions that are made after an M&A. These include power differentials and internal politics as well as the business-IT strategy fit.

Further, even if the framework will be a tool to describe and analyze an actual integration, this is not intended to cover the outcome of the integration. We argue that our main area of study is the architectural choices of an IS integration, not the consequences that it will ultimately result in. We recognize that these are of interest but as they are influenced by a myriad of other variables as well we rest on the theoretical viewpoint that integration is crucial to achieve the synergies sought in an integration (Trautwein, 1990; Alaranta, 2005). Neither do we examine the process of actual integration in our study. We believe that, as important as it may be, this is a whole different topic and should be investigated on its own merits.

1.8 Structure of thesis

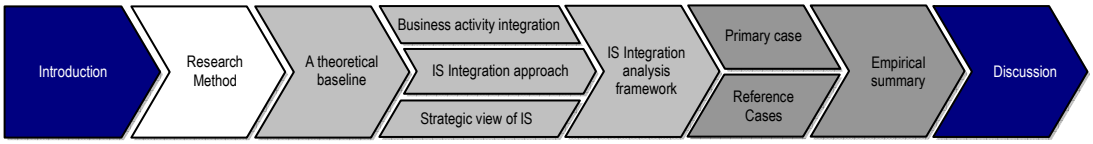

Figure 1.2. Structure of thesis

Chapter 1: Introduction

Explains and motivates *what* the study is about. This is the initial review of the background of the thesis, where the problem area and the perspectives used are motivated. The purpose and research questions are defined, knowledge contribution articulated and definitions and delimitations are made.

Key issues: Enterprise Architecture perspective, the Business activity level, the research purpose and evaluation criteria, research questions and contribution of knowledge.

Chapter 2: Research Method

Explains and motivates *how* the study was conducted. The method consists of two phases - one theoretical and one empirical - addressing different parts of the purpose of the study. The first phase is concerned with deducing from theory, the latter with how data was collected and analyzed, along with a discussion of validity concerns, the selection of cases as well as method criticism.

Key issues: Research design, validity threats, data gathering & analysis, sampling, ethics.

Chapter 3: A theoretical baseline

Presents briefly the framework by Henningsson (2006) and its relevance to this study. We also position ourselves in relation to this by motivating a re-conceptualizing of the theoretical dimensions that form the outline of our framework. These three dimensions also form the structure of the theoretical review in the following three chapters. The theoretical part of the thesis ends with the presentation of the synthesized framework in chapter 7.

Key issues: Theoretical baseline, the three dimensions of our framework.

Chapter 4: Business activity integration

Why do businesses integrate and how is this done? The drivers behind an M&A and also how these drivers are realized are discussed, as well as the need to use a lower level of analysis than previously done. The chapter is finalized by the selection of a taxonomy from the literature and a summary of the theoretical contribution to the framework.

Key issues: Synergies, modes of integration, business activity level, Haspeslagh & Jemison's model.

Chapter 5: IS integration approach

This chapter deals with different ways of integrating IS. Three different approaches are selected, examined and discussed in terms of their different characteristics. The chapter ends with a summary table and a summary of the theoretical contribution to the framework.

Key issues: Enterprise-wide, Middleware, Point-to-Point, Technological level of integration, Integration level.

Chapter 6: Strategic view of IS

How can IS be used to create competitive advantage on behalf of an organization? We discuss the resource-based view, strategic necessities and the business model concept along with the business activity level. The chapter ends with a taxonomy of strategic importance of an IS and a summary of the theoretical contribution to the framework.

Key issues: Strategic view of IS, business model, strategic necessities, complementary resource.

Chapter 7: IS Integration Analysis framework

Our framework is presented in whole along with internal relations. A relational model of this framework is presented and motivated in terms of its relation to the framework and theoretical baseline. We discuss the scope, terminology and dimensions of the framework. The model forms a visualization of our understanding or the problem area before the gathering and analyzing of empirical data. Chapter 7 concludes the theoretical part of the thesis that began with chapter 3.

Key issues: Enterprise architecture, applicability of model, internal relations of the framework, business activity scope.

Chapter 8: Primary Case

The empirical part of the thesis aimed at testing the framework begins with the case of TSS and Chase-Walton. This is described and analyzed in detail using the framework from the previous chapter. Special attention is given to the enterprise architecture of TSS and its implications for business execution.

Key issues: Enterprise architecture as strategy, IS-strategy fit with business model.

Chapter 9: Reference Cases

The empirical testing of the framework is continued as two separate cases are briefly discussed and analyzed. First the case from Trelleborg, the CRP case is reviewed, followed by a case by Alaranta (2005). Both rely on secondary data only.

Key issues: Enterprise architecture development, maturity of enterprise architecture.

Chapter 10: Empirical Summary

The case findings are collated in the relational model and summarized, concluding the empirical part of the thesis that began with chapter 8.

Chapter 11: Discussion & future research

Purpose and research questions from chapter 1 are revisited as the framework and model are evaluated in terms of relevance as well as analytical and descriptive powers. Possible explanations behind findings are elaborated upon, ending with an explicit discussion on our perceived contribution of knowledge. A reflection on the research process concludes the thesis.

Key issues: Evaluation of framework, purpose fulfillment, practical implications, future research.

2 Research Method

In the previous chapter we defined the problem area and the purpose of our study to create a framework aimed at describing and analyzing the IS integration in an M&A. To do this we have selected an abductive approach with one theory-deducting and one empirical phase. The empirical data for testing the framework will be gathered through a case study. This chapter goes further into detail in describing the motives, possibilities and problems related to this. Finally, an important feature of this chapter is the identification of validity threats and the steps taken to mitigate them.

2.1 Background

As mentioned in the introduction, the foundation for this study is the research on three different strands: business and strategy theory related to M&A objectives and value creating, IS theory related to competitive advantage, and technical IS integration theory. This study is concerned with the creation of a synthesized framework in the intersection of these areas as illustrated in figure 2.1.

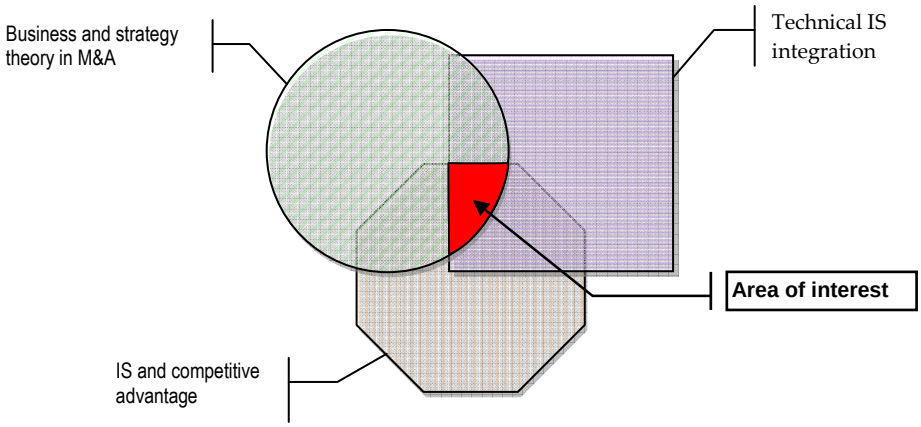

Figure 2.1. Area of interest

This leads to the classification of our study as *descriptive* as it aims to provide a mean to describe and analyze a more or less known phenomenon. It relies on a foundation of existing knowledge leading to our theoretical synthesis but this has not reached enough saturation to aim for a normative or predictive approach. When conducting a descriptive study, it is necessary to look at the problem area from a multitude of perspectives, as you want to gather knowledge that can be foundational for further studies. It is also common to use a multitude of techniques when gathering data (Miles & Huberman, 1994). This approach will be covered more in depth later in this chapter.

The investigation of "*How does the business model integration in M&A relate to Information Systems Integration in an Architecture perspective?"* is one where the conveying of meaning is central. The concept of synergetic potential behind an M&A is a complex concept, not trivial to define measurements of, the data needed are assumed to be soft rather than hard. Most likely these data will be consisting of words and/or observations. This view rests on a hermeneutic stand where the meaning of the raw data – words – will be interpreted and analyzed in an iterative fashion (Kvale, 1997). Due to the holistic nature of investigation, the immaturity of the research field, and the need to gather rich data in the form of words, the study is qualitative in nature (Miles & Huberman, 1994).

In addition to the above, there is another reason for this approach. It is the fact that we were not positively sure that the research question would remain the same throughout the research process. If this changes, so should the research design. By choosing a qualitative approach it is not only possible, but desired, to take information into account as it is revealed and change the research design along the way in an iterative fashion (Yin, 2003; Bryman 2002).

2.2 A descriptive approach

This thesis is mainly descriptive and aims to deepen our understanding of the field by providing a theoretical contribution in terms of a framework for analyzing and describing, as well as testing this framework empirically. This two-legged strategy opens the door for an *abductive* approach which is particularly well suited for exploratory research (De Mast & Bergman, 2006) in terms of stating goals and hypotheses. Generally abduction differs from *induction* in the way that we do not formulate causal explanations or hypotheses as an explanation of observed behavior. Rather than stating that B follows A, we use an abductive approach to say that a hypothesis is *plausible* rather than an actual rule (Niiniluoto, 1999). By using this approach we allow for others to later test our hypothesis thoroughly – the main focus is on developing an idea of plausibility. Abduction is basically concerned with the studying of a fact or phenomenon and devising a theory to describe and analyze this fact.

DeMast and Bergman (2006) have devised a theoretical model for abductive studies partially based on quality improvement methodologies (see Figure 2.2). In an introductory phase of the study the *operationalization* is made, which is equivalent to isolating and describing the problem. Following is the *exploration* phase which focuses on causal theories of the fact; a realistic solution is sought. This can be done in a multitude of ways but as academic writers, we use what DeMast & Bergman label as 'deductive reasoning of theory' – i.e. we seek an answer (our synthesis) in a set of rules (current theories).

When the exploration phase has resulted in a set of plausible hypotheses, these must be *elaborated* upon and refined. Following comes the phase of *confirmation* where empirical evidence is sought to justify the theory. Although DeMast & Bergman does not explicitly include this in their model we have included the iterative element of qualitative research in our approach as we believe there is significant support for this (Miles & Huberman, 1994; Maxwell, 2003). As the theories produced are either validated or discredited, *conclusions* regarding their quality and implications can be drawn.

The core of DeMast & Bergmans model is the *exploration phase* in which researches should investigate and evaluate different rival theoretical explanations (2006). In practice this would mean that the research question and purpose is refined and iterated upon. In the case of this research it was the framework idea that was the result of this exploration of the problem space and theory.

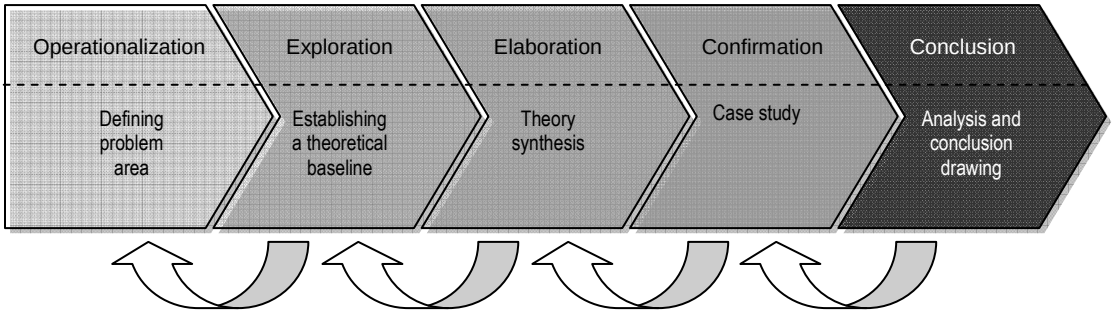

Figure 2.2. Research process (mod. after DeMast & Bergman, 2006)

This model is beneficiary to us as it allows us to accomplish our two-legged strategy of describing and analyzing as previously mentioned (see figure 2.2). During the first stage of the DeMast & Bergman model, *operationalization*, our attention is turned to the problem area. During this stage the research area is defined as well as the phenomenon to be studied - IS integration approaches in M&A. The product of this phase is the problem area and the perspectives we will use in our study.

To enable to answer the research question(s) the *exploration* phase is conducted in which the research question is further defined and the boundaries of the theories to use appear. It is during this stage that Henningsson's (2006) framework appears to be the natural starting point for the study. Primary contribution of this phase is the explicit definition of preliminary research questions and purposes. The stating of these is made possible by the reaching of a deeper understanding of the subject matter.

As the problem area and research questions are further tightened, the review of existing knowledge in the form of literature is begun. Possible relations and similarities of existing theory are explored and analyzed. As the theoretical understanding a synthesis of the framework begins by deduction of theory. This last part is the elaboration phase of DeMast & Bergman (2006). As this phase is concluded the framework is more or less ready for testing and validation. At this point the first part of our purpose is considered to be fulfilled.

The confirmation phase in this study consists of the application of the primary and reference cases on our framework. This phase is to a higher degree than the others an iterative element where the framework is constantly reviewed during the primary data collection and analysis. The output of this phase is the description of the analysis and the empirical conclusions. This phase accomplishes the second part of our purpose, to empirically test the framework.

As the framework is tested and reviewed the conclusion phase results in our review of the framework as well as the perceived applicability of it. The final result of the last phase is the revised framework that may be used for future research, by other researchers and/or practitioners.

2.3 Theoretical research strategy

The previous section highlighted the phases of the research process where an explicit focus is put on existing literature. In line with DeMast & Bergman (2006), the primary source for the theoretical deduction was the already existing body of knowledge. The importance of Henningsson's framework (2006) can not be overstated in this context. As this was our main entry point into the field, our selection of theories and the literature review we conducted was biased by his view. However, as our understanding of the field grew, so did our independent selection of literature and relevant theories.

We have tried to focus on literature from within the academic community as we know that these have been reviewed and exposed to validity tests in form of peer reviews. Therefore we do not consider there to be an explicit need to evaluate the credibility of individual studies. However, the theoretical fit to our framework is another thing and those who did not fit into our world are unlikely to be represented here. As we covered extensive theoretical fields in several areas, there has been an explicit need to focus on certain theoretical views. These selections have primarily been based on our previous body of theory but also on case relevance. We have tried to explain all theoretical delimitations when there is an explicit need for this.

2.3.1 Process of theory synthesis

Previous theory within the field was synthesized into a new framework and relations have been deducted. The base for this synthesis is the framework by Henningsson (2006) but it has been adjusted to fit our focus on business activities and the enterprise architecture focus that we have taken. By reviewing different theories and comparing them and analyzing their fit in a synthesis of selected theory was reached. This selection of theories, their implications and fit are motivated in more detail in the following chapters.

2.3.2 Nature of theory produced

Our purpose states that the main goal of our thesis is to develop a framework for analyzing and describing IS integration in M&As. A framework is best described as the lens to be used when observing a situation. It allows us to categorize and describe what we see (Morgan, 2002). Hence we want to produce a tool to aid in analysis and description in the domain studied. A framework can also include one or several models. Models are simplified abstractions of real-world phenomena which are to be separated from frameworks. Typically models include relationships or causal flows.

Gregor (2006) proposes a classification of different types of theory in IS research and states that these follow a logical and consecutive order. A predictive theory should then be preceded by an analyzing theory. As the research area at hand is still in its infancy, the natural theory type would be *theory for analyzing* which aims at the development of sound theoretical constructs to aid and pave the way for future research (Gregor, 2006). 'Analyzing theories' should be able to provide a description of reality as close to 'what is' as possible, but there is no element of causality or predictive propositions (ibid.) and as such our main focus is on finding and identifying the relationships within existing theories and empirically based data.

2.4 Empirical research strategy

The empirical research was conducted as a *single embedded case study*. The rationale for choosing the case study is multifold; there is a complex amount of variables, a temporal perspective and a clearly defined boundary in time and space of the study. The case study as such is also particularly suited for this research as it is of descriptive nature (Yin, 2003). Let us revisit the research questions: "*How does the business model integration in M&A relate to Information Systems Integration in an Architecture perspective?"* and the sub-question: *"How does the integration need on a business activity level relate to the conceptual level of IS integration?"*. In a situation where questions are asked concerning contemporary events of which the researcher has no control, the case study is the most advantageous strategy (Yin, 2003).

In order to enhance the external validity of our study we have chosen to include reference cases in addition to our primary case. These have been used to further test the applicability of the framework. The first reference case is based on data gathered by Stefan Henningsson in the Trelleborg AB funded research; the second of peer-reviewed case descriptions from an academic journal. Although the reference cases consist of secondary data, they have been gathered by closely linked researchers and/or examined by peer review. This closeness is likely to enhance the quality of the data, as we have had opportunities to further deepen our understanding on the reference case presented to us by our mentor. Mainly this has been done by posing further questions regarding our interpretations of the data, as well as questions concerning intricacies on the actual data gathering; something that is rarely the case when utilizing secondary data. The reference cases were chosen because of their differences from the primary case in areas we deemed relevant for assessing the validity of our framework (see table 2.1). Brief presentations of the cases are presented below, as well as the main criteria for the primary case study are outlined below.

Single Embedded case: Yin (2003) argues for five different rationales for choosing a single case design. These seem to be founded on an assumption that the resources at hand are limitless. In reality, this is rarely – if ever – the case. The main reason for our choice of a single case design is the amount of time at hand, two months in total. Thereby the conducting of a *multiple* case design is disqualified; the depth needed will unlikely be attained by superficially rushing through several cases. In an attempt to try to capture some of the benefits from a multiple case design we have however extended our analysis with reference cases. These are given less importance but serve as an additional test of our framework presented.

However, as the case is in fact an acquisition and it might be seen as typical it does fit Yin (2003) rationale of a using a representative case. Furthermore, by using a single case we have made for the allowance of flexibility in instrumentation (Miles & Huberman, 1994). This is an advantage in qualitative studies where it is expected that research questions and/or theoretical framework will change during the study.

In a single-case study the case selection is of high importance (Miles & Huberman, 1994). Our selection of the case was made as a combination of a theoretical and convenience sample. In dialogue with Trelleborg AB – our research sponsor - we defined what we would like to see as prominent characteristics of the case, grounded on a theoretical viewpoint as well as the preferred direction of study. Following, Trelleborg AB, proposed a suitable acquisition which we evaluated according to our preferred criteria, and accepted (see table 2.1). The reference cases were aimed at differing on all criteria except for one: the time of acquisition should be similar. The reasons for this are twofold. Firstly, to ensure that the data from both cases had been gathered from informants that had the

acquisition fresh in their minds, and secondly, that the similarities in technological development and IS integration trends would ensure a similar palette of possible choices.

Table 2.1. Case criteria

Criteria	TSS/Chase-Walton (primary)	TES / CRP (reference)	Manufacturing company X (reference)
High level of business integration	x		x
Homogeneous integration architecture	x		x
Homogeneous business model	x		
Recent integration	x	x	

Units of Analysis: Our study is concerned with the integration of two entities, and it can be argued necessary to analyze both acquirer and target company to reach sufficient richness of data. Although this reasoning makes sense, there are different needs for data types as our perspective is that of the acquirer. Both acquiring and target company will be the units of analysis. However, primary data will only be gathered from the acquirer, as the study has a forthright acquirer perspective.

This is a more complex design than a single unit of analysis, which is not only appropriate but desired as it provides the needed opportunities to reach the level of insights sought after (Yin, 2003). The risk of losing the holistic perspective by tunnel vision focusing in too high degree into each part of the M&A is inevitable, due to the nature of research question. It will however be taken into account when conducting data gathering, as well as the different phases of data analysis.

Within-case sampling: Data will be collected from informants within the acquiring unit. The reason for this is that we have an outspoken acquirer perspective in both research question and in the study as a whole. Sampling will be made on a basis of convenience and snowball sampling as our informants will mainly be made available to us by recommendation and availability (Körner & Wahlgren, 1996). The main idea behind the informant sampling has been to try to get one informant per theoretical area that makes up our area of interest, see figure 2.1.

After acquiring an initial contact at TSS, a number of possible informants were identified. In order to better pinpoint relevant informants pilot interviews were also conducted before finalizing these choices. These have enabled a better pre-understanding when creating tools of data gathering such as interview guides and also to help clarify the tools and processes of data analysis.

Our first contact at TSS was Global IT director, Alexander Jarosh (see figure 2.3). As he provided us with a preliminary understanding of the case he also gave us directions to our other informants at TSS, David Brown and MathieuDebreucq. As we shall see later in table 2.2, all informants were interviewed once over the phone and once in person.

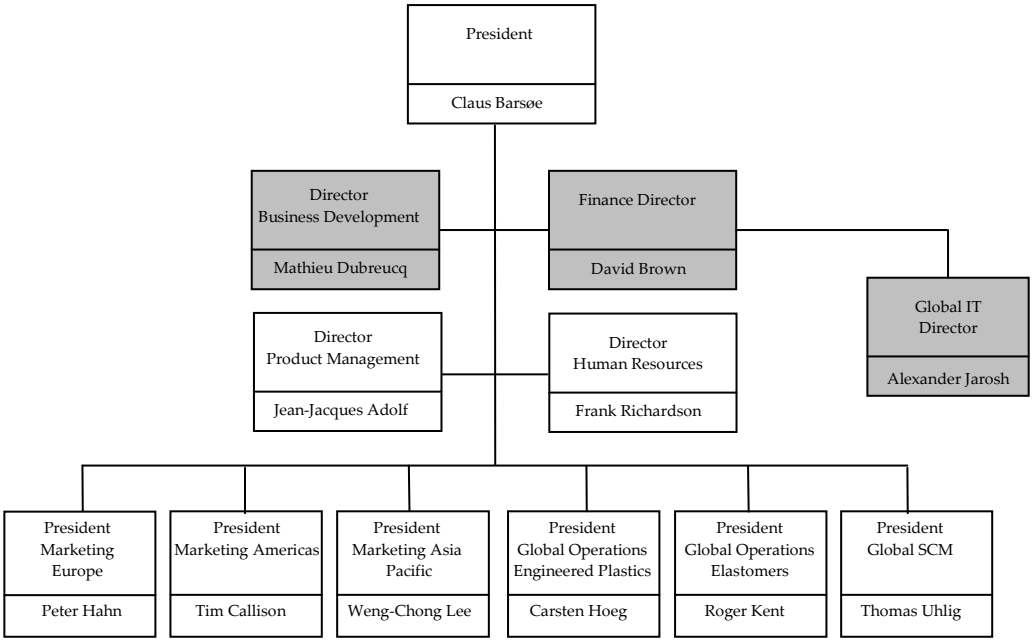

Figure 2.3. Trelleborg Sealing Solutions, organizational chart

2.5 Presentation of the primary case

The chosen primary case is the acquisition of a company within the Trelleborg Group in October 2005. The acquiring business area consists of around 6,000 employees; the target has a more humble number of 100 employees. The acquired unit is positioned in the U.S. and is active within the Trelleborg Sealing Solutions business area. The level of integration sought after is high, the aim is that the acquired company will be "integrated fully" (Trelleborg press release, 2005). The strategic goals with the acquisition are to expand in the U.S. market area, and the existing product portfolio, as well as to gather know-how (Trelleborg press release, 2005).

The case was carefully chosen to fit the research question and perspective for several reasons. Firstly, the need to fully integrate the unit points to a high likelihood that the chosen integration architecture will be including the implementation of an ERP system, as well as including point-to-point, and middleware approaches. Secondly, the closeness in time ensures that the case have been exposed to current possible IS integration approaches, the same as our theory consists of. Finally, the time frame of one year ago is chosen because of the likelihood of entering in the middle of things - before the smoke has cleared - so to speak. The implementation process have been ongoing long enough to bear fruit data wise, but not so long ago that informants have made cognitive adjustments memory wise as to what really went on.

On a final note, when it comes to business area, and strategic goals for the acquisition, these are coincidental or of convenience. We could not initially make predictions regarding the possible impact of these characteristics on the study in one way or the other.

2.6 Presentation of the Reference cases

In order to further develop our understanding of the problem area, as well as to give our model a more thorough testing, referential cases were chosen to accompany the primary case. The first reference case is the one of Trelleborg Engineered Systems (TES) and their acquisition of a UK-based engineering company - the CRP group. TES is also a business area within the Trelleborg Group and is one of the cases used by Henningsson (2006). This acquisition was completed in January 2006 and as it has already been covered to some extent by Henningsson (2006). This case was chosen for two reasons. Firstly, for its contrast to our primary case in important dimensions (see Table 2.1. Case criteria), and secondly, for the access we could get to the secondary data as these were gathered by Stefan Henningsson.

In addition to this, a second reference case was selected from literature. This is the case of Manufacturing Company X where two manufacturing companies merge. As the merger was concluded in 1999 it is less adjacent in time than the CRP case. However, the actual integration started in 2003 which makes us consider the criteria of recent integration to be met (see Table 2.1. Case criteria). This case has similarities to our primary case as it deals with the enterprise wide integration of an enterprise system, and that the integration architecture is homogeneous. In spite of this, there are differences that make this case useful in testing our framework. Firstly, because the business models of the units to be integrated are heterogeneous. Secondly, and more important, it deals with a merger rather than an acquisition. By including a merger as a reference case we somewhat extend the applicability of our framework to cover the full range of M&As.

The inclusion of these cases gives us some of the benefits of multiple case study as we get an increase in external validity (Yin, 2003), that is the ability to generalize outside the case. Both reference cases are differing in these dimensions they are likely to enhance the value of the framework testing. The reference cases are not based on the direct replicability but rather a *theoretical replicability* i.e. that they are chosen to fit the theory or framework rather than the primary case (Yin, 2003). By choosing contrasting cases, we aim to cover a larger part of our framework and at the same time deal with some validity concerns regarding the single-case study.

2.7 Data gathering

2.7.1 Primary case

In order to gather the rich data in form of words the techniques available are based on three basic strands - documentation, interviews and observations (Miles & Huberman, 1994). All three have been used in this study, for different specific purposes due to their different characteristics. We have also used both secondary and primary data sources. The purpose for this was to use the resources at hand in the most efficient way without compromising effectiveness. Secondary data was used initially to create a pre-understanding, because of its relative ease of gathering. The primary data rests on this foundation with the aim of increasing the likelihood of gathering a total amount of data sufficient to answer the research question.

Kvale reasons regarding the planning of an interview investigation: to answer the “what?”, “why?” and “how?” (Kvale, 1996). The purpose of the study (“why?”) needs to be made explicit before the study

commences; this has been done (see 1.3). The "what?", the gaining of pre-knowledge is the outcome of the documentation gathering phase. "How" to conduct the interviews have been answered by working through relevant literature, and by making use of the supervisor and other more experienced researchers. The specifics of these data gathering techniques are described below:

Documentation: Secondary data in the shape of press releases, meeting agendas, and press articles, etc. formed the initial pre-understanding of the case and its context. This data was made available through a convenience basis as it was publicly available or presented to us by our informants. These data had the purpose of making explicit the context of the case by answering questions related to the framework for IS integration in M&A presented in Henningsson (2006). These concern dimensions such as: *Synergetic potential, Organizational integration, Intentions and Reactions, IS type, Integration Architecture, IS integration role*. The aim of having answered these questions is to heighten our understanding of the nature of the case to a level that would make the following interviews equally rewarding. This also aided in the choice of specific informants at the data analysis units: the organizations involved in the M&A.

Interviews: Interviews form the empirical foundation of the study, as an essential source for case studies (Yin, 2003). Two types of interviews were conducted in different ways and for different purposes. Initially a pilot interview was conducted with a representative from TSS. The purpose of this was only partly to warm up the interviewers to the major empiric gathering interviews that were to come, (Kvale, 1996; Maxwell, 2005). The major benefit was that it aided in getting the necessary pre-understanding of the case and problem area, as well as in developing the interview guides. This pilot interview took place as a phone interview during the documentation gathering.

Following was two phone interviews and three face-to-face interviews with informants at site. The numbers are believed to be reasonable with the resources at hand, as well as the purpose of the case to test the theoretical framework, and are in fact a part of the data reduction (Miles & Huberman, 1994). The informants were chosen on their relevance to the M&A and IS integration process at the time. The need for face-to-face contact is emphasized by Kvale (1996) as important contextual information as body language, tone of voice etc. might otherwise be hard to record. In addition, there is a need to be skilled conversationalists and to tune in to the specific style of language of the informant (Kvale, 1996). The interviews were conducted in English, which is not our mother tongue, a second argument for face to face interviews, rather than telephone interviews.

For descriptive studies interviews should be open and with little structure (Kvale, 1996). As it is founded on previous research to some extent it leads to the conclusion that a somewhat more structured interview approach is appropriate. Therefore interviews were to be semi-structured in nature. In order to aid the interviewer to keep on track, but at the same time open up for information previously unexpected, focused interviews as described by Yin (2003) were more appropriate. These were aided by the development of interview guides to ensure that themes are investigated, at the same time leaving interviewer discretion the possibility of following up interesting threads. An additional purpose with using interview guides is to aid in the following analysis. These interviews were recorded and transcribed for later analysis. This also enables our data to be used by other researchers within the same field, such as Stefan Henningsson for example.

2.7.2 Data collection plan – Primary case

For our primary case, apart from reading press releases, annual reports and previous research, our main point of data collection has been interviews. The complete schedule for the interviews conducted can be seen in table 2.2 below, the organizational chart for TSS can be found in figure 2.3. The first pilot interview was aimed at developing an initial understanding of the case and the topic and helped us to structure the subsequent work. The following two pilot interviews were gradually narrowing down the scope and aiming for increased depth, while at the same time gathering background information. The purpose of this was to prepare us for the face to face interviews that were conducted in Antibes, France at the TSS office.

Table 2.2. Data collection plan

Method	Company	Source	Purpose	Dates
Phone interview	**TSS**	Alexander Jarosch Global IT Director	Short pilot – understanding of IS architecture at TSS and integration at Chase-Walton	2006-11-10
Phone interview	**TSS**	David Brown Finance Director	IS importance in business model	2006-12-28
Phone interview	**TSS**	MathieuDebreucq Business Development Director	Business integration at Chase-Walton	2006-12-01
Face to face interview	**TSS**	Alexander Jarosch	Global IT strategy, business models and integration issues, future directions	2006-12-06
Face to face interview	**TSS**	David Brown Finance Director	Business models and IT importance, acquisitions and global strategy	2006-12-07
Face to face interview	**TSS**	MathieuDebreucq	Acquisition strategies, issues in M&As, due diligence	2006-12-07

2.7.3 Mapping of interview guides

The mapping of interview guides was made with the expected expertise of the informants in mind. As none of the informants were considered to have access to answers to all relevant questions, interview guides were created purpose specific – one interview guide per informant. However, our framework is concerned with three dimensions and their relationships. Therefore, all interviews were to some extent overlapping. Also this overlap was intended to shed light on dimensions from different viewpoints with the ambition to heighten the validity of the conclusions drawn. For the global IT director, the main focus was the dimension of *IS integration approach*, while at the same time including its relations to the *Strategic view of IS* currently, and in the future (see appendix B). For the finance director, the focus was on the dimension of *Business activity integration* deepening our understanding of the TSS business model as well as *the Strategic view of IS*. This interview guide also included questions regarding the acquisition process of Chase-Walton (see appendix B). Finally, the business development director was to provide information regarding the Business activity integration dimension as well as the Strategic view of IS. This interview guide also included questions of how a target company is assessed and evaluated in regards to these dimensions (see appendix B).

2.8 Data collection – Reference cases

The reference cases used to further the external validity in this study consists of two different data sources. The first reference case of TES and their acquisition of the CRP group (see 9.2) consist of secondary, as well as primary data gathered by Stefan Henningsson. These data consist of interpreted data in form of case descriptions and analyses conducted by Henningsson, transcriptions of these interviews, as well as the recorded interviews themselves. As we have had access to these data, we consider the case of TES and CRP to be of reasonably high scientific quality, although it would have been optimal to gather these data ourselves.

The second reference case of Manufacturing company X (see 9.3) consist of several articles written by Alaranta (2005a, 2005b) which have both? peer-reviewed. In this case we did not have access to the secondary data, rather these were analyses and interpreted by another researcher. Although these data can be considered of lower quality than the first reference case, we consider this level of quality to be sufficient for the purpose of furthering the testing of the framework. On a final note, as we as authors have been furthest away from these data, we also consider the case of Manufacturing company X to be the one of least scientific value of the three.

2.9 Data Analysis

2.9.1 Primary case

Our view of the qualitative data analysis is based on the one of Miles & Huberman (1994), and is comprised by three more or less concurrent phases: data reduction, display and analysis. For qualitative studies it is important to start the analysis as soon as possible. This aids the ongoing process of creating strategies for collecting data of enhanced quality by the iteration by the researcher between the data at hand and the data to come (Miles & Huberman, 1994). This process did in fact already begin when the research strategy was made explicit in the research proposal that initiated the study and is well represented in the formulation of our approach earlier in this chapter.

Data reduction: The anticipatory data reduction have begun as decisions were made regarding the case, units of data analysis, number of interviews, data gathering scope etc. Decisions regarding the data reduction also concern the mode of transcription of the interviews. These were assumed to be compressed by excluding non-relevant data such as introductory talk, lines of thought that occur but that are more of a conversational nature, rather than focused at the topic of inquiry. The transcripts were also pruned from spoken-language, into a more coherent readable language to make the conclusion drawing and verification less strenuous. This choice has been made with Kvale's (1997) thoughts on transcription and adapting the "style" of transcription to the purpose of the study. Even though we have argued that our qualitative approach is grounded in the hermeneutic side of the discourse, we would still argue that our interest is rather in the content of our data than the actual representation and semantics of data. Other similar choices were made regarding note memos, tables, sketches etc.

All data will be subject to data reduction in the sense of codification and categorization. These codes will be mapped to different dimensions, concepts and areas of ours and Henningsson's (2006) framework respectively were the latter will be used to provide somewhat of a contingency-picture.

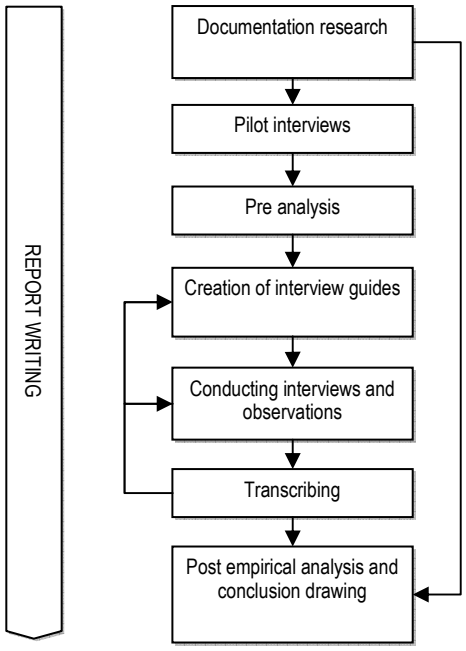

Figure 2.4. Data gathering and analysis sequence

Data display: Although the founding data of this study consists of words, to present large chunks of raw text is difficult to relate to and in fact renders poor readability. Drawbacks with text are the sequential nature, rather than logical; it is large and cognitively challenging to grasp (Miles & Huberman, 1994). The data included in the report will be reduced using techniques such as quotes from the transcripts and the logical ordering of information. Data will primarily be displayed in a narrative sense to enhance the readability.

Conclusion drawing and verification: The main method of analysis was pattern matching of different themes. Using the reduction techniques described previously we have mapped the data against our theoretical framework. These themes were then used to elaborate on the relative importance of concepts and dimensions. Following, was a clustering of these themes into logical areas which was the foundation of conclusion drawing. This activity was iterated where the verification of themes and clusters found in one transcript was made when the next transcript went through the same phase, but now with the patterns from the previous one in mind. Finally, after several iterations, a theoretical saturation was reached and the theoretical view was sufficient.

2.9.2 Reference cases

The data analysis of the reference cases was similar to the latter phases of the analysis of the primary case. Differences were present though, as we ourselves did not gather these data. These differences are presented below. The major difference was that the analysis that was conducted in parallel with the data

gathering was left out. This is the case for data reduction, as we did not ourselves make the interviews, we could not benefit from focusing subsequent interviews better than early ones. It is also the case for conclusion drawing and verification which had to be left out when dealing with the secondary data related to the reference cases.

Data reduction: Decisions regarding the anticipatory data reduction in the TES & CRP case were made by means of discussing with Henningsson. His pre-knowledge of relevant data was the logic lying behind and these decisions were made with both authors present. In the latter Manufacturing company X case using Alaranta's articles (2005a, 2005b) the choice of these articles narrowed down the amount of data.

Data display: The decisions regarding the display in this thesis were made based on the same line of reasoning as the ones for the primary case (see 2.9.1).

Conclusion drawing and verification: In a similar fashion to the primary case, the main method of analysis was pattern matching. However, in the reference cases this phase was somewhat shallower, due to the perceived distance between us as researchers and the data - even more so in the case of Manufacturing company X, as the pre-interpretation made by Alaranta increased this distance. Similarly, the weight of these conclusions is less for the above mentioned reasons. This analysis was first conducted by one author; thereafter these conclusions were peer reviewed by the other. If diverging conclusions were drawn, these were further analyzed until consensus was reached. Although early interviews in the primary case had impact on choices regarding theoretical areas, this was not the case with the reference case data.

2.10 Validity threats and Ethical concerns

When conducting this study there are a number of validity threats, as well as ethical concerns, that need to be addressed. For some of these we have counter measures, for others we can simply acknowledge them and communicate them to the reader to be the judge of their implications. An overview of validity concerns and the main tactics used can be viewed in table 2.3 on the following page.

Table 2.3. Validity tactics (based on Yin, 2003)

	Threat	Tactic	Phase of research
Ecological validity	▪ Using data that are out of date in relation to theory. ▪ Using primary and reference data incomparable due to differences in time.	▪ Using recent cases. ▪ Both cases adjacent in time.	▪ Research design
Internal validity	▪ Drawing inferences of poor correctness.	▪ Pattern matching. ▪ Data triangulation.	▪ Data analysis

	Threat	Tactic	Phase of research
Construct validity	▪ Misunderstanding concepts used by informants. ▪ Respondent amendments for reasons related to hidden agendas.	▪ Data triangulation. ▪ Respondent validation.	▪ Data collection and theory deduction
External validity	▪ Disability to generalize.	▪ Theoretical grounding. ▪ Reference case.	▪ Research design
Reliability	▪ Disability to reach the same result conducting the same study again.	▪ Documentation of study.	▪ Data collection

2.10.1 Validity

The first validity threat concerns the *ecological validity* - that the data used would have little to say about the research problem. In this study, the main concern is regarding the time frame of the data. The field of IS integration is one of rapid technological evolution. As our framework entails contemporary integration approaches it would not say anything about its usefulness if the data came from cases before these integration approaches were offered; it is fair to assume that none of these would have used ERP or SOA as parts of their is enterprise architectures. Therefore the data had to come from recent M&As. Another threat would be that the primary and reference case were differing in time. Differences in M&A business integration needs and their consequent IS integration architecture would be difficult to separate from differences grounded in technological possibilities. Therefore, both primary and reference cases are at time of writing less than 3 years old even though the actual acquisitions may be older.

The threat of drawing flawed inferences when analyzing the transcripts from the other data is concerning is the *internal validity*. The main threat is that the causal explanations are not true or wrong; as our study is not of an explanatory nature, this is of no concern to us (Yin, 2003). However, a related subject is regarding the correctness of the inferences made based on the data. This have been addressed by using triangulation during the independent first-stage analysis (i.e. pattern matching) of data and later comparison of results between both authors. If conclusions and interpretations match, this validity threat has been pacified to some extent. The tactic of rival explanations has only to a limited extent been used in the data analysis phase. However, the *notion* of rival explanations has been present all through the study. We have cultivated a working environment where the challenging of ideas and explanations has been seen as deepening our understanding of the problem area, thereby enhancing the overall quality of the study.

To avoid the threats concerning *construct validity,* such as the misunderstanding of concepts, the transcriptions and analysis findings, were fed back to the informants. This was in order to clarify and validate - or disconfirm - conclusions, so called respondent validation (Maxwell, 2003). Although this addresses one explicit validity threat, at the same time it introduces a new: the ones of hidden agendas. What if the informants are displeased with what they seem to have said and change their minds for other

reasons than to clarify or validate, such as political reasons? Although we were prepared, there never was a need to deal with this threat as it did not surface.

This review is also repeated at a later stage to achieve a higher level of internal validity as informants review our analysis (Yin, 2003). Construct validity have further been addressed by the triangulation of data sources. As we collect the same data from different sources, we strengthen the validity of the construct; i.e., we ask the same question to several informants.

The "disability to generalize" is a threat concerning external validity. This is sometimes referred to as generalizability. A strong external validity gives us just that possibility, to extend our findings outside the boundaries of the case. Yin (2003) describes two general tactics to achieve this. Firstly, there is a need to ground the case study itself in theory. This would account for some level of external validity but to be able to generalize to a wider extent we need to test the theories on relevant cases, using replication logic. As our case is theoretically grounded as well as *theoretical replicated* by means of the reference cases, we have taken the actions available to avoid this threat.

Last of the validity threats listed in table 2.3 is reliability which is concerned with the ability to do the same study all over again and also arrive at the same conclusions. As this is a case study and the nature of our data derived from interviews, we believe it to be extremely difficult to do the same study all over again. This can in part be attributed to the object of study as it includes a process perspective; it would have changed by the time the next researcher gets there.

On a final note, we may have biases that we are not aware of. By being explicit with our viewpoints and why certain choices have been made in the study, we hope to leave to the reader to decide whether conclusions and logical chains of evidence are valid. As another means of resources we have made the most of our faculty supervisor, mentor as well as voluntary peer-reviewing during this process.

2.10.2 Ethics

The ethical baseline of this study is that *none should be harmed in any way as a result of this study*; at the same time, the baseline is also to ensure our integrity as independent researchers. As we have gathered data face to face from informants, it has been crucial to receive the trust of the informants. As a result of this we also had to get an informed consent by all informants. In order to get such *informed* consent we explained to the informants that this study was funded in some way by the Trelleborg. As all participants were managers, there was less doubts regarding the potentially harmful effects on the informants, but rather on the company.

Similarly, when analyzing and drawing conclusions, we also had to take into account the fact that we have been sent out by the Trelleborg Corporation. In some sense; we may have been perceived as being sent out by the acquiring company. This has implications on *reactivity*; that the informants in one way or the other tells us things that are dependent on our presence. They may tell us what is politically motivated due to concerns regarding their careers or future economical security or matters of similar nature. This has been taken into account when analyzing and drawing conclusions of the data. This involves a trade off regarding the informed consent needed for due to ethical reasons, and the specific validity threat of reactivity. As the ethical baseline has higher priority, this could only be handled by being explicit about this validity threat.

The context of the study is that it is linked to a larger research project funded by the Trelleborg corporation and partly conducted in cooperation with PhD student Stefan Henningsson. This implies the presence of two stakeholders whose interests will have to be balanced with our interests. This context might not have lacked in potential ethical dilemmas. The case has been selected in cooperation with Trelleborg. It may well be that they have a hidden agenda for choosing this case. Fears that we have are that they are interested in putting pressure on the acquired company, to find out compromising information that may lead to negative consequences on involved individuals or organizational units. It is difficult for us to make predictions regarding this pointing in either way. Another ethical issue concerns confidentiality, who will own data, what this data can be used for and so forth. The data gathered is owned by the University in conjunction with Trelleborg AB. As such the data will never be used without the explicit permission of both parties.

2.11 Shortcomings

What are the main weaknesses of our research method? The limited ability to generalize empirically is an apparent drawback. Our framework would presumably need to be tested with several other cases but as we only have limited time and resources it seems to us that this approach when we use two reference cases seems to be a fair compromise between the single case study and the multiple ditto. The number of informants and the selection of these is another potential liability. Ideally we would have had time to interview informants at the acquired part as well but due to time and resource constraints this was not possible. Also, since only one informant per "domain" was made available the possibility to triangulate data from different sources was not an option. The reference cases provide us with an interesting and valuable tool to somewhat strengthen the external validity, as well as the theoretical replicability of our framework. At the same time we are aware that even though these may provide some additional validation they do not give us the same strength as a multiple case study due to the limited richness of the data gathered.

3 A theoretical baseline

The case study approach reviewed in the previous chapter will be conducted by applying collected empirical data on a new, synthesized framework. This chapter deals with the theoretical baseline from which our framework is derived. It is discussed in relation to our purpose, our focus on business activities and the enterprise architecture perspective. Finally, three theoretical dimensions are selected that will form the body of our framework, as well as the structure of the theoretical review in the following chapters.

3.1 Background

Even though research that explicitly addresses the area of IS integration in M&As is scarce, there are a number of articles that deal with the topic. These have managed to attract some attention to the field and highlight its importance (McKiernan & Merali, 1995; Henningsson, 2006) but as noted earlier we have identified what we believe to be serious shortcomings of the frameworks presented. There is a tendency to look at "too big pictures" – i.e. to focus too much on the corporate level of the companies involved (Giacomazzi, 1997; Mehta & Hirscheim, 2004). Organizations seldom have one, but rather a multitude, of systems for different purposes as well as importance and these may well need different levels of integration. Because of this, there is reason to believe that previous theories run a risk of loosing some prescriptive power and pragmatic use as they do not cover the complexity of real life where integration needs are made on a case by case basis rather than a corporate level. Although Stylianou et al. (1996) and Robbins & Stylianou (1999) has developed an interesting framework, they focus more on the IS integration success than the success of the M&A. Success is not a trivial measure to define and we believe that although IS integration success is crucial, it is not what we are looking for.

Just as IS does not create value by itself (Hedman & Kalling, 2002), the IS integration success is only valuable when supporting the value creation of the M&A as a whole. Thus, there is a need for a framework describing the overall IS integration dimensions that relate to the *realization of synergies* of an M&A rather than the *success of IS integration*. Since success depends on the perspective taken, we prefer to view an M&A in terms of the synergies that are the drivers for the acquisition and by doing so, we are also taking an implicit shareholder perspective. One framework that tries to deal with the complexity of the situation and encompass all dimensions relevant to an IS integration of M&As is the one presented by Henningson (2006).

As a foundation or base line for our study this framework is well suited for two reasons. Firstly, because it represents a bigger picture – all the dimensions that can be used to describe IS integration in M&As are represented. This is in line with its purpose of being a descriptive framework to better understand the nature of this phenomenon (ibid.). Secondly, because focus of the framework is on managerial issues it is compatible with our acquirer and shareholder perspective.

3.2 Towards a descriptive framework

Henningsson states that M&As are multifaceted and complex activities that in fact are outcomes of a multitude of motives, therefore they can be described from several perspectives (2006). The framework is multidimensional and can be seen in figure 3.1. It builds on theory from six strands of research: *Synergetic potential, Organizational integration, Intentions and reactions, IS integration role, Integration architecture* and *IS type* and each dimension represents a different taxonomy.

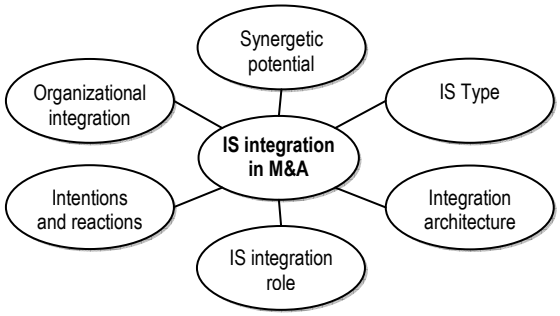

Figure 3.1. Framework for IS integration in M&A (Henningsson, 2006)

3.2.1 Synergetic potential

This dimension relates to the synergies that may be the outcome of an M&A initiative. These are found in three major categories as suggested by Lubatkin (1983). *Technical economies,* which are fundamentally related to economies of scale, cost savings are the main benefit; less input leads to more output. *Pecuniary economies* are related to market power that is grounded in size; a bigger market participant may have better means of dictating prices. Finally, *Diversification economies,* where benefits relate to the spreading of risks by entering new markets or extending the product portfolio.

3.2.2 Organizational integration

In order to achieve synergetic potential there is a need for organizational integration at some level, unless an acquisition is a mere investment to earn future stock dividends. Haspeslagh & Jemison (1991) suggests four categories of integration levels. *Holding* is the lowest level of integration in which the target company is basically left untouched. *Preservation* is the next level where only partial integration is implemented. *Symbiosis* is when the acquirer as well as the target – or the equals in a merger – are both transformed to fit the other. The highest level of integration is *Absorbtion* where the target company is completely consolidated into the acquiring organization.

3.2.3 Intentions and reactions

Depending on the states of acquiring as well as target organizations pre, during and post merger the process of M&A integration might differ along a Hostility-Friendliness scale proposed by Prichet (1985). The least hostile acquisition is termed an *Organizational rescue*, for example in the case where a target company is in financial trouble. Somewhat less friendly is the *Collaboration*, where the objective is to reach a fair deal for two equal companies. If only the acquirer wants the deal to happen, or if disagreement

exists regarding the terms, it is more of a *Contested Combination*. If the management of the target company is bypassed and the acquisition is carried out by purchasing shares, the acquisition is considered to be a *Raid* (Bouno & Bowditch, 1989).

3.2.4 IS Type

In an M&A there may be a significant number of IT systems that are involved as targets of IS integration. In order to categorize these we will take a perspective that is focused on the functionality of a system, or a part of a system. This categorization builds on Weil & Broadbent (1998) and their view on how an IS contributes to an organization. *Infrastructural IS* is the networks, cables, servers and software that may be seen as fundamental for other applications to work upon. *Transactional IS* is aiming at business transaction IS such as a HR payroll or an Accounts payable system. Decision support systems or other aimed at providing managers with information are *Informational IS*. Finally, there is the category of *Strategic IS*. These are IS that have a fundamental bearing on a competitive advantage, such as an IS enabling an industry unique value chain.

3.2.5 Integration architecture

There are fundamental choices that come about regarding which approach to choose when integrating the IS as two companies become one. *Point-to-point* involves the creation of interfaces between distinct applications. In multi application environments, complexity soon reaches intimidating levels. One option that lacks this specific downside is the implementation of commercial software packages – the *Enterprise-wide* approach. This implies that all the IS within such a package are fully integrated. The *Middleware* approach instead uses a middle integration layer using a hub-and-spoke architecture. This reduces complexity and can be used to integrate ERP systems as well. Finally, Meta-level integration is reached if data is extracted from existing applications and stored in separate data-warehouses. This is fundamentally different as it only integrates data from essentially non-integrated systems.

3.2.6 IS Integration role

In the acquisition process IS integration may be treated *Pro-actively* as an important issue that gets significant attention early on in the process. The objective is to minimize the risk of negative outcomes as results of an M&A. The other alternative is that IS is dealt with *Re-actively* late in the acquisition process or even post-M&A. In this latter case managers are either unaware of the risks that may manifest, they have limited resources that may be wasted should the deal not come about, or they simply accept the cost or problems involved when integrating the IS involved.

3.3 Focus of attention

An important point to make regarding the framework proposed by Henningson (2006) is that it is aiming at becoming somewhat normative on basis of relationships found within the framework. Some of these relationships can be theoretically deduced while others have been found empirically. For this study, the attention turns to the dimensions of organizational integration, IS type and integration architecture. Markus (2000) states that the type of integration approach employed is dependent on the type of IS

concerned, i.e. whether the system is of strategic value to the organization. This can be seen as a relationship between IS type and Integration architecture (Henningsson, 2006). Henningsson (ibid.) has also empirically found that the organizational integration in an M&A has a two-way dependency to the integration architecture.

As the theoretical relations show, it is reasonable to believe that there is an actual relation between these dimensions of an M&A. Yet, the theoretical sources of these deductions do not tell us anything about the nature and directions of these relationships. Hence, to enrich and extend the framework by Henningson there is a need to explore these theoretical gaps.

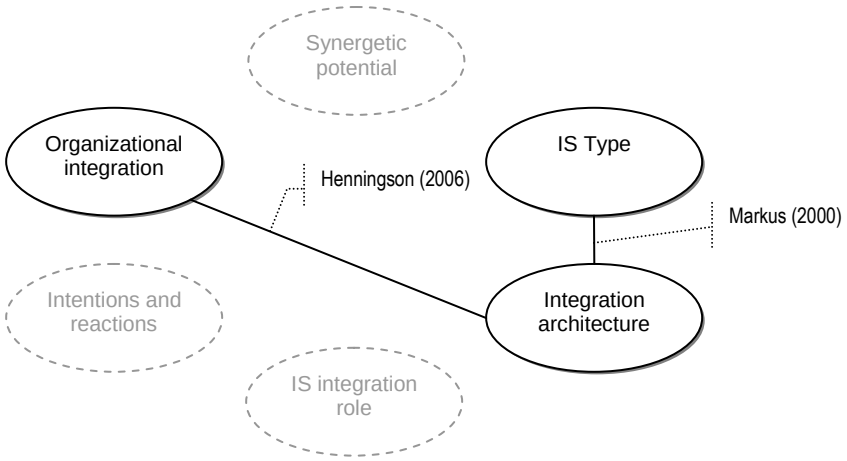

Figure 3.2. Selection of deductively derived relationships (from Henningson, 2006)

In sum, the above points to the need to further investigate the relationships between *Organizational integration*, *IS type* and *Integration architecture*. The purpose of this study is to develop a framework regarding these dimensions, but on a finer level of granularity – the business activity level.

3.4 Three dimensions

The dimensions of Organizational integration, IS type and Integration architecture form the theoretical baseline for this study. However, as our thesis has an Enterprise Architecture perspective and a level of analysis that differs from Henningsson's, these dimensions need to be re-conceptualized.

3.4.1 A change in taxonomy

First, O*rganizational integration* is renamed *Business activity integration* to reflect the change in level of analysis. As we look at a business activity level our primary concern is that of value creation from the realization of synergies, and therefore the term business activity integration is more suited. Also, within this dimension is – implicit – the dimension of *potential synergies* as this is clearly related to the integration approach (Haspeslagh & Jemison, 1993; Henningsson, 2006).

Secondly, *Integration architecture* is renamed *IS integration approach.* Although there are similarities between our dimensions, the views on architecture are fundamentally different. In Henningsson's context, architecture is used to typify organizations, pointing out one general architecture before another. With our Enterprise Architecture perspective, we are instead concerned with differentiating between integration approaches that are applicable to different IS. Combined with IS and related business activities, these instead form an Enterprise architecture, rather than a general type of architecture.

Finally, *IS type* concerns the type of IS affected in an M&A and even though the dimension represents a position of strategic importance between IS and business, this is not self-communicating. Therefore this dimension is labeled *Strategic view of IS* to better express what importance a specific IS has in terms of fulfillment of business goals.

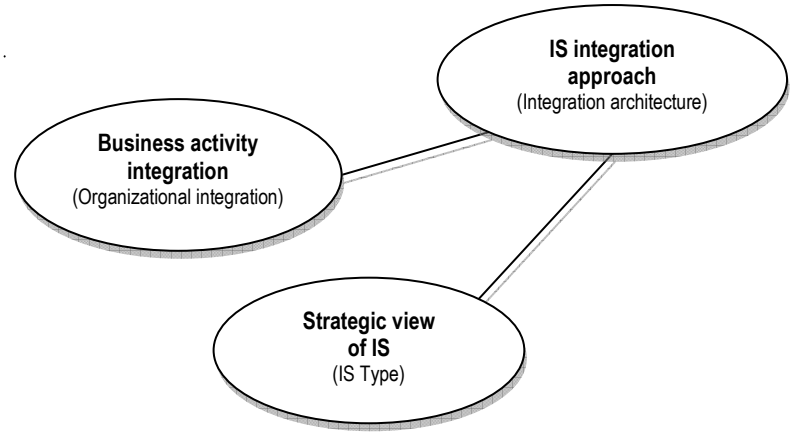

Figure 3.3. Dimensions of our framework (Henningssons taxonomy in parenthesis)

3.4.2 Towards a framework

The output of this chapter and the re-labeling of relevant dimensions is the provision of direction for the following three chapters. These are concerned with a theory review on existing knowledge, with the purpose of conceptualizing these dimensions to suit the purpose of developing a new framework. This theoretical review will start with chapter 4: *Business Activity integration* viewed in the context of M&As. This is followed by a more technical examination of *IT integration approaches* in chapter 5, with a focus on comparing different alternatives and their implications for an M&A. Finally chapter 6 is aimed at deepening the understanding of a business *Strategic view of IS*. These chapters will each lead to a conceptualization that will form dimensions for the proposed IS Integration analysis framework presented in chapter 7.

4 Business activity integration

In the previous chapter the dimensions of our framework were established. This chapter will conceptualize the first dimension of Business activity integration. In M&As, integration is used as a mean to realize synergies. The nature of these synergies are discussed and how they are integrated on an business activity level. More specifically, the contribution of this chapter is a review of how different modes of integration are used to realize synergies. These levels of integration form the taxonomy of the first dimension in our framework.

4.1 Background

Mergers and acquisitions (M&As) have become one of the most important acts for realizing organizational growth (Giacomazzi, 1997). It has also come to be considered a strategic tool as a mean to achieve market expansion, knowledge transfer, technical expertise and other potentially competitive important aspects of the organizational environment (Henningsson, 2006; Stylianou et al., 1996; Haspeslagh & Jemison, 1991). The term creates a theoretical concept embodying mergers as well as acquisition although they differ in some important aspects. Giacomazzi et al. (1997) distinguished between the *merger of equals* and the *incorporation of one firm into another* where the latter is thought to be less symbiotic. Acquisitions are generally thought to be the most dominant form but as Giacomazzi (ibid.) also notes, the main difference is in the legal aspects of the process. Within the following chapter these terms are used interchangeably.

Although M&As have grown in popularity and have come to be regarded as a superior vehicle for resource investment (Pablo, 1994), all to often the post-merger performance of the new unit fail to reach the high set expectations of the M&A (McKiernan & Merali, 1995). Numerous researchers attribute this failure to an insufficient attention to a variety of integration issues (Haspeslagh & Jemison, 1991; Napier, 1989; McKiernan & Merali, 1995) and we will in this chapter explain the need for integration when combining two different organizational bodies. In order to do this, however, we must first turn to the very process of an M&A.

4.1.1 The process of M&As

Mehta & Hirscheim (2004) distinguished between three phases of the process. These are, in turn, the pre-merger; merger and post-merger phases. The pre-merger phase constitutes the phase where a target is selected and evaluated as well as the legal contract is negotiated. This phase also contains the conducting of due diligence. Due diligence refers to the process of investigation and evaluation of a target company by the acquirer regarding legal risks, financial status, IT infrastructure etcetera. The purpose is to mitigate risks regarding post-acquisition issues.

The merger phase is more of a momentous nature where the actual deal happens, the contracts are signed and press releases are sent out. As this is concluded, the post-merger phase, which has to deal with the integration of the two units, take over. These processes is unavoidably sequential and could roughly be

divided into two different problem phases; decision-making process and the integration process (Haspeslagh & Jemison, 1991). These two phases are traditionally dealt with by separate managerial teams but as we will later show they are intrinsically interconnected. Firstly the decision-making process in which the motives and rationale of the merger can be understood is examined.

4.2 M&As – in search of synergies

During the decision making phase of the M&A, the driver of the process is a main area of focus. There is, however, no single way of explaining this motive of an M&A as it is a composite of several factors (Trautwein, 1990). These include the personal empire-building striving of managers, the desire to create monopoly as well as information asymmetries in the market and, most widely cited and accepted, the rational view where synergies result in an increased level of efficiency (ibid.). Roughly, these motives can be divided into value and non-value maximizing motives (Napier, 1989; Giacomazzi, 1997) where the value-creating drivers are primarily the rational motives of efficiency and efficacy.

Taking a managerial as well as share-holder perspective on the process of M&A we will focus on the value-creating drivers of an M&A, whose ultimate goal is to increase the present or future value of the company. The value-creating motives can further be divided into those who create *direct financial value* and those who do not (Trautwein, 1990). The first are termed *combination benefits* by Haspeslagh & Jemison (1991) as the value that is created stems from the legal combination of two organizational bodies. A direct example of this would be an increased capital stock.

4.2.1 Synergies as capabilities

Motives of mergers that do not create direct financial value rest on operational and/or managerial synergies stemming from the combination of organizational resources (Trautwein, 1990; Haspeslagh & Jemison, 1991). As organizational value is created through capabilities and resources (Haspeslagh & Jemison, 1991; Clemons & Row, 1991) these synergies is the creation of organizational capabilities within the merger. Capabilities are collections of resources that have a strategic impact (Grant, 2005), i.e they create value.

The capabilities are commonly defined as the organizational knowledge how to use and leverage resources to create value (Hedman & Kalling, 2002). Hence we can conclude that M&As are concerned with the transfer and combination of resources and the ability to use these (which is a resource in itself). Clemons & Row (1991) argues that resources may be acquired either by internal development or via the market. According to Ranft & Lord (2002) the resources that are readily available on the market, such as machinery as production facilities, are seldom the reason for an acquisition but rather the resources that must be internally developed such as market share and knowledge.

Concluding the above: M&As can be divided into two categories where one is concerned with the acquisition of strategic capabilities where the other is concerned with pure direct financial or legal benefits (Haspeslagh & Jemison, 1991). As strategic value is derived from organizational capabilities, these are the real targets of M&As.

4.3 Integrating resources

The idea that synergies create value creation in M&As implicitly states that some transfer of resources must take place. Also, these resources must be integrated within the new organizational body to create value through the creation of new capabilities (Pablo, 1994). This is the second phase of the M&A, the integration phase. The notion that integration is a necessity to achieve the benefits sought is commonly accepted (Trautwein, 1990; Mehta & Hirscheim, 2004). Haspeslagh & Jemison distinguishes between four different types of synergy benefits as a result of an M&A (1991). One of these, combination benefits, have already been discussed and while it concerns the transfer of resources (funds for example) it does not require any integration and will not be discussed any further.

The three other of these possible benefits however stem from the utilization and transfer of resources and capabilities. These are: *resource sharing*, *functional skill transfer and general management transfer*. In Haspeslagh & Jemison's taxonomy, *Resource sharing* involves the popular concept of economies of scale and scope. Economies of scale are the ability to use resources to increase the internal efficiency of operations while economies of scope is when resources are used to expand into new markets (Grant, 2005). Resource sharing often involves the elimination of duplicates within the acquired unit and the business is streamlined into the existing body (Haspeslagh & Jemison, 1993). *Functional skill transfer* on the other hand implies that the company has something to learn from the acquired part. This often presents severe difficulties, since the capability that should be transferred has some embedded characteristics. These made it a competitive advantage in the first place and protects it from transfer (Hedman & Kalling, 2001; Ranft & Lord, 2002). *General management skill transfer* occurs when the know-how and experience of managers are used to perhaps turn a failing business around. This is thought to be especially prevalent in the types of acquisitions denoted *rescue operations* (Henningsson, 2006).

Ranft & Lord (2002) makes a point that the acquisition of *intangible* resources often is the most complicated. These are suggested to be especially delicate as they are embedded and hidden from view. Noteworthy is that the number one target of acquisition in modern organizations is knowledge – previously dubbed functional and/or management skills. The argument behind intangibles being the most desired resources is that all other are more or less commodities as previously argued – that is that they are readily available in the market.

This transfer can occur in a multitude of ways where the most simple form is the physical relocation of a resource. We will however not discuss the practical implications of resource transfer here but rather the two aspects of the integration – organizational independence of the resource and the direction of transfer – that are necessary to create the synergy sought. The direction of transfer tells us whether the change is uni- or bidirectional, that is to what extent is the acquiring company adapting to the target company.

4.3.1 The need for integration

The reason for M&A can as we have seen be traced to the acquisition of resources. However, to leverage the benefits from these resources and to create the synergies, further action is called for. This is the process commonly known as *integration* and can take different forms depending on the purpose, context and situational factors. Trautwein (1990) argues that integration of business processes is inevitable as long as the synergies are related to resources in some sense. Only when the acquisition concerns very simple matters, such as lowering the cost of capital for example, integration may be avoided. It seems to be important though, to see *how* and *where* the companies should be integrated to create value (Pablo, 1994).

Integration has previously been described mainly on an organizational level. Napier (1989) describes a framework that lists four different types of mergers, mainly differing in the extent that the value is distributed between the parties and also the extent that resources are transferred across the organization. Ranft & Lord (2002) emphasizes the need to adjust the level of integration within the business unit – not all parts should be equally integrated to the acquiring company.

4.4 Levels of integration

Integration per se implies that two units should co-exist and work towards a common goal. In this context, the integration of business activities within an M&A, it tells us about the linkages between an acquired part and its acquirer. The parts that are to be aligned include strategy, market focus, resources, skills and culture (Braganza, 2001). We will focus on the alignment of resources in this thesis since we have concluded that the synergies derived are mainly from the transfer of resources which requires some part of integration.

It is also this transfer of resources that Haspeslagh & Jemison (1993) describes in a framework based on the rationale of integration described above. In Figure 4.1 is a four-field matrix that contains four different modes of integration on an organizational level. The integration mode depends on the position based on the two dimensions - need for organizational autonomy and need for strategic interdependence to achieve the synergy of the resource transfer.

Haspeslagh and Jemison (1993) argue that these dimensions should focus on the rationale of the acquisition – that is the capability or capabilities that are thought to bring the synergetic effects of the integration. An integration may have a multitude of different benefits, but the mode of integration should be concerned with the ones that were the strategic drivers of the acquisition (ibid.; Pablo, 1994).

Need for strategic interdependence is how much the boundary between the two organizational units should be affected by the integration. In which way will the integration affect the both companies. An integration high in strategic interdependence is typically a horizontal integration where the acquired part is to be a part of the acquirers value chain. Pablo (1994) calls this *Strategic task need* and is defined as the successful sharing and exchange of resources among the firms.

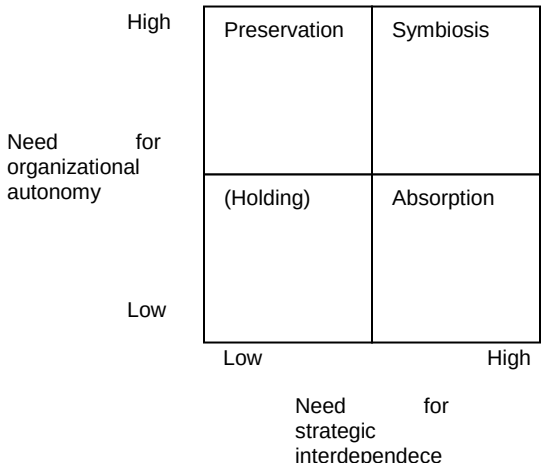

Figure 4.1. Integration modes (Haspeslagh & Jemison, 1993)

Need for organizational autonomy should reflect the need of the acquired part to remain an independent unit in order to realize the benefits proposed. Especially functional skill transfers and transfer of management are often associated with the actual routines and the embedded knowledge within the organization. This might require the acquired company to retain its autonomy in order to keep the capability that is to be transferred. This is equivalent to what Pablo refers to as *Organizational task need* and is negatively correlated to *Strategic task need* as it implies the preservation of the acquired unit.

Preservation is the integration mode where there is a high need for organizational autonomy and no interdependence. An example of this could be when the acquiring company wishes to transfer a functional skill or know-how. The unit is kept intact to preserve the knowledge as the acquirer tries to learn from the new unit (Haspeslagh & Jemison, 1993). *Symbiosis* is probably the most complex form of integration where there is a need to preserve the original context as well as transfer the capability into the acquiring firm. In this mode the two organizations first co-exist and the gradually become increasingly interdependent as a process of mutual adjustment continues. *Absorption* deals with the typical situation of high interdependence and low autonomy. This is a typical situation when the underlying rationale is resource sharing. Differences are eliminated and the acquired organization is absorbed into the other.

Holding is a special case where there is no need for autonomy nor interdependence. This reflects typically the case when the only benefits are so called combined benefits (ibid.). Pablo (1994) proposes as somewhat more complex framework that only results in a higher or lower level of integration as a result of certain factors. These include the strategic and organizational task needs and map somewhat fairly to dimensions of Haspeslagh & Jemison as we shall se later on.

As resources are transferred across the organization, new capabilities emerge (Braganza, 2001). These new capabilities describe the strategic impact of the integration as either being a necessity, opportunistic or even being a source of competitive advantage (ibid.). This framework could be used together with the others to examine and discuss the value of a integration.

4.4.1 A business activity level

The framework described above is constructed at a general level where benefits and functions of the involved organizations are weighed and an average is reached (Haspeslagh & Jemison, 1993). Our intention is to use this framework as a ground for our taxonomy of integration modes. In line with Ranft & Lord (2002) & Pablo (1994) we emphasize the need to make the distinction on a lower level. We return to our purpose and introductory statement where it is stated that we need to investigate businesss activities rather than organizational entities using the model. This has of course some implications on the frameworks, the most important aspects being listed here:

- The unit of study is a process or a set of processes (a business activity) instead of the organization as proposed by Pablo (1994).
- The unit studied must be mapped against potential benefits of the integration. What are the possible synergies related to this unit of study?
- Where a mode describes the deletion or preservation of processes this regards the actual activity under study.
- It is primarily the activities of the acquired firm that is to be examined and their final state in the final organizational entity is the sought result.

With this focus on business activities rather than the overall organizational integration we turn to the mode of integration as we have previously discussed them. When we put the different frameworks next to each other we get a intuitive spectrum, from a low to a high level of integration, as can be seen below in figure 4.2.

Amount of integration — **Low** → **High**

Haspeslagh & Jemison (1993)	Holding	Preservation	Symbiosis	Absorption
Pablo (1994)	Organizational task need			Strategic task need
Napier (1989)	Extension	Exchange collaboration	Synergy collaboration	Redesign
Braganza (2001) *(Describes the type of capability resulting from an integration)*	Local	Dynamic	Opportunistic	Inimitable

Figure 4.2. Integration theories

As we can see in the figure above we have a spectrum where the amount of integration goes from *none* which represents either a total *hands-off* to the *redesign* integration. As no other taxonomy have proven more useful, we will use the taxonomy by Haspeslagh & Jemison (1993) which implies that as we increase in level of integration there is also and increase in amount of bidirectional change as a result of

interdependence. A Holding- integration is close to none at all and any capabilities resulting from this integration is believed to have little or no strategic value.

4.5 Contribution to the framework

This chapter has dealt with the synergies driving M&As and how these can be realized. It has been argued that the synergies are actually a result of the combination (integration) of two different resources which will create a distinct new resource – a synergy. Hence M&As are primarily concerned with the acquiring of resources. To achieve these possible synergies a certain amount of integration is required and the integration differs in the amount of independence an acquired unit needs and also the interdependence between the units. Figure 4.2 summarizes different theories of integration but as none has proven superior than the framework by Haspeslagh & Jemison this will be used as our taxonomy of business integration, although on a different level of analysis.

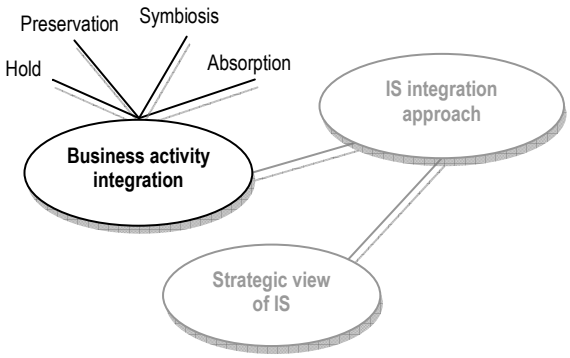

Figure 4.3. Tentative framework – Business activity integration

- *Absorption* refers to the situation where the acquired company is assimilated into the acquiring company.
- *Symbiosis* is the situation where the influence is bi-directional and both organizations are affected by the M&A.
- *Preservation* occurs when the acquired unit has to be kept intact in order to realize synergies.
- *Holding* implies that no integration is needed as no synergies are to be realized.

5 IS integration approach

In Chapter 3: 'A theoretical baseline' the boundaries and dimensions of our framework were established. In this chapter we will conceptualize the dimension of IS integration approach by conducting a review of selected literature. The focus is on the effects and levels of integration associated with each approach. The contribution is a taxonomy of IS integration approaches to be used in our framework and subsequent analysis and description. A table comparing and summarizing these approaches is located at the end of the chapter.

5.1 Background

Historically IT application infrastructures have come about organically grown in an ad-hoc, non planned manner, for a number of reasons. Examples include incremental technical evolution, short sighted departmental goals, IT competence at hand, and even the salesmanship of IT consultants with somewhat different goals than those of the purchasing organization (Erasala et al., 2003; Linthicum, 2000). Such an evolution produced co-existing functional and technological islands of information. IS integration on an enterprise wide level is fundamentally aimed at utilizing this implicit potential buried in existing non integrated 'stove-pipe' applications (Erasala et al., 2003). Contemporary IT environments may therefore consist of a plethora of applications, such as custom developed legacy systems and commercial off the shelf ERP systems, working together with eCommerce applications that meet end customers in their homes via web browsers (Gulledge, 2006).

The evolution of IS integration have paralleled the ones of computer technology and IS trends (Linthicum, 2000). Initially this was carried out by implementing Point-to-point (P2P) interfaces linking applications together. Although a seemingly trivial approach, the number of interfaces grows exponentially related to the number of applications. Aimed at addressing the complexities following P2P integration for multi-application environments, Enterprise Resource Planning (ERP) systems were marketed as "integrated suites", solving integration problems once and for all (Davenport, 1998). As these systems only achieve local integration – bigger 'stove-pipes' - for the functions or modules that they include, they did not provide the final solution to all the IT needs of a company (Themistocleous, 2001; Gulledge, 2006). To cater to these needs more elaborate Enterprise Application Integration (EAI) systems were developed to enable the more intricate integration challenges accompanying the ERP islands. The latest in the evolution of IS integration approaches is also a current paradigm shift in IS architecture - Services Oriented Architecture (SOA).

5.2 Effects of integration

IS integration is fundamentally driven by business related goals. These can be discussed in terms of *techno-economic* and *strategic* gains (Markus, 2001). Techno-economic gains are cost related, focusing on minimizing maintenance or licensing costs; the aim is to make IS integration efforts more efficient.

Examples of this would be to implement an ERP system to avoid the costly maintenance of a complex P2P infrastructure, or to outsource the same. The strategic business related gains are instead focused on pursuing long term benefits related to enhancing performance in the market place; the aim is business effectiveness. Examples would be where IS integration between logistics and production systems may enable a company to enhance customer satisfaction by shortening delivery times, or to make earlier 'promises to deliver'.

Although these two integration rationales and consequences are both beneficial to the profit of a company, they may also be mutually excluding (Markus, 2001). Cost savings may come with rigidity, and flexibility and business agility may be more expensive. It is entirely possible that the implementation of an ERP system and the following standardization of both IT and business processes will lead to the cutting of costs. At the same time a likely lock-in to this one ERP vendor for significant time ahead, as well as rigidity of business processes may follow; agility will be severely hampered. This leads to the conclusion that it is possible for companies to implement integration that supersedes business requirements, as well as to end up with integration that does not cater to actual business needs (Markus, 2001). The different IS integration approaches have characteristics make them more or less suitable depending on the business goals (see figure 7.3). The remainder of this chapter will review different IS integration levels, present characteristics of different IS integration approaches, and discuss these in relation to their techno-economic and strategic business potential.

5.3 Levels of integration

Information systems can be logically divided into different tiers that separate functionality. IS Integration can be carried out in accordance with one or more of these levels; generally the more elaborate integration - the more complicated it gets. There is no one way to describe these levels in terms of defining where these levels begin and end. Rather choices have to be made regarding the level of detail needed. We consider a three layer model with the main levels *Technological, Application* and *Business* levels to provide the relevant granularity, as this maps well to the levels of Business activity integration. The model below is in fact a synthesis from views and models used by Pushman et al. (2004); Linthicum (2000); Henningsson (2006); Stohr & Nickerson (2003). These levels of IS integration are related to the business activity integration levels (see 7.3.1. Relation A: Level of IS integration).

The integration levels relate to each other in a hierarchical way, where integration at higher levels demand and rely on integration on lower levels (Stohr & Nickerson, 2003). For example, in order to enable two applications to work together, these must share agreements on data types, as well as have the same semantic definitions on their data. Continuing, for a business process to be integrated, such as the horizontal or vertical co-ordination of a supply chain, the supporting applications need to be integrated. This implies the need for integration between levels as well (Stohr & Nickerson, 2003). Integration at the technological level is lowest one. This level acts as the foundation for integration on the Application level, concerned with user and application interfaces. On the top is Business level concerned with the integration of business processes. It is here that the highest potential value of integration can be found, but this may also come with the highest levels of rigidity.

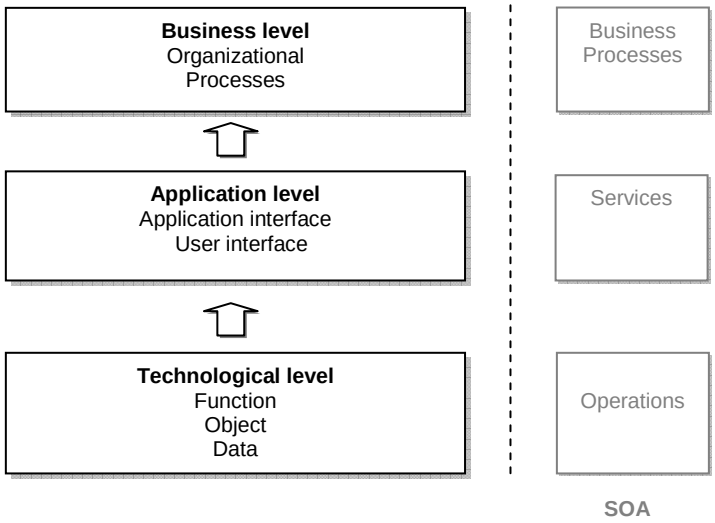

Figure 5.1. Levels of integration

5.3.1 Technological level integration

Technical level integration is concerned with the most fundamental pieces of an IS, such as data, objects and functions (Henningsson, 2006). At the most foundational level is data integration. It supports a joined view of the data used by the business units and external partners, and it may well be the most common type of integration (Al Mosawi et al., 2006). Basically this involves the extraction of data from one database, processing this as needed and updating it in the target database (Linthicum, 2000). The data can be moved without changes, to database systems and it can be shared regardless of technical platforms (Al Mosawi et al., 2006). In other words, the purpose of data integration is to aggregate, combine and report on data from different sources (Stohr & Nickerson, 2003), thereby enabling their use by a number of resources, applications and organizations. Data integration is fairly simple and inexpensive, but as it bypasses application/business logic its real time transactional capabilities are poor (Linthicum, 2000; Stohr & Nickerson, 2003).

Using these data are commonly *objects* encapsulating business logic, as well as variables (Al Mosawi et al., 2006). Object integration allows the cooperation of objects and the sharing of functionality implemented in these objects, ideally in a 'plug and play' manner (Al Mosawi et al., 2006). For enterprises with a heterogeneous IT infrastructure this integration level holds great value as it allows the wrapping of legacy systems logic into objects. However, integration at this level is complex and challenging to achieve (Al Mosawi et al., 2006). One reason for this can be that the business rules implemented in object functionality may impair the 'plug and play' simplicity of the concept.

Function level integration is concerned at sharing business logic within an organization by aligning application functions and methods in standardized ways (Al Mosawi et al., 2006). There are two fundamental ways of achieving this. One is to define the methods to be shared, another is to provide an infrastructure that enables this sharing (Linthicum, 2000). Function level integration enables the orchestration of methods and functions into business processes, and it therefore acts as a precursor to higher level process integration (Linthicum, 2000).

5.3.2 Application level integration

Today, applications may come with pre-defined Application Programming Interfaces (APIs) that enables *Application interface* integration by providing well defined connection mechanisms (Linthicum, 2000). This addresses application interoperability by enabling a sharing of business logic as well as data, thereby accessing full application functionality (Al Mosawi et al., 2006). However, downsides include performance limitations due to a sequential nature, as well as implying tight coupling, and applications platform dependability (ibid.).

The integrated presentation of user screens is the technologically least sophisticated integration. Examples of this would be web-based portals retrieving data from a number of systems, implying benefits such as trivial development and nominal interference with existing systems (Henningsson, 2006). This is concerned with the integrated presentation of a number of basically *non-integrated systems* (Linthicum, 2000). This may provide a good trade off where a medium level of business integration is desired, as well as a limited amount of organizational change.

5.3.3 Business level integration

Business process integration is concerned with the information flow and automation based on business logic that may include a number of applications (Al Mosawi et al., 2006). This is the therefore the technologically most complex integration level to architect and implement, but at the same time it may bring the most valuable strategic gains. The essential goal of successful IS integration have been stated to be the full integration of Business processes (Kumar et al., 2002), and business process integration have been considered critical in achieving M&A related strategic gains (ibid.). The M&A synergies related to the higher levels of business integration are likely to be reliant on business level IS integration (see 7.3.1. Relation A: Level of IS integration).

5.4 Integration approaches

There is no one way of conducting IS integration (Henningsson, 2006). Instead principally different alternatives exist of which Markus (2000) proposes a taxonomy of four: *Enterprise-wide, Middleware, Point-to point,* and *Meta-level*. The first three of these approaches involves the linking the applications and databases, thereby integrating the information systems. The fourth approach is fundamentally different, as it involves applying a Meta-level layer by implementing a data warehouse. This merely extracts data from two or more *un-integrated systems*. Downsides with this approach are firstly, that the following integration is only on data level, and secondly that data structures are lacking in quality for being used to support operational applications. As this does not enable the integration at a business process level and that it does not integrate IS (Markus, 2000), it is excluded from the classification below. Looking at these three approaches, further distinction can be made into two main categories: interfacing and non-interfacing. Both P2P and middleware integration are interfacing, they differ only in whether to use a spoke-and-hub or point-to-point architecture (Gulledge, 2006). The ERP approach is differing in the sense that it is not constructed around interfaces, rather all the included IS/functionality/modules are built in an already integrated way.

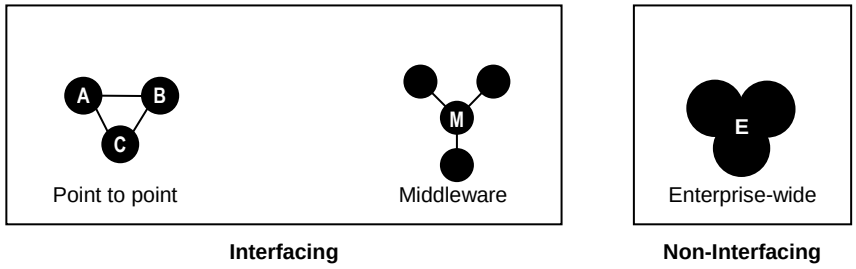

Figure 5.2. Integration approaches (Markus, 2000)

5.5 P2P – Point-to-point integration

The oldest and conceptually simplest integration approach is the one where one application is linked to another via the creation of interfaces (Mosawi et al., 2006). For two applications to communicate there is a need to create two interfaces. As long as there are only a few applications to connect this is a viable option, but the number of interfaces grows exponentially with the numbers of applications (Pushman & Alt, 2004; Henningsson, 2006; Stohr & Nickerson, 2003). This soon leads to intimidating levels of complexity and coupling with two main downsides. Firstly, there are techno-economical implications related to costly maintenance due to the large number of interfaces. Secondly, strategic implications as the flexibility of the IS environment will be severely hampered (Pushman & Alt, 2004; Gulledge, 2006; Duke et al., 2005); as changes in applications and business processes become cumbersome, business agility will be impossible to achieve. This reasoning is supported by the empirical study conducted by Themistocleous et al. (2001) where none of the respondents saw interconnectivity as an acceptable solution to integration problems, due to the severe maintenance issues. Gulledge (2006) concludes: "point-to-point integration should be avoided and only be used when there are no other options".

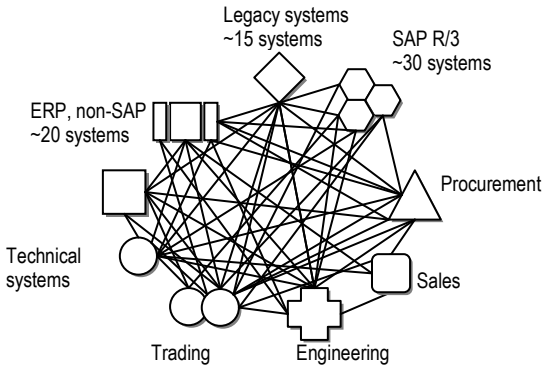

Figure 5.3. The complexity of P2P architecture (Reproduced from Gulledge, 2006)

However, we argue that although its apparent downsides, this option may be worth considering as a temporary solution. For example if a IS project is planned to affect the specific integration area in the

foreseeable future, a P2P integration might be cost efficient in the short run. Or if users resist an M&A, a P2P solution might minimize organizational change. In this case it may make excellent sense to minimize the change inflicted on them by enabling them to use their own ERP system, for a transient time frame.

5.6 Enterprise Wide integration

ERP packages were developed as answers to integration difficulties with legacy and custom systems, and were marketed as "integrated suites" (Davenport, 1998). The largest vendors include SAP, Siebel, Oracle, JD Edwards and Baan, among others. The ERP approach of IS integration is excluding the concept of interfacing. Instead the data of a defined group of business processes is processed within one software application. The data is stored in a single database and is updated in real time, meaning that all the processing functionality within the ERP is committed on the same data (Gulledge, 2006); this ensures high levels of data integrity (Stohr & Nickerson, 2003). When employing an ERP approach IS integration is actually carried out on data, object and process levels. It is, however, not an viable option to avoid this level of integration by dis-integrating modules from each other and then interface them back together at the desired integration level(s). One reason for this is that these applications are built with high levels of coupling as business process logic is tightly linked to master data (Gulledge, 2006). Another is that altering these applications is likely to have severe consequences on future upgrades or conversions (Brehm et al., 2005). Finally, as cost related techno-economic benefits are the most apparent ones with ERP solutions, the costly dis-integrating of such a system would significantly affect these standardization driven economies of scale.

Although built on the value proposition of integration (Davenport et al., 2002), implementing an ERP system rarely – if ever - fulfill all IT needs that enterprises have (Davenport, 1998; Markus, 2001). These systems only achieve local integration – bigger 'stove-pipes' - for the functions or modules that they include. In an empirical study, Themistocleous et al. (2001) found that an overwhelming majority of asked companies reported that ERP solutions only supported between 30-60% of their IT needs. The rest will logically have to be filled by autonomous applications. Accenture points out that further integration of ERP systems is commonly the most value increasing activity of such an investment (Davenport et al., 2002). Conclusion: ERP solutions are not the be all and end all of enterprise wide integration problems, but rather create new integration problems instead. Empirical data claim that a majority of companies have technical integration problems with existing systems as well with other applications (Themistocleous et al. 2001). The reality of these problems is pointed out as ERP vendors facilitates third party application integration in products such as Oracle Data Hubs and SAP Net Weaver (Gulledge, 2006).

Major benefits with ERP as an integration approach are connected to techno-economic gains as the consequential IT standardization leads to lower maintenance costs (Markus, 2001). Strategic benefits could involve fragmented or decentralized companies to present one face to customers (Markus, 2001). As a trade off, strategic disadvantages such as business process rigidity, vendor lock-in and difficulties using IT as means of achieving competitive advantages may follow . ERP systems have more or less fixed business processes which implies that organizations will have to change to fit the systems, rather than the other way around (Stohr & Nickerson, 2003). However, ERP systems are evolving as well and there are trends pointing at future ERPs will be less tightly coupled and therefore be increasingly flexible (Stohr & Nickerson, 2003).

5.7 Middleware integration: EAI

Aimed at solving the problems accompanying the P2P approach, as well as to the integration need spawned by ERP systems, software tools have been developed over the last decade or so under the umbrella term Enterprise Application Integration (EAI) solutions. It addresses the complexity of the exponentially growing number of interfaces with a P2P approach by instead applying a hub-and-spoke architecture (Gulledge, 2006). By implementing a hub – EAI system - between applications, complexity is reduced as only two new interfaces have to be built for each added application. Such a hub can go under many names for example a Software bus (Stohr & Nickerson, 2003), or a Business bus, but the fundamental hub-and-spoke architecture and underlying mechanisms are the same.

EAI provides the infrastructure as well as the mechanisms (Al Mosawi et al., 2006) via message-oriented-middleware (MOM), to share business logic and data across homogenous as well as heterogeneous applications (Gulledge, 2006). This enables a loosely coupled integration by abstracting component characteristics from other components (Stohr & Nickerson, 2003). There is a fair amount of variety in the underlying logic, as well as differences in how terminology and concepts are defined in various EAI solutions. (Al Mosawi et al., 2006). Furthermore, they differ in which integration levels they address and which support they provide organizations (Puschman & Alt, 2004), which in conclusion demands an understanding of relevant business process and future IS architecture in order to make these decisions (ibid.; Al Mosawi et al., 2006). Other

Compared to a P2P approach, after the initial learning costs are paid, considerable economies of scale are likely consequences, (Puschman & Alt, 2004; Themistocleous et al, 2002), as well as a reduction of integration time (ibid.) However, the actual benefits gained by implementing EAI are dependant on situational factors; the more homogenous the IT environment, the easier it is to integrate without EAI. In heterogeneous environments, such as in an M&A, the likely benefits of applying EAI may be greater (Linthicum, 2000; p 15). Different EAI systems address different levels of integration. Technological, application, as well as process levels can be supported (Puschman & Alt, 2004). Therefore this integration approach may be a combination of techno-economical benefits that come with economies of scale while at the same time providing strategic flexibility.

5.8 Middleware integration: SOA

An acronym that have been receiving its fair share of contemporary media attention, as well as major investments by significant IS and software companies, is SOA – Services Oriented Architecture. Although it can be considered middleware (Gulledge, 2006; Henningsson et al, 2007, Wong-Bushby et al., 2006; Feng, 2005), SOA differs significantly from P2P and EAI, as it is business process driven as opposed to being data driven. SOA is rather a software design principle (Yefim, 2003). It is a set of architectural guidelines building upon the definition of interfaces where the entire application environment consists of a topology of interface implementation and interface calls (Yefim, 2003). This is carried out in a reply-request mode where processing is carried out after the service has been requested, as opposed to Event Driven Architecture (EDA) where users rather subscribe to some past processing (Yefim, 2003).

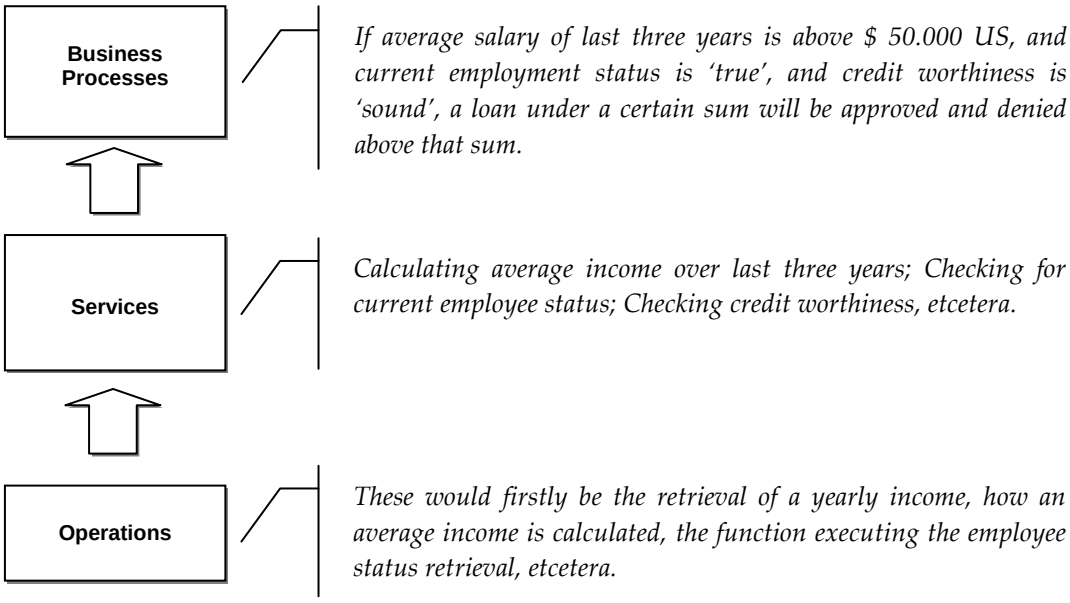

Figure 5.4. SOA example

The main conceptual leap involved with this architecture paradigm is that once the services and their interfaces are defined it is possible to build and rapidly change the constitution of business processes. This is enabled by the loose coupling between components as the technical intricacies of how a service is implemented is abstracted from the service requester (Yefim & Schulte, 2003). In an integration perspective, this brings with it the basis for reusing back-end logic without altering it (Yefim, 2003), meaning that when integrating the systems of a target company these do not have to be altered. Rather it is possible to achieve loosely coupled integration on a high business process level without imposing more change on the target company than what is desired.

SOA can be described at three conceptual levels according to Feng et al. (2005), where each level builds on the level below, analogous to the integration levels described above (see figure 5.1). These are, starting from the top, *business processes* that consists of an orchestrated compilation of services to make up a sequence of activities. This may build upon basic functionality of several underlying applications which are abstracted from the customers of the services. Next is *services* which are logical groupings of underlying operations that offers a clearly defined set of functionality, a service. Finally there is operations The most fundamental units of work that may consist of functions in objects, procedures, components or routines. An example of the three layers is seen in that depicts the way a credit is automatically granted or denied to a bank customer.

5.8.1 SOA - Technologies

Web services are sometimes confused as being synonymous to SOA (Yefim, 2003). They are not. Instead, Web services is one way of implementing SOA, with some benefits related to heterogeneous environments (Gemstone, 2005) which is likely in M&As. SOAs has previously been done using non-web

based protocols and technologies such as Distributed Component Object Model (DCOM) or Common Object Request Broker Architecture (CORBA) (Wong-Bushby et al., 2006; Yefim, 2003). Web services are basically remote procedure calls using Simple Object Access Protocol (SOAP) over the internet by means of eXtensible Markup Language (XML) messages (Stohr & Nickerson, 2003). Web services are platform, as well as procedure independent, self describing for computers through the XML based Web Services Description Language (WSDL) and discoverable through Universal Description Discovery and Integration (UDDI)(Duke et al., 2005; Stohr & Nickerson, 2003). Concluding: Web-services are concerning technology specifications, SOA rather a software design principle (Yefim, 2003). These use of open technologies such as those mentioned above enhance flexibility and the reuse of components, intra as well as inter organizationally. Although the encapsulating of data with XML and SOAP is process intensive and comes with performance related costs (Wong-Bushby et al., 2006); in a business world where agility is a priority, web services do cater to this need. For global corporations the use of internet protocols and platform in-dependability carry with them the lure of making IS integration across geographically distributed systems less challenging.

5.8.2 SOA - Effects

Benefits sought after by organizations include strategic ones such as the promise of swiftly adapting to needs of the market due to an increased agility, as well as techno-economical ones where interoperability and reuse of components lead to cost reduction (Duke et al., 2005); it would enable the possibility to make use of earlier IT investments made by a target company, such as an ERP system. It is also entirely possible to develop and implement SOA incrementally (Wong-Bushby et al., 2006). This involves benefits such as the amount of change inflicted on an IT and Business organization can be kept at appropriate levels, it may be considered an attractive alternative budget, as well as risk wise (Wong-Bushby et al., 2006). Another advantage that might manifest is the enhanced communication between IT and business personnel as they would have to communicate extensively, thereby increasing the likelihood of business/IT alignment (Datz, 2004).

Although SOA and web services are increasingly employed in the business community there are downsides as well. One is a significant learning cost as a conceptual and technological paradigm shift is involved when moving to a SOA (Datz, 2004). Specific problems are related to the semantics of the underlying business logic (Duke et al., 2005; Feng et al., 2005); if data or functions do not share definitions the services are not likely to perform according to intentions. This initial investment can be analogous to that of a driving-license (Henningsson et al., 2007); the techno-economical benefits of lower cost and reuse of components does not manifest themselves until after this phase has been covered.

These lower cost benefits may paradoxically come with costs related to the updating of applications. With an ERP approach the whole system is updated at once; this is far from the case with SOA and the complexity of managing an SOA may well be challenging (Datz, 2004). Other drawbacks are related to the relative immaturity of SOA. There are concerns related to security due to the lack of security standards for web-services and the fact that open architectures are more difficult to control and protect than closed systems (Datz, 2004). For integration situations with a short time span, such as interim integration of a specific business activity, SOA is unlikely to provide the best option. This is due to limited possibilities of reusing the business logic involved, thereby not attaining the characteristic benefits of a SOA (Yefim & Schulte, 2003).

5.9 Comparison of IS integration approaches

In order to make theoretically grounded conclusions regarding which integration approach to use for what scenario, the literature has been reviewed and synthesized. The purpose has been to extract likely implications with each approach, therefore they have been categorized and classified. It is however important to notice that there are significant discrepancies as well as a fair bit of terminology confusion within the field (Henningsson, 2006) making it almost impossible to achieve an solid classification of integration approaches. Business processes might be interchangeably used with workflow, sometimes meaning the same thing, other times not. The same goes for integration approaches where some authors use the term middleware to hint at what others call P2P integration. Some use web services as synonymous to SOA, others again do not. This part of the thesis do not claim to be all encompassing and final in its definitions. Rather it is aimed at providing the reader with the relevant background for understanding what business implications come with different IS integration approaches.

The table below has been built with the purpose of classifying the characteristics of each approach. The literature, although of a mostly technical focus, has been reviewed with the purpose of extracting high level managerial and strategic implications of each approach. For example it is of managerial relevance to consider whether or not an integration type will come with significant organizational impact in terms of change, or may lock in future changes in strategic direction, thereby hampering organizational agility. The review of IS integration approaches is presented as a comparison between the different alternatives and their characteristics. Some of the characteristics have been explicit in the literature; in those cases the reference is stated in the table. Other characteristics have been of a more implicit nature, in the sense that our concluding impression is that an approach might be ranked as 'low' in flexibility.

Table 5.1. Comparison of IS integration approaches

	Non-interfacing	**Interfacing**		
	Enterprise-wide	P2P	Middleware EAI	SOA
Level of integration	High, all the way up to process level. (Pushman & Alt, 2004)	Low, data level only. (Pushman & Alt, 2004)	Optional	Optional
Data integration	Yes	Yes	Yes	Yes
Object integration	Yes	No	Optional	Yes
Process integration	Yes	No	Optional	Yes
Flexibility	Low	Low (Mosawi et al., 2006; Gulledge, 2006; Duke et al., 2005).	High	High (Duke et al., 2005)
Cost to implement	High	Low		High initially, thereafter lower(Datz, 2004)
Cost to maintain (Dependent on size)	Low	High (Pushman & Alt, 2004; Gulledge, 2006; Duke et al., 2005)	High (Pushman & Alt, 2004)	Medium (Datz, 2004)
Organizational impact	High	-	-	Optional/low
Economies of scale (Dependent on size)	High	Low (Pushman & Alt, 2004; Gulledge, 2006; Duke et al., 2005)	High (Pushman & Alt, 2004)	

5.9.1 Nature of comparison

This comparison is not aimed at being the complete and final say in this matter as there are built in problems; rather it is a manifestation on our view as researchers. One such apparent problem is the concept of 'cost'. Whether this is ranked 'high' or 'low' is to a great extent influenced by the *scope* of an integration initiative, rather than the *approach*. It is not necessarily cheap to implement a full scale P2P integration of two companies. But if the scope is only one business activity or even less it is not unreasonable to assume that the cost will be lower than implementing a fully fledged ERP system. An option that is not there with an ERP approach.

5.10 Contribution to the framework

In this chapter three major approaches of IS integration have been described and evaluated. The approaches defined by Markus (2000); *point-to-point*, *middleware* and *enterprise-wide* are also the ones used by Henningsson (2006). These have been established as fundamentally different approaches in terms of the level of integration on a technological as well as a more conceptual level. They have also been found to differ in terms of the effects that they may have on business as well as the cost required to implement and maintain them. Over all, there is no single best solution but rather a need to carefully assess each situation and choose an approach from there. A summary of the approaches and their characteristics can be found in table 5.1.

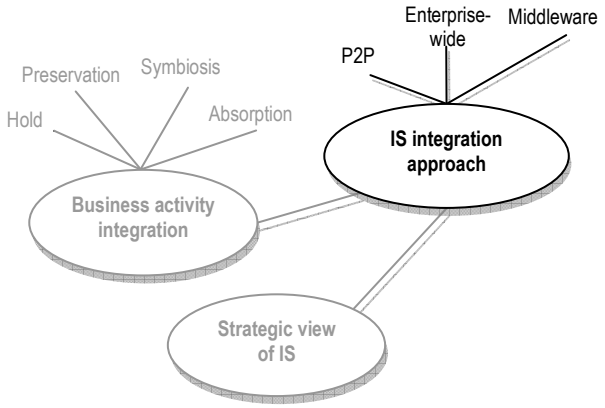

Figure 5.5. Tentative framework – IS integration approach

- *Point-to-point integration* is where two IS are integrated via a direct interface that is created at each end. Though cheap to erect they may be costly to maintain as they quickly increase the complexity of the enterprise architecture.
- *Middleware* is the layer in between the two units that should be integrated. By adding several more entities, a hub-and-spoke architecture evolves. Middleware may be costly to implement but cheaper to use over again and also provide more flexibility.
- *An enterprise-wide* approach implies that one IS should cover both parties that should be integrated – and hence there is no real need for IS integration – just replacement. Enterprise-wide solutions are traditionally synonymous with high level of data and process standardization but also with difficulties in costly implementations and roll-outs.

6 Strategic view of IS

The final dimension selected from the theoretical baseline in Chapter 3 is the 'Strategic view of IS'. This dimension deals with the conceptualization of IS and strategic importance. By describing the business model concept we explain the level of analysis and the focus on resources and activities. It is concluded that IS is a catalyst of competetive advantage and that the strategic importance is created in the connection between an IS and the activity it supports. This connection is finally labeled in a taxonomy and is presented as the final dimension of the framework.

6.1 Background

In the introduction we stated the need to assess the fit between strategy and IS. The goal of strategic fit is a generally accepted 'truism' but there are few practical examples of how this should be achieved. As this area has been covered very extensively previously we have chosen to limit ourselves to a resource-based view as this is in tune with the discussion on acquisition of resources in the previous chapter on *Business Integration*. The resource-based view will also be used in conjunction with the business model as proposed by Hedman & Kalling (2002) as this complements our view on business activities.

6.2 IS and the business

We have already seen that information systems, following the ideas of Langefors (1993), are dependent and built around the use of knowledge to create information from data. It is later the application, or use, of this information that is the key to achieving value. Hence, as organizations employ information systems as a part of their business – it is a fundamental part of the system to create value.

Langefors states that while the organization itself can be viewed in terms of an information system, the typical view is the IS as supporting the organization (1993). Following this we can conclude that while the IS acts as supporting the function – it is also a part of the organizational system typically sharing some resources such as the users. Given this it is safe to conclude that when an information system is present and creating value, it is also – to some extent – embedded in the organization. This view is also supported by Walsham (2001) who sees IS as such a natural part of business that is believed to be inseparable.

6.3 What is competitive advantage?

A business is said to posses a competitive advantage when it has the potential to earn a persistent higher rate of profit (Grant, 2005). The fact that it is not a necessity to actually earn the higher profits to have the advantage is derived from the fact that a company may choose to forgo the higher profits in return for investments, R&D, customer loyalty or similar.

Competitive advantages are generally connected with two difficult problems. Acquiring them and also sustaining them. The first part is concerned with identifying the possible sources of a competitive advantage, possibly among competitors. As a competitive advantage is held it is unavoidable that competitors will try to copy or destroy the advantage reached (ibid).

Historically, IS has been viewed as the source of competitive advantage for many years. At first it was viewed in terms of creating lock-in effects and barriers of entry (Powell & Dent-Micallef, 1997). This may have been true at the time when IS resources where scarce, extremely expensive and hard to come by. As the technological revolution continued and strategy theory became more resource oriented IS was seen as a resource which could be the source of competitive advantage if it was rare, valuable, and hard to imitate (Hedman & Kalling, 2002). Time went by and IS became a more pervasive part of everyday life and business. With respect to this, it has become to be viewed as a commodity that can readily be acquired at will. This implies that it is not possible to acquire and sustain a competitive advantage by IS (Powell & Dent-Micallef, 1997).

6.4 Complementary resources

Resource-Based theory views resources as being any asset, tangible or intangible, that is long-lived and also includes some sort of productive capability (Clemons & Row, 1991). Resources are generally believed as being able to create competitive advantage but to achieve this a resource should be valuable, rare, hard to imitate and leveraged within the organization (Hedman & Kalling, 2002). Competitive advantage was previously defined as the ability to "earn above average profit in an industry". When this is coupled with resource-based view the definition is changed to "the ability to earn above average profits *as a result of having acquired the resources necessary to implement a particular strategy at less than the resources current value*" (Clemens & Row, 1991). This puts the focus to how resources are acquired.

Resources can be either acquired or produced internally within the firm. The acquisition of resources is made via the appropriate market, this differs with the type of resource. As we shall see, acquisition of whole companies is a popular way of acquiring a specific resource. This is true in particular to resources that are not commoditized or readily available on the market. Mata, Fuerst & Barney (1995) claims that resources that are commodities are *competitive parities* or necessities if you so like.

As IS increasingly is being viewed as a commodity the technology per se cannot be used to create competitive advantage. Today, so called turn-key systems are ready commercially of the shelf to implement. This conclusion that IS cannot be the source of competitive advantage is supported by Mata, Fuerst & Barney (1995) who in a study found that only IS managerial skills where a possible source of competitive advantage. This suggests that the system per se is not enough but, in this case, rather how it is managed and leveraged.

Clemens & Row (1991) claims that competitive advantage is achieved by *complementary resources* in terms of information systems. These resources are coupled with the other resources, in this case the IS, and their combination creates a greater value than the complementary resources would do on it's own (ibid.). Complementary resources that are truly dependent of the first resource are labeled *co-specialized*, a term that fits many resources in today's business environment where eCommerce is rather the rule than the

exception. The value added to the complementary resource is however determined not by the information system but by the resource that it supports and the mode of support.

6.5 Strategic necessities

Broadbent & Weill's notion of IS strategies as being derived from business strategies are in line with the contemporary view of competitive advantage and IS. Powell & Dent-Micallef (1997) rejects the possibility of an IS resulting in a competitive advantage per se but rather by complementary. Complementary resources are resources that increase the value created by others by leveraging them (ibid.) and creating superior value. As such the analogy of a tool could be use, it is not the tool per se but how you use it that matters.

An example of IS as a complementary resource would be the traditional mail-order firm. Their traditional way of doing business is in no way dependent on IS, they were doing fine long before the invention of computers. However, with the advance of IS they are able to support their activities and make them much leaner by for example minimizing inventory and reducing billing staff as this is dealt with automatically. Here, the IS would be complemented by Billing and Logistic resources.

Hedman & Kalling (2001) notes that information systems of today have moved on from being a source of competitive advantage to in some ways being an absolute necessity. That is that they are a 'must-have' for organizations wanting to compete in the industry. With this view the advantage is on behalf of the part that implements and uses the system in the most efficient way. Powell & Dent-Micallef (1997) labels this the 'strategic necessity hypothesis' and also states that rather than being to exploit a competitive advantage from the adoption of an IS the non-adopter will receive a competitive *disadvantage*. Davenport (1998) argues that this could actually be reversed to a form of advantage as well. Certain industries that has industry standards in IS, such as ERP-software (ibid.), may embed certain features such as inflexibility that competitors are available to exploit.

Powell & Dent-Micallef (1997) describes two strands of complementary resources of IS, human and business. Where the first encompass resources such as open communications, organizational flexibility and IS-strategy integration the latter focuses on areas such as business process redesign, benchmarking and supplier relationships. We would like to think that all resources are possible as complementary since IS today is such an integral part of business that it is complementary to almost all resources in some way.

6.6 The Business Model Concept

The business model was previously defined as a run-down model of how a firm earns revenue and by what activities this is done. Although a very popular and widespread term (Hedman & Kalling, 2002; Grant, 2005) this definition seem to be somewhat universal. It is generally expressed in terms of the offering to customers, activities and the resources used to generate this profit (Applegate et al., 2003). The term has proven especially viable in terms of describing the possibilities of generating a profit (Grant, 2005) and it is probably here the concepts greatest contribution lies – the ability to easily communicate the rationale for business and also highlight the areas that should be focused upon within the organization (Hedman & Kalling, 2002).

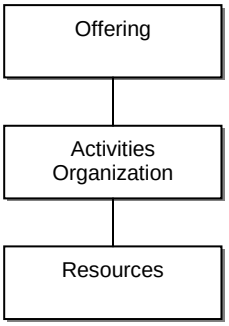

Figure 6.1. The Business Model concept (Hedman & Kalling, 2002)

Hedman & Kalling (2002) proposes their model of the business model to include the offering, the activities and organization and finally the resources. These are interconnected in the mode that activities are used to create and exploit resources to serve the market with an offering. The definition of resources are taken from the resource-based view explained earlier but they explicitly state that the identification and leverage of important resources may very well require an open mind on the way a resource is viewed. A resource may be any combination of assets, tangible or intangible and can include skills or activities performed (ibid.). What is key is that the choice of resource classification is suitable to the purpose.

However, resources as a concept can be misleading to some and many prefer to focus on the activities of a business model instead as this is what is most visible and "hands-on". To better fit the purpose, we could express resources in terms of activities as these are related. Simply put we could state the activities of a business model are built around several resources and that these are key to achieving whatever purpose of the activity and – in the end – delivering the offering.

So to deliver the offering to the market a company carries out different activities. These are, in Hedman & Kallings model, similar to the functional activities of Porter as used in the value chain. These are often functionally different and constitute separate clusters of inter-related processes. Surprisingly often, these functional units are also represented in organizational charts (Applegate et al., 2003). To distinguish these activities that are a part of the business model from any activity taking place within the organization, we use the term *business activity*.

6.7 The strategic importance of IS

As we have argued that information systems do not produce a competitive advantage per se but rather by the way they leverage other resources within the firm and are used to create value within the organization we have still to find a framework to judge the strategic importance of IS. The idea that information systems work as complementary resources gives us a hint that we should try to asses information systems on a resource scope rather than organizational or technical scope.

Henningsson (2006) uses the taxonomy of Weill and Broadbent (1998; according to Henningsson, 2006) that divides IS into four categories. *Infrastructural* is the basic technology that makes up the information

network. *Transaction* includes the actual business transactions that take place inside the organization. *Informational IS* refers to a decision support system that aids managers with relevant information. Finally is *Strategic IS* that has a direct impact on the competitive ability of a company. These categories seem to be of four different types rather than measures of a single aspect – i.e. the ability of an IS to provide a competitive advantage. We believe that the infrastructural components of an IS always are present and that is more appropriate to measure one quality of IS to determine their strategic importance.

Broadbent & Weill (1997) provides us with an earlier, somewhat different taxonomy that they label 'view of IT infrastructure'. With the strategic purpose of the organization in mind this view should be seen as the way that an IS supports the coordinating actions across resources striving towards the business strategy. These are *None*, *Utility*, *Dependent* and *Enabling* and more specifically reflects the level of alignment, or strategic fit, between the business and the IS.

The *None* view implies that no shared services are used and no investments are made to achieve a higher level of coordination. *Utility* view is equal to the sharing of common resources and is largely driven by economies of scale (Broadbent & Weill, 1997) as the increased usage of resources a higher output is accomplished by the same input. No coordination of knowledge is however necessary (ibid.). The *dependent* view implies an increased focus on IS services as they represent key factors in current business strategies (ibid.). These investments are derived from actual business plans that specify or in other ways imply IS requirements in terms of need of coordination across organizational boundaries. *Enabling* represents an overinvestment in terms of current needs (ibid.). The key idea is to provide flexibility by cutting-edge technology and a leading position in the industry. This view is particularly dominant in industries heavily dependent on R&D.

The above view implies that the strategic view is derived from the business value that it creates and as such, the resources that it complements. However, the explicit purpose as stated by the authors is the view on infrastructure with a focus on investments. Weill & Broadbent (1997) also notes that these views requires a firm wide view of the business on behalf of the part that implements the views. If this is not achieved an alternate, and more common, route can be pursued – IS by deals rather than maxims. In this model the IS department of a firm functions as an independent profit center that strikes deals with different business units and supplies them with the services they need at a given price.

6.8 Strategic view of IS

By combining the ideas of complementary resources, the business model and the taxonomy of 'IS view on infrastructure' we get the view of integration between different business activities and an IS within an organization. This integration is, as we have previously seen, what creates value and competitive advantage on basis of information systems.

By defining a business model of a firm, we get the primary activities used to make a profit within the business. These are the main *business activities* that should be evaluated in term of *strategic view of IS*. Each activity is in turn related to a number of resources that are utilized within the activity. These are the complementary resources of the information system but for the sake of simplicity we view the *business activity* as the complementary resource. Thus, the creation of additional value is enacted in the interface between *information system* and *business activity*.

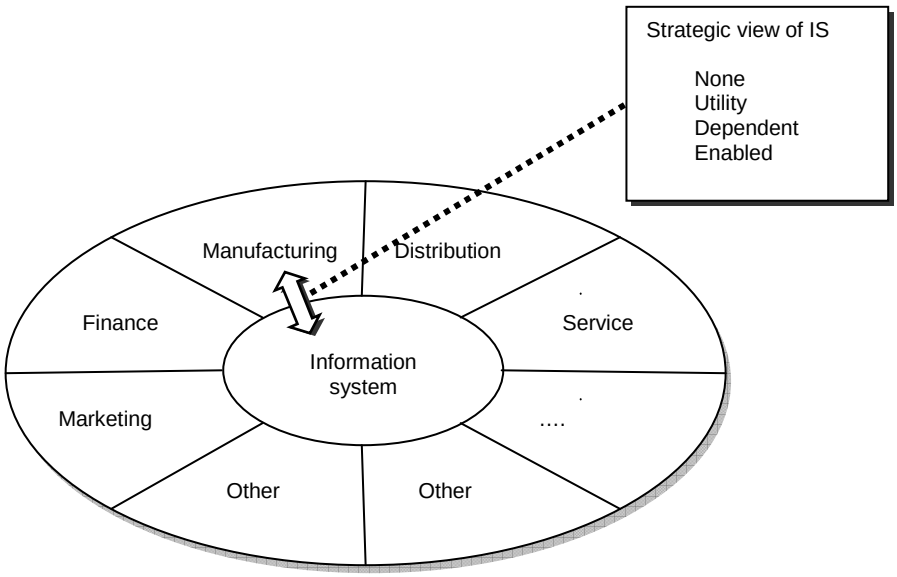

Figure 6.2. Strategic view of IS (modified from Grant, 2005)

Each activity that is supported by an information system requires a certain amount of coordination with this. This level of coordination of data and knowledge is, as we have previously argued, the primary driver of *strategic view of IS*. Simply put, the higher need for coordination – the more dependent the strategic view of IS.

The above figure illustrates the concept of strategic view of IS on an activity level. The figure also illustrate that it is derived from the complementarities between the IS resource and the complementary resources, clustered together as a business activity. The arrow represents the actual complementarity between a resource and the IS that has a strategic view.

6.9 Contribution to the framework

This chapter has argued on behalf of the commonly accepted belief that IS do not provide value for organizations per se but rather as a supportive resource. As IS of today are readily available they are rather strategic necessities that create competitive disadvantages on behalf of the parties that fail to leverage them. However, they can also be a source of competitive advantage when they are utilized in an efficient manner. All IS does not create competitive advantage and each IS must thus be viewed in light of the resources, or activities, that it supports. This view can be labeled as *none*, *utility*, *dependent* or *enabling* in terms of the complementarities it offers. The strategic view is to a large extent based on the amount of coordination required within the supported activity.

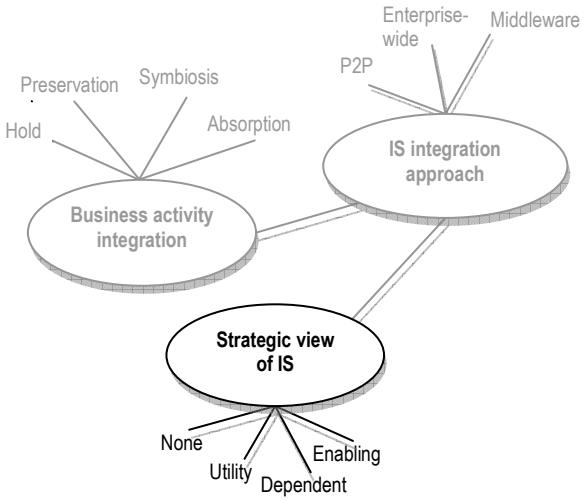

Figure 6.3. Tentative framework – Strategic view of IS

- *None* implies that the importance of IS is relatively low and no efforts are made to change this.
- A *utility view* states that an IS is used to achieve benefits related to economies of scale as resources are shared.
- *Dependent views* is the equivalent of a high strategic importance of IS. The activity is relying on an IS to create value and coordinate activities across the organization.
- *An enabling IS* does not only satisfy today's needs but also allows for a high degree of flexibility.

7 An IS integration analysis framework

In chapter 3: 'A theoretical baseline' the selection of the three dimensions were grounded in deduced relationships on an organizational level. Following the theoretical reviews that produced the conceptualizations of these dimensions, the framework is now presented in a whole. To heighten the level of synthesis, as well as communicative abilities related to the Enterprise Architecture perspective, the relationships within our framework are described and visualized in a model. The relational model of the framework can be seen as a manifestation of our understanding of the problem area before applying case data to test it..

7.1 Background

The preceding tree chapters focused on a theoretical review of the dimensions in order to create a synthesized framework for analyzing and describing IS integration in M&As. The output of these chapter were the conceptualizations that form the taxonomies that constitute the dimensions. The framework in a whole is presented below with summaries of the dimensions and their individual taxonomies.

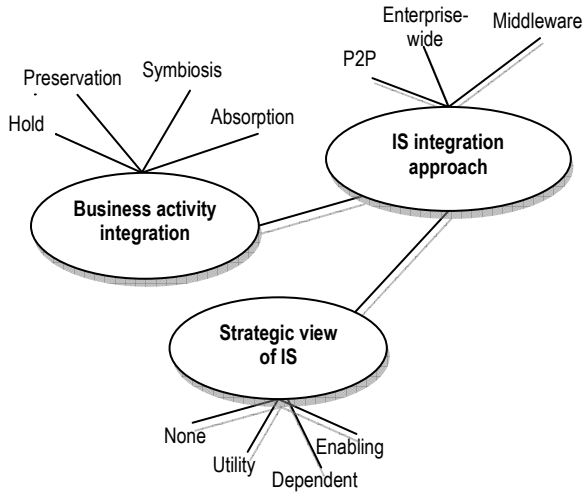

Figure 7.1. IS integration analysis framework

7.1.1 Dimension A: Business activity integration

Concerns the different levels of business activity integration in an M&A situation. Four different levels are possible:

- *Absorbtion* refers to the situation where the acquired company is assimilated into the acquiring company.
- *Symbiosis* is the situation where the influence is bi-directional and both organizations are affected by the M&A.
- *Preservation* occurs when the acquired unit has to be kept intact in order to realize synergies.
- *Holding* implies that no integration is needed as no synergies are to be realized.

7.1.2 Dimension B: IS Integration approach

IS integration can technically be carried out in three conceptually different ways. These each have different characteristics with techno-economic and strategic implications related to underlying business need.

- *Point-to-point integration* is where two IS are integrated via a direct interface that is created at each end. Though cheap to erect they may be costly to maintain as they quickly increase the complexity of the enterprise architecture.
- *Middleware* is the layer in between the two units that should be integrated. By adding several more entities, a hub-and-spoke architecture evolves. Middleware may be costly to implement but cheaper to use over again and also provide more flexibility.
- An *enterprise-wide* approach implies that one IS should cover both parties that should be integrated, hence the need for IS integration is addressed through replacement. Enterprise-wide solutions are traditionally synonymous with high level of data and process standardization but also with difficulties in costly implementations and roll-outs.

7.1.3 Dimension C: Strategic view of IS

Relates to strategic importance of a specific IS of a target company seen from the perspective of the acquiring part. For levels of strategic importance are possible:

- *None* implies that the importance of IS is relatively low and no efforts are made to change this.
- *A utility view* states that an IS is used to achieve benefits related to economies of scale as resources are shared.
- *Dependent* views is the equivalent of a high strategic importance of IS. The activity is relying on an IS to create value and coordinate activities across the organization.
- *An enabling IS does* not only satisfy today's needs but also allows for a high degree of flexibility.

7.2 The need for a relational model

The creation of the framework has been focused on the first part of the purpose of the thesis: "*To create a synthesized framework from existing theory and for analyzing and describing IS integration on a business activity level in an M&A context"* (see 1.3 Knowledge contribution and purpose). Although the framework have been amalgamated from three different strand of research, at this stage we see it more as a combination than a synthesis. The actual synthesis is more reliant on how these dimensions relate to each other. It does also lack in its abilities to communicate a vision related to the Enterprise Architecture perspective. In order to heighten the level of synthesis, as well as to cater to the communicative abilities, the second research question have focused our efforts: *How does the integration need on a business activity level relate to the characteristics of different IS integration approaches?* (see 1.3 Knowledge contribution and purpose).

7.3 Identified relations

Relationships within the framework have been theoretically deducted between *Business activity integration* and *IS integration approach* and *IS integration approach* to the *Strategic view of IS*, an overview of these are displayed in table 7.1 and table 7.2.

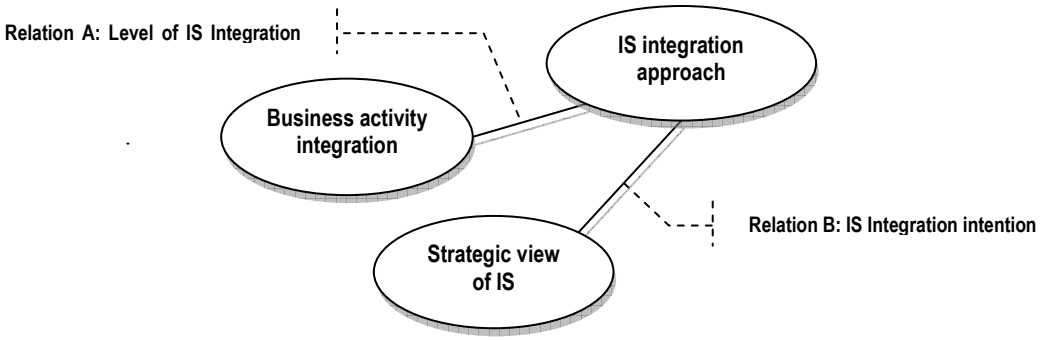

Figure 7.2. Framework relations

7.3.1 Relation A: Level of IS integration

The first relation concerns the mapping of the levels of Business activity integration to the conceptual levels of IS integration approach. In the taxonomy of Business activity integration the highest level of integration is the one of *Absorbtion* where business processes are integrated. The discussion regarding IS integration levels (see 5.3 Integration levels) points to the fact that the IS needs to be integrated to the highest *Business level* in order to achieve Business process integration. Following is the business activity integration level of *Symbiosis* where independence on a process level is co-existing with interdependence. The level of IS integration that maps to this is the one of *Application* integration where it is possible to have different applications support identical business processes, while at the same time allowing for underlying divergence. One example of this would be the provision of portals enabling autonomous business rules depending on geographical location behind otherwise identical business processes. The business level integration of *Preservation* is the lowest one, concerned with data exchange that requires communication. This only require the IS to be integrated at the *Technological* level. An example would be

the exchange of financial reports. Finally, the business integration level of *Hold* does not imply integration at all.

Table 7.1. Theoretical grounding of Relation A: Level of IS integration

IS Integration approach (e.g. Al Mosawi et al., 2006; see 5.3. Level of integration)	**Business activity integration** (e.g. Haspeslagh & Jemison, 1993; see 4.4 Levels of Business Integration)
Business level include the integration of integration flows and business processes.	*Absorption* is the assimiliation of one businesses processes into the other.
Application level provides well defined connections, providing full application and process interoperability while allowing independent back-ends .	*Symbiosis* requires the independence as well as interdependence of units, i.e. coordination and independent processes.
Technological level gives us the ability to exchange data and objects within the organization and thereby easing and enabling communication standards.	*Preservation* is the lowest level of integration where the unit is left more or less untouched. Still, there is a need for communication.
	Hold does not imply any integration.

7.3.2 Relation B: IS Integration intention

The second relationship is the one regarding the Effects of IS Integration approach and the Strategic view of IS. The Effects of IS integration can be divided into two major categories: *Strategic benefits* related to achieved competitive capabilities related to a specific approach, and *Techno-economic* ones related to economies of scale and the cutting of costs in achieving a certain goal. The Strategic view of IS contains the category of *Enabling* where an IS is viewed in terms of its ability to achieve future strategic change. This would be where investments in IS are made, not for current needs, but rather for future ones. The example of over-integrating an IS infrastructure beyond current needs is applicable here. The *Dependent* category is implying the role of IS as supporting current strategic needs, such where an IS enables global transparency regarding logistics. These categories are both related to *Strategic benefits* of IS integration approaches. Following, is the *Utility* view where the focus of IS is on standardization and the sharing of resources. Finally is the category of None, where IS is viewed only in terms of facilitating operations in terms of infrastructure. The last two categories are related to Techno-economics benefits related to standardization enabling the sharing of resources and maintenance costs.

Table 7.2. Theoretical grounding of Relation B: IS Integration intent

IS Integration approach (Benefits) (Markus, 2001; see 5.2. Effects of Integration.)	**Strategic view of IS** (Broadbent & Weill, 1997; see 6.7. The strategic importance of IS)
Strategic benefits refers to the ability to achieve long term gains in competitive ability.	*Enabling* is where IS acts as the mean to achieve future strategic change.
	Dependant implies that current strategic needs rely heavily on IS integration.
Techno-economic benefits are primarily cost related and are related to the sharing of resources, maintenance costs and alike.	*Utility* is where there is focus on the sharing of resources, an economies of scale.
	None is where the IS is of mere infrastructural nature – it is only IT.

7.4 A relational model

The dimensions of our framework with the dimension of IS integration approach can be put together in the form of a matrix. Here the dimension of Business Activity integration forms the vertical axis ranging from the lowest level of integration of *Hold* to the highest level of *Absorbtion*. On the horizontal axis the dimension of Strategic view of IS ranging from the lowest level of *None* to the highest level of *Enabling*. When the theoretically deduced differences in characteristics of IS integration approaches are applied to the matrix they can be visualized in the form of three areas, see figure 7.5. These areas are mere visualizations of theoretically deduced hypotheses and should not be regarded as normative in any sense. (see Table 5.1. Comparison of IS Integration approaches).

Before describing where theory points to the suitability of different IS integration approaches, a word on the quadrants left blank. Regarding the lowest *Hold* level of Business activity quadrants, there is no theoretically grounded need for IS integration is needed regardless of the Strategic view of IS. This row is therefore left empty. This is also the case for the None column of Strategic view of IS. If there is no IS support need of a specific business activity, there is no theoretically grounded need for IS integration either. This column is left empty as well. For the other quadrants there have been found theoretical justification for one or several IS integration approaches. These are reviewed below.

7.4.1 Point-to-point

In the theoretical review, *point-to-point* is generally not recommended. However, there are cases where the characteristics of P2P might be appropriate. In table 7.1 it is stated that the technological level of integration which corresponds to Point-to-point, is related to preservation approach of business acitivites. Then, where the integration need for a business activity is *Preservation* and the IS supporting this is viewed as a *Utility* there arguments can be made that a P2P solution will enable the target company to preserve their business processes, while at the same time a sharing of the same resources such as a data base. This is considered dependant on the scope of this integration. If the necessary numbers of interfaces are few, and it is carried out over a limited amount of time this can be a quick-and-dirty solution that meets the need. The same goes for the Preservation and Dependant quadrant where the P2P integration may enable strategic need of the moment. It is the relative speed of implementing a small number of interfaces that theoretically justifies this. Otherwise there are no justifications for the use of the P2P integration approach.

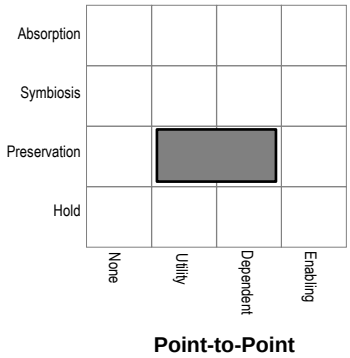

Figure 7.2. Releationships of Point-to-point integration

7.4.2 Enterprise-wide

The most explicit characteristics of this approach is the high level of integration - integration is achieved all the way up to business process level. The major benefits most commonly associated with this approach are techno-economic gains as systems are integrated, centralized and standardized. However, while doing so, these processes need to be altered – the amount of organizational impact is high. It is therefore unfeasible to use this approach if there is no desire to change the business processes of the target company. These characteristics place this approach typically in the *Absorbtion* row; the high level of organizational impact enables a target company to be absorbed into the business model of the acquirer. This relation is also explicitly defined in table 7.1 where business process level integration associated with an Enterpris-wide approach is related absorption type business activity integration. As unveiled in chapter 5 there are several aspects to the enterprise-wide approach in terms of techno-economic and strategic gains. As well as a possible source for strategic change it can also impose rigidity into the organization. In terms of techno-economic gains the centralized hosting, maintainance, support and training offers dramatic possible cost-reductions.

With table 7.2 in mind, for the *Utility* view the added benefits of techno-economic gains makes this an excellent fit both for *Absorption* type integration but also for *Symbiosis.* As the level of integraton is reduced the benefits of shared resources and data can be realized while avoiding the many pitfalls of reengineering business processes. The *Dependant* in IS where current strategic needs relies heavily of IS integration an Enterprise wide integration approach caters well to this situation as well. Finally, the *Enabling* quadrant in the *Absorbtion* row is justified as an over integration compared to current strategic needs can be viewed as enabling a business strategy in the future. One example might be the implementation of an ERP system that is the future industry standard, which might enable external integration towards suppliers or customer business processes. Trade offs that need to be considered with this approach comes in form of high process rigidity and vendor lock in. Downsides that are catered to by the final IS integration approach – Middleware.

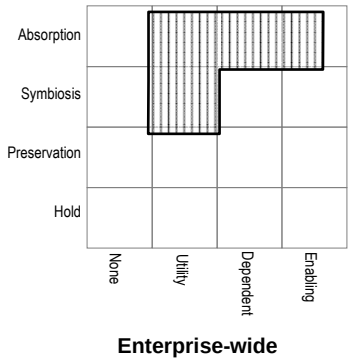

Figure 7.3. Relationships of Enterprise-wide integration

7.4.3 Middleware

The most apparent characteristics of this approach is the increased flexibility in relation to enterprise-wide, as well as to P2P. However, since a new interface still has to be constructed for each integration – it

is in this way a more complex integration solution. The latest evolution in this area is the SOA paradigm which after initial investments may provide a high level of integration with a high flexibility in combination with low maintenance costs. The Middleware approach does not require a certain level of integration in the same way as Enterprise-wide did, see chapter 5, but can be utilzed on levels of integration as shown in table 7.1 Hence, *Absorption, Symbiosis* as well as *Preservation* are levels of integration that could benefit from a middleware approach. The *Symbiosis* row in the matrix is concerned with the co-existence of independence and interdependence. This can be enabled by middleware for a *Utility*, *Dependant* as well as an *Enabling* view on IS. For the Utility view middle-ware can enable resource sharing by providing a low cost maintenance alternative. For the Dependant view, middleware can provide a high level of integration, all the way up to business level, while providing flexibility that relative Enterprise wide of P2P is significant.

While middleware is flexible and somewhat suitable for all kinds of integration the primary issue is flexibility and instead of consolidating systems by integration rather another, integrating component is added. Hence the focus is rather on a strategic rather than techno-economic level. With this in mind and relating to table 7.2 we get the relations seen in figure 7.4 were the enabling and depending view on IS is dominant.

This is especially the case for the SOA approach to middleware integration, even though this comes with initial learning costs. The investment of such learning cost that might enable future strategic abilities place this approach in three quadrants of the Enabling column: Absorbtion, as it enables the business process of an acquirer to be implemented on a target company business activity; Symbiosis as the modular approach enables flexibility as to parts of an activity that may be interdependent as well as in-dependent; finally, *Preservation* as it also enables lower levels of integration business processes can be kept intact while at the same time integrating the IS at lower levels. The quadrant of Preservation and Dependent is also applicable as a high level of integration is possible, combined with techno-economical benefits of low maintenance costs.

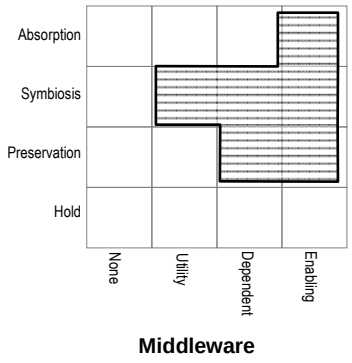

Figure 7.4. Relationships of Middleware integration

7.4.4 The complete model

In figure 7.1 we can see the relational areas covered by each integration approach, put into one visual model. As we can see there is substantial overlap between the approaches and this is due to the complex nature of IS integration and M&As. As was discussed earlier in chapter 3 there are numerous other variables that will influence the choice of integration approach and there is not always a single best choice.

The relational model presented here is a mere visualization of the relations that we have theoretically deduced as can be seen in table 7.1 and table 7.2. These relations are not the only possible ones and are not exclusive. The model is to be used as a tool for analyzing and describing cases of integration and comparing live cases to theory and the relations previously identified. In relation to previous theories in the field the we do not claim to be normative (see for example Giacomazzi et al., 1997 and Wijnhoven et al, 2006) but present a theory for analyzing and describing, This is a consequence of the relative imatturity of the field (Gregor, 2006) and also the complexity of the situation.

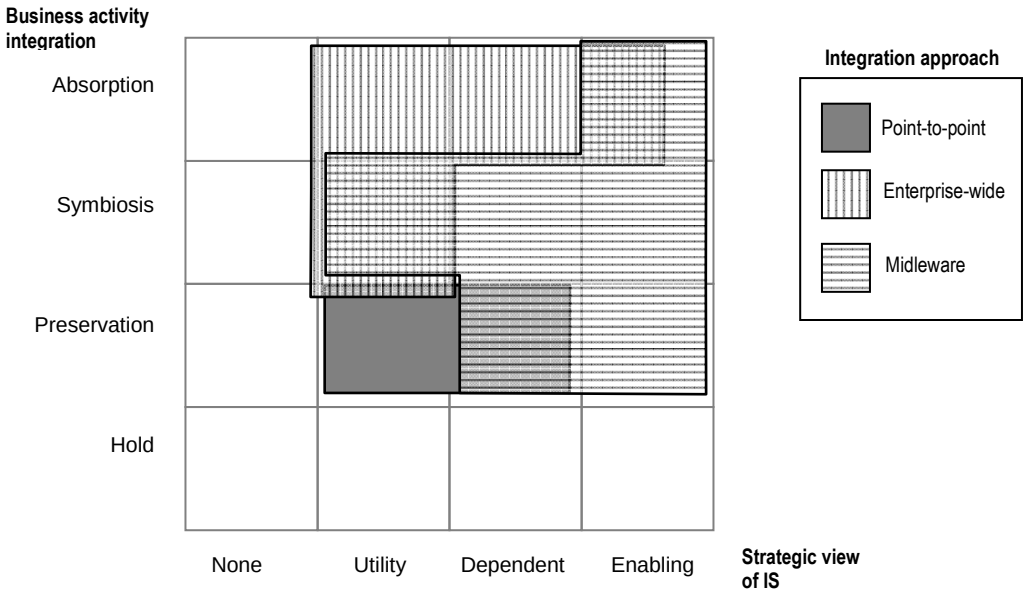

Figure 7.5. Relational model of the IS Integration Analysis framework

7.5 Testing the framework

The relational model is a visual representation of the relations identified in the theory review. Areas where the different IS integration approaches are visualized point to theoretically grounded relationships. This does not exclude their applicability in other situations than those described above, only that the theoretical perspective of this study does not point to that. In addition, the model can be seen as our

understanding of the problem area before the gathering and analyzing of empirical data. The relational model concludes the theoretical part of the thesis.

The following three chapters concern the empirical testing of the framework. This is done by analyzing and describing three cases of IS integration in M&As. The framework is applied and tested as we describe the activities in each case by using the taxonomies presented. Then by comparing the actual IS integration approaches to the theory we test the relational model as well. Testing the framework was done by first a primary case where we conducted six interviews with high level managers. Following, is the further testing by applying two reference cases consisting of secondary data to the framework.

8 Primary case

The purpose of this thesis is to create and empirically test a framework for IS integration in M&As. In the previous chapter the synthesis of the framework was completed and it is now used for analyzing and describing a real life case: the acquisition of Chase-Walton by Trelleborg Sealing Solutions. The analysis is done by the application of the IS integration analysis framework. Also, it is made with an explicit Enterprise Architecture perspective to reveal the fit between strategy, business activities and their individual integration approaches. At the end a summary table is presented.

8.1 Trelleborg - TSS

Trelleborg is a global industry group focused on sophisticated polymer technology. It was originally founded in 1905 and have been involved in the design and manufacturing of rubber products since then. Totally they employ some 22000 people and annual sales are at 22 M SEK annually (Trelleborg, 2005). Trelleborg Sealing Solutions (TSS) is one out of five business areas within the Trelleborg Group. TSS was formed in 2003 after the acquisition of Polymer Sealing Solutions, an operation of Smiths Group Plc. The acquisition became the base for the new business area which, since then, has grown dramatically, with a focus on growth by acquisitions the last couple of years. Annual sales for TSS 2005 was around 5.400 M SEK and they employ some 5500 people world wide.

TSS produce and distribute precision seals for industrial applications globally. Geographically they are organized in three regions: Europe, which is still the main market with a 70% share of total revenue, the Americas and the Asia Pacific together make up for 30%. The organization is divided into three distinct business units for marketing, logistics and sales. The majority of sales are conducted through the renowned trademark Busak+Shamban. Three business segments make up the business portfolio of TSS. Industrial applications is the major segment with over half of the sales. In this segment they also enjoy a position as market leader in Europe. Two other segments are Automotive and Aerospace applications.

8.1.1 Chase-Walton

Chase-Walton was a family owned company which started out in the mid 1950's (Trelleborg press release, 2005). It is located in Hudson, Massachusetts in the US and had some 110 employees at the time of acquisition, with annual sales at approximately 100 M SEK. Its main markets was in the Aerospace industry, with customers such as Boeing, as well as in the Medical and Biotech industries. Chase-Walton was up for sale as the present owner wanted to leave the firm, and the formal take over by TSS was in October 2005.

8.1.2 TSS Business Model

TSS is marketing driven and aims to compete with a value-added offer of quality and high technology, rather than cost. Industry trends point to where customers demand holistic solutions and aim at reducing the numbers of suppliers (Trelleborg annual report, 2005) and the business model of TSS is solutions oriented. This means that TSS salesmen and application engineers meet up with customers, discuss and analyzes their specific sealing needs and then come up with a solution that caters to this. This business model is supported by an organizational structure that distinguishes between Marketing, Supply-chain (or Logistics) and Manufacturing activities, these can be seen in Figure 8.1. The solutions proposed by the marketing units may involve in-house manufacturing but products may also be procured from third party suppliers, or even competitors; the number of goods purchased through this channel is said to be as high as 30-35%.

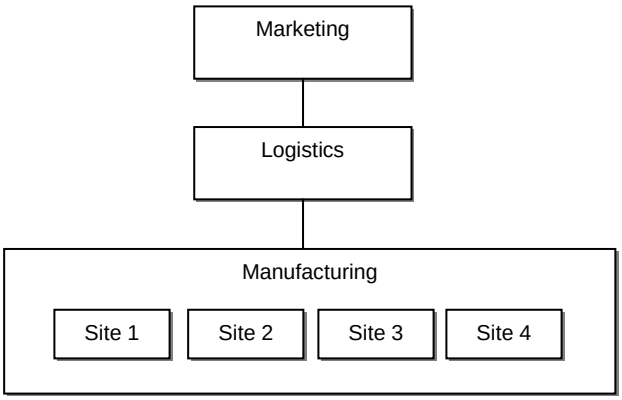

Figure 8.1. TSS Business Activities

According to Windahl et al. (2004) the modern solutions-oriented company should seek to re-evaluate their internal competence and move core competences from manufacturing and technical applications to marketing, consulting and integration competences. In practice this means that a solutions-oriented business place less emphasis on their manufacturing but more on consulting and the ability to integrate vertically with customers and suppliers. Windahl et al. (2004) also states the need to develop systems integration competence within the solutions-based company.

Even though TSS has a clearly defined strategy for IS-integration, as will be presented later, it differs between two parts of the world, the Americas and Europe/Asia. This discrepancy is in large a result of previously different business models, but today these are the same. However, as the case was situated in the US this will be our focus but we will also present the approach used in Europe/Asia to deliver a richer picture.

8.2 The acquisition

Chase-Walton caught the eye of TSS for two main reasons. One was to gain access to markets where TSS considers themselves to be under represented in relation to potential market size: "we're close to being a leader in Europe, but we're just another player in the US" (Interview, DB, 061206). CW had customers within the Aerospace industry that was important as well, as it can be a fairly lengthy process to become a supplier in this industry. As an interesting perk CW also had customers within the Medical industry, an area which TSS was new to. The other main reason was to get local physical presence. TSS views this as an important step in gaining access to customers, which is viewed as critical in the US market.

In the case of CW the explicit intention was that they would be "fully integrated" (Trelleborg, 2005). In the process of folding an acquisition into the business model of TSS, the former stand-alone company will be partitioned and the business activities will be assimilated within TSS. The manufacturing part will become a group supplier, the sales staff will be integrated in the marketing unit, and the logistics will become a part of the SCM. This was deemed necessary to reach synergies related to economies of scale and scope, and the possibility of introducing new products to existing customers. This means that the future group supplier Chase-Walton will become, will have a single customer alone: the TSS marketing units.

8.2.1 IS integration

The IS types that have been the focus of integration in CW have firstly been infrastructural such as the network connections and e-mail systems. This was carried out about two weeks after the legal take over, which is normal for M&A integration in TSS. To integrate the infrastructural IS are considered to be fairly straight forward. In this case it was carried out by a single IT employee and without formal project planning. Integrating the actual business transactions of the company - transactional IS - have been carried out in regards to Marketing and Logistics.

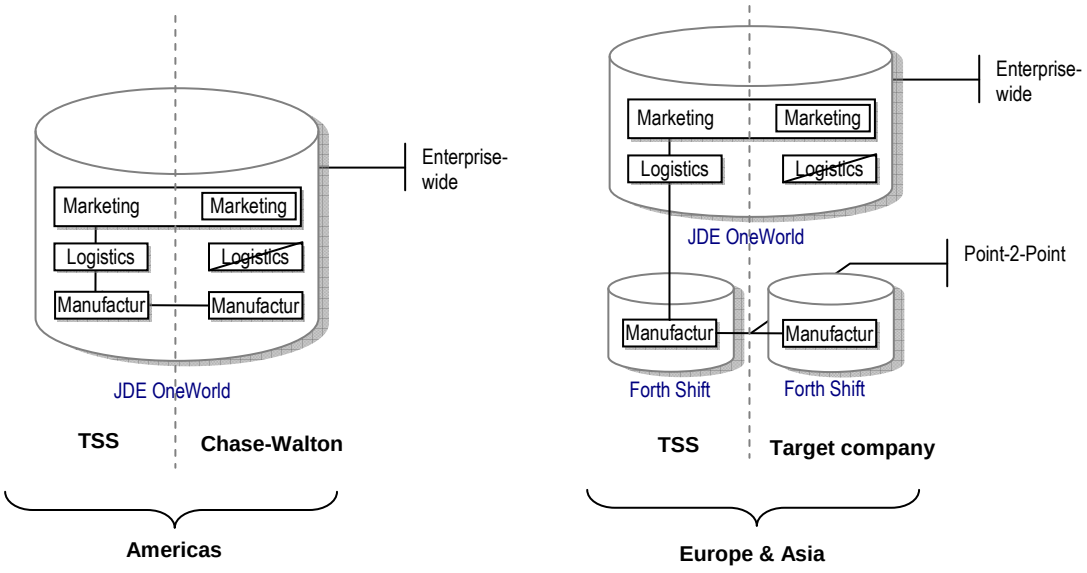

Figure 8.2. Conceptual illustration of IS integration at TSS

This has been done by implementing the JDE OneWorld ERP system used in TSS Americas. For the manufacturing activities no integration has yet taken place although it is scheduled to happen sometime during the next year. Rather, this is still being carried out on legacy systems and a number of workarounds supported by "Excel – the worlds biggest ERP!"(Interview, Jarosch, 061206).

TSS have a distinct enterprise architecture approach that is based on their business model and their ERP system. The focus is the marketing and logistics activities – JD Edwards World in Europe and JD Edwards One World in the Americas. The integration strategy that is employed to integrate CW is simply to add this unit to the existing instance of JDE One World: "Because, no matter what they used, we'd be replacing their systems with our systems, our own ERP" (Interview, DB, 061206). This is more so the case for the marketing and logistics activities, the SCM model is in fact developed around the ERP. For the manufacturing, where the integration need is not considered as critical, the integration is currently carried out via middleware interfaces exchanging data in Electronic Data Interchange (EDI) format. Other IS that may be used are not integrated at all except on an occasional basis.

Although the manufacturing systems are not deemed as critical to the successful integration of the business, they are seen as a potential source of process improvements due to a change in information systems. While it is not critical to the integration of businesses, it is still a very important topic if and when they should be supplied with a new system – an ERP. This new system, JDE in the Americas or ForthShift in Europe, is then the vehicle for process reengineering that dramatically can increase internal efficiency of the affected manufacturing unit and further improve performance of the acquired unit.

8.3 IS Integration analysis

When comparing figure 8.1 and figure 8.2 a notion of the enterprise architecture at TSS is visible and we will now dissect and analyze this, activity by activity, using the framework presented in the previous chapter.

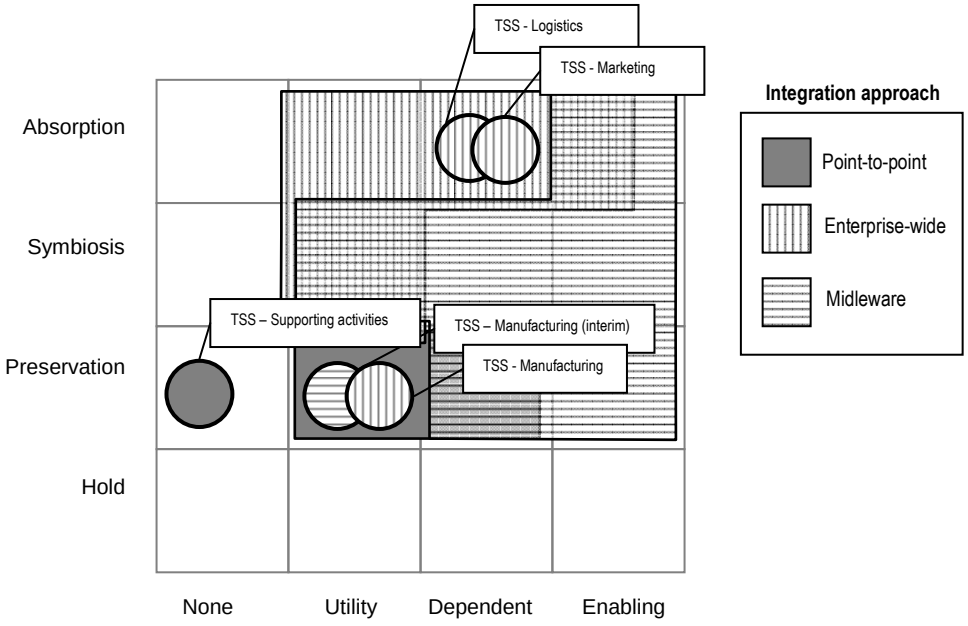

Figure 8.3. Case relations

8.3.1 Marketing activity

In the case of the marketing activity within the acquisition the only possible level of integration was the full integration - *absorption*. As TSS is a marketing-driven company what they deliver is dependent on the marketing, rather than the manufacturing of goods. The need for organizational autonomy is low as customers expect only one marketing function. Because the need for strategic interdependence is high they do not carry any own goods but rather act as distributors of the manufacturing facilities. Furthermore, the synergies in this case required an extensive integration, as the acquired resources (market shares, knowledge and customers) had to be incorporated into the existing body. Such an extensive integration commonly requires the creation of shared processes which is the highest level of integration, this was further discussed in chapter 4.

In the Chase-Walton acquisition JDE OneWorld was to become the IS of the marketing activity. In a solutions-orientated organization such as TSS, the most important part of the business model is the marketing activity as this is the front end to the customer. In relation to this we have concluded that the IS used is seen as an utility, as the solutions aspect require very little coordination among activities. TSS made explicit statements that typical features of systems building on high transparency, such as accurate delivery and inventory, is not necessary for the marketing function. On the other hand, these are said to be key features of the business model as it is envisioned in the future. Also, the marketing activity as a part of the SCM-model was originally developed around an ERP-system. Therefore we could assume that there is a *dependen*t view of JDE OneWorld in terms of marketing.

> *Not necessarily something that is made by us. We could buy from a third party supplier – sometimes we would even buy from a competitor if that would be the best solution for the customer.*
>
> – David Brown, 2006-12-07 (p. 1, 1)

Marketing will be integrated via an *enterprise-wide* approach; that all marketing activities will be rolled out under their ERP. This is possibly due to the tight linkage with the logistics layer, but also because of the ease that the system is rolled out to a new site; once the major implementation is behind TSS, the adding of new units is comparatively simple. As the organization is market-driven, it is fairly obvious that this activity should be fully integrated. However, there is no apparent need for extensive flexibility. As packaged ERP systems have these very characteristics opting for such an integrated enterprise-wide system providing all marketing companies access to the same data, products etcetera makes good sense. In connection with the enterprise-wide integration of marketing systems the rest of the SCM-model is integrated into the same fashion.

The theoretical relation between the *business activity integration* level and *strategic view of IS* would also point to an enterprise-wide approach as can be seen in figure 8.3. As there is a dependent view of the ERP in terms of strategy the integration approach must have strategic benefits (see Chapter 7.3.2: Relation B: IS Integration intention) according to the relations of level of IS integration presented in the previous chapter. The *level of IS integration* points to a business-level integration IS-wise as there is an *absorption*-level of business activity integration.

8.3.2 Logistics activity

The Logistics activity's only source of synergy in this case was to actually relocate the physical locations of stock and people, which would result in more resource-efficient operations where all shipments and

storage is dealt with centrally. Analogous to the marketing, while there was no need for autonomy, there was a huge need for interdependency as stocks were moved – hence: *absorption* is the appropriate business integration level as the target activity is completely absorbed into the acquirers processes. Once again, we have a situation of shared or rather redesign of processes.

> *We won't have be having that warehouse, it will close and we will remove all the stock and the personnel team… The stock and related activities will move to our distribution center.*
>
> – David Brown, 2006-12-07 (p. 9, 4)

Just as marketing is logistics supported by JDE OneWorld and this is also viewed as *dependent* to this activity. Logistics is also a part of the initial SCM-model developed around an IS-core. The SCM-model with three separate logistics centers is hardly feasible without the possibility of a shared datacenter, with the availability of global inventories and visibility - core features of the ERP system.

The integration is carried out in enterprise-wide fashion but in a different manner. There is no actual integration to speak of here since all stock will be moved and the logistics of Chase-Walton will cease to exist. The integration is basically a physical assimilation (see figure 8.2). Thus, the empirical relation is to the enterprise-wide approach.

Building on theory, the relation to integration approach would be analogous to the one of marketing. An absorption would point to a business level integration IS-wise and the dependent view would emphasize the need for strategic benefits. In all, an enterprise-wide approach would be the theoretically grounded approach.

8.3.3 Manufacturing activity

The only main business activity that did not require absorption was the manufacturing activity. TSS stated that it is really not that important whom they buy their products from. While manufacturing was not a major target of the acquisition, the only realizable benefits were cost synergies as they are able to get better terms with suppliers and such. Synergies of this kind, known as combination benefits, does not require strategic interdependence; the target may be left independent to a large extent. The only collaboration required is on a basic transaction level where orders need to be sent back and forth. The conceptual level of integration required is on a more basic object level. Thus, as the re-engineering of business processes is not required to achieve syneriges, the *preservation* level of integration is most suitable,

> *… They are rather simple transactions, we can evemtually treat them like an external supplier but they are part of our group. So it is basically based on paperwork , we send them an order and we receive the goods with a delivery note and an invoice. It is just a normal trading relationship whether they are internal or external.*
>
> – Alexander Jarosch, 2006-12-06 (p. 6, 2)

Chase-Walton's most visible activity, the manufacturing, is to be integrated into JDE OneWorld. This is the model of the Americas, where the rest of the world run a separate system (ForthShift) that is interfaced into JDE. Whatever the system employed in manufacturing, it is however only deemed

utilitarian as there is no real rush to replace legacy systems or even interfacing them into TSS's ERP-landscape. The transactions that the manufacturing apparatus deal with are, accordingly to TSS, very basic and could be handled by fax if necessary. This activity requires very little coordination across organizational boundaries and is therefore only viewed as an utility.

Since Chase-Walton sits in the business area of the Americas, their manufacturing activities will be integrated *enterprise-wide*, as they will be brought into the ERP-system. In Europe and in Asia Pacific *ForthShift*, a common manufacturing system, is being rolled out on the manufacturing unit one by one. In the meanwhile however, while waiting for this rollout (, old legacy systems are interfaced via EDI. As EDI is a standard for the transfer of data this is considered a *middleware* integration since there will only be one interface on the acquiring part of the integration, no matter how many targets that are acquired.

However, there are also other reasons for implementing an ERP. TSS stresses the process improvement potential that the introduction of an ERP provides. In terms of internal efficiency of an acquired unit the implementation of an ERP may be a positive thing as it brings standards and best practices with it. This is however a different aspect that is not covered by our framework. This consideration shows a good example of how an external factor, as the need for internal business process improvement, may have a important effect on the choice of integration approach.

According to the theoretically deduced relation of *Level of IS integration*, the manufacturing activity would be integrated on a technological level rather than business level. As the IS integration intention suggests techno-economic benefits from the Strategic view of IS we will not end up with an enterprise-wide approach. Rather, the appropriate integration approach, according to theoretical relations deduced, would be a Point-to-Point approach as a mean to quickly establish a cheap interface where there is no strategic importance. However, in the TSS case they have chosen Enterprise-Wide and Middleware approaches instead. This may be due to the fact that they first of all already have an ERP-suite that is capable of supporting the manufacturing activity. Hence it would cover the techno-economic benefits even if only at a technological level. In the case of the middleware approach, the EDI solution, is simply an even cheaper way of dealing with the integration need as there are many integrations taking place.

8.3.4 Supporting activities

According to TSS all other activities are either outsourced or too small to be of importance to integration. These are run locally as independent operations most likely since there were no synergies available in terms of these supporting activities. As such the appropriate integration would be *preservation*.

The IS supporting these activities are clearly not of strategic importance since they were not once mentioned during our interviews. Neither are they mentioned in the business model or otherwise. Hence, they are labeled as of *none* in terms of strategic view. They are only rarely integrated into TSS. Whenever this is necessary they are interfaced via local interfaces or point-to-point as it is deemed to always be custom-made solutions.

As can be seen in figure 8.3, there is no theoretical relation suggesting an integration approach for the supporting activities of TSS. A strategic view of none implies that the main concern is techno-economic factors and a preservation integration tells us that level of integration is technical. The reason that they choose to build P2P interfaces may be considered a time and money constraint. During the interviews it was emphasized that this was a rare situation, where other activities than the ones in their business model

were integrated. Supposedly, as these are custom for each site but there is still a need for common data – easy and cheap temporary P2P interfaces are used.

8.4 Summary

All three activities end up being integrated enterprise-wide in the Chase-Walton case. The reasons for doing so are somewhat different, however. The marketing and logistics activities, by JDE OneWorld, is integrated enterprise-wide as a strategic necessity. The activities need full integration to deliver the synergies and the IS was deemed to be dependent. As such the internal coordination is of strategic importance but the need for future flexibility is necessarily not very high. The choice to use enterprise-wide integration of marketing companies is also a key strategic decision as the growth strategy of TSS requires the ability to quickly integrate an existing marketing activity into the TSS's business model.

> *We are pretty clear on what the steps (of integration) should be… depending on where the acquisition would fit into the organization, we have very experienced people doing integration, restructuring and change management.*
>
> – MathieuDebreucq, 2006-12-01 (p. 4, 4)

In terms of the manufacturing activity the dominant argument of integration, whether middleware in Europe or enterprise-wide in the Americas is that while low level of business integration is needed the IS system is viewed as only utilitarian. This opens the door to choose a strategy that is more beneficiary in techno-economic benefits and enterprise-wide integration offers distinctive cost synergies in these areas. This exemplifies how factors external to the IS Integration analysis framework are taken into account when making actual decisions. The framework points to benefits and drawbacks with the IS integration approaches that are important to consider. The framework may in a situation as this be considered as an aid in making decisions, rather than being a final decisive tool. Below in table 8.1, the main aspects of the analysis is put together in terms of TSS and Chase-Walton.

> *For Europe and Asia we have made a differente strategy based on ForthShift since it was in place in about 50% of the locations in Europe… by sharing the same system we do not have to pay maintaince and software for all kind of systems.*
>
> – Alexander Jarosch, 2006-12-06 (p. 2, 2)

Table 8.1, Summary of analysis

	Manufacturing	**Logistics**	**Marketing**
Integration level	Preservation	Absorption	Absorption
Synergies	Combination benefits	Economies of scale	Product and market expansion
Conceptual level of IS integration	Data	Process	Process
Strategic view	Utility	Dependent	Dependent
Coordination	Little	High	High
IS benefits	Techno-economic	Strategic	Strategic
Integration approach	Middleware/Enterprise-wide	Enterprise-wide	Enterprise-wide

TSS themselves state that the reason that they employ different integration strategies in different parts of the world is due to legacy reasons. While the Americas use a ERP software that is suitable for manufacturing, Europe does not. And as the current IS-strategy is only an interim strategy until a new ERP is rolled out that should cover all needs. The reason that Europe is going with Fourth Shift is also typical of the techno-economic factors in play; it was in used in several sites and was working well. Therefore it was a cost-effective solution to use as a standard across the organization.

In terms of overall strategy for integration, TSS seems to have a well developed but informal strategy for the process of integrating new acquisitions. They state that this is not much of an issue. Their view on an acquisitions is to a large extent reactive, we rather consider their strategy to be highly proactive. The reason being that their integration strategy - or rather their enterprise architecture - that allows them to perform quick and effective post-merger integrations. This is in line with Windahl et al. (2004) who states that a core competence of the solutions-based company should be the systems integration and partnering competences.

> *When you have the model and you have the software globally it is going to be much easier to integrate an acquired company eventually since you know what has to go in there and it is a matter of time when you're going to put it in there and it will be a part of the global set-up. And that is another benefit we will get out of this new global ERP system.*
>
> – Alexander Jarosch, 2006-12-06 (p. 3, 5)

8.4.1 Note on enterprise architecture

Is there an enterprise architecture in place at TSS? Even though it is not explicitly defined there is an well-defined architecture in place as there is a conscious fit between the business model and the IS supporting this. This architecture may not be so much of a blueprint of IS systems but rather a vision of the interrelatedness between the business model and the IS. Also, during interviews the terms for their

business activities, the SCM model and the actual name of the IS were used interchangeably. This may be as the current business model is in fact spawned from the SCM-model which evolved around an IS.

> *… the marketing and logistics activities were brought together under the supply-chain-model which was essentially also a software implementation of the JDE system.*
>
> – David Brown, 2006-12-07 (p. 3, 6)

8.4.2 Conclusion

In sum, as there is an obvious alignment throughout the organization it is not hard to see why IS integration seems to be such a trivial issue to TSS. Even though IS is such an important supporting feature of their business model the IS integration of new units is not a big concern. Not during the acquisition phase and neither during the actual integration. Since their architecture is already in place, adding a new unit presents little trouble and just as they claim – nothing to worry too much about during an acquisition.

9 Reference cases

The acquisition analyzed in the primary case showed that the acquiring part had an enterprise architecture in terms of a well defined business model that was supported accordingly with appropriate IS. As a result, integration of the target company provided no significant challenge. We will now examine two reference cases that differ in significant aspects from the TSS case. Each case is examined on its own and also analyzed with an enterprise architecture perspective.

9.1 Two cases

These two reference cases are tested against the framework to test the external validity and applicability. The first case, CRP, is an extreme case. The other is more of a 'vanilla' integration of enterprise systems. These cases are dealt with in a fashion similar to that of the primary case. The descriptions, as well as analysis, will however not be covering all of the organization, rather what we believe to the most important aspects of the cases.

9.2 TES & CRP

Trelleborg Engineered Systems (TES) is a business area within the Trelleborg Group that differs in many aspects from TSS. As the previous case has shown, TSS is a highly centralized organization where TES is quite the opposite. All units within TES function as more or less completely independent units as it is reasoned that they serve different customers with different products and their internal processes and so forth differ too much to be standardized.

In January 2006 Trelleborg Engineered Systems (TES) acquired the CRP Group, a UK-based engineering company. By this acquisition TES became the market leader on a global market and the total sales of TES were expected to increase with 7-8 percent. CRP can be considered a solutions-oriented company, just as TSS but to a lesser extent. The activities of their business model can be divided into two different groups: Solutions-based activities and Supply-chain activities. These are divided as seen in figure 9.1. As discussed in regard to the framework, it is the business activities of the acquired company that are analyzed as it is their business model that will be integrated to an extent.

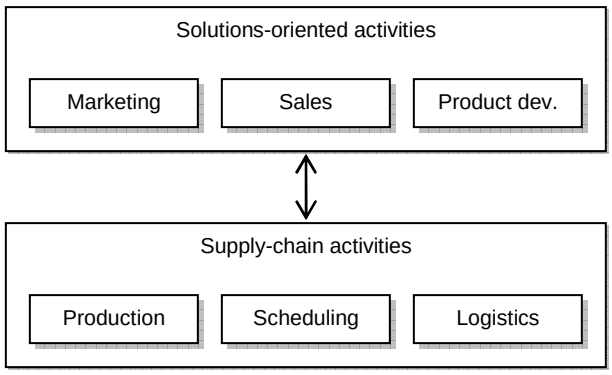

Figure 9.1. CRP business activities

The main drivers behind the acquisition was to increase market share and also access to new markets, in other terms – an extension in markets and products. Although the acquisition had potential for economies of scale, there were no explicit top-line synergies to be realized. The only synergies mentioned where potential cost savings in marketing, sales and product development. These savings were to be leveraged by integrating sales and marketing into a more general network of distributors and resellers. Also, additional synergies were in time to be realized from a potential integration between CRP and another TES unit - Trelleborg Viking - who serve similar customers with the same type of products.

9.2.1 IS Integration analysis

As the outspoken ambition of TES is to employ a 'hands off' approach on their units, no integration of the business activities was planned as to date. Therefore we conclude that both activities were subject to a preservation-type integration, that is they are left as is with only some combination benefits, such as a bargaining power against suppliers, to realize. However, as mentioned above there is a thought that the *solution-oriented activities* should be integrated with one more other units within the group. These would probably best be integrated as *symbiosis* as TES wants to have all units as independent as possible.

We know very little about the IS employed at CRP, except that there are Novell and Lotus Notes systems in place. This is hardly regarded as important in terms of strategy. Also, the former owner has supposedly neglected the need for IS investments. Throughout the organization, the strategic view of IS is *none* or at best *utility* as it allows for internal communication and the sharing of documents, files and etcetera.

If the ambition to realize the synergies were to become a reality, the strategic view of IS would probably go to a utility or dependent view for the solutions-oriented activity. This as it would increase the need for coordination and cooperation across units. Also, things such as a shared inventory with on-line status and such would become more important.

As the acquisition was to be integrated the only integration carried out was to put CRP on the TES infrastructure in terms of wide-area network, email system and security. Also the user database was migrated and CRP users were given access to the Trelleborg intranet. These systems, being the only ones documented, were integrated enterprise-wide for both activities.

Considering the theoretical relations discussed earlier in chapter 7, there is a need for a integration approach focusing on techno-economic benefits as the strategic view of IS is *none*. In fact, it could be argued that the IS actually is more of an IT-system since it does not, per se, involve any human interaction or interpretation of data into information. Also, the system would be integrated in an entirely technological manner as the business activity will be integrated in an *preservation* manner. There is however no approach that is theoretically related with these characteristics. The reason for this could be the nature of the system, the framework and relations are meant for the purpose of analyzing IS rather than IT-systems.

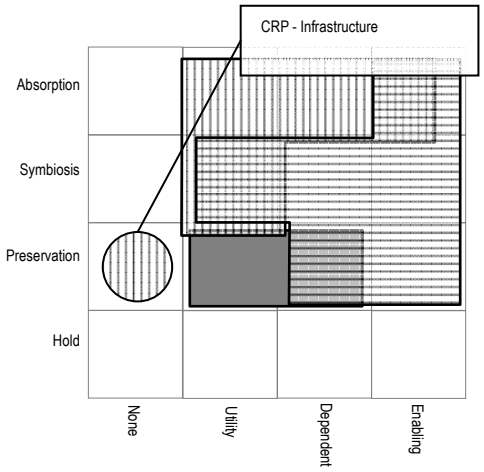

Figure 9.2. CRP case relations

9.2.2 Conclusion

Since there were no cases of IS integration in the case it is hard to draw conclusions. However, if we take into account the integration of infrastructural elements the picture changes. These being the only outspoken IS even though they did not provide any support of the business model, they were integrated enterprise wide for both activities. The acquisition of CRP is truly an extreme case in terms of our framework since there was virtually no integration of business, no IS integration and the IS currently in place had a low importance – if any at all. As argued before the IS can actually be termed an IT-system rather than an IS. For the sake of simplicity we will use the term IS though.

If it was to become a reality with the integration of the solutions-oriented activities across different units within TES, some integration would probably become necessary. As the idea was to combine and save up on shared products, marketing and logistics, IS integration would be necessary. Also, since flexibility is a keyword within the TES group they would probably want to refrain from investing in any integration approaches that would move away from this. A guess would be that some kind of middleware would be implemented to allow the solution-oriented activities of the affected business to coordinate their activities. This is somewhat consistent with the theoretical relations that would suggest a enterprise-wide or middleware approach, depending on the strategic view of IS.

There is no enterprise architecture in place at TES as we can tell. All businesses run their own separate 'empires' and the coordination is on a minimum. No standardization of business models exist and the

group is to a high degree diversified. Our conclusion is that no enterprise architecture can be reached before a common business model is decided upon, at least for the units that should be integrated. But, as long as no integration is deemed necessary, neither is the call for an enterprise architecture.

9.3 Manufacturing company X

This case is covered in several articles by Alaranta (2005a, 2005b) and concerns the merger of two manufacturing companies: Company A and Company B. In this joint venture a new company, Company X, was formed from A and a factory from B. Although the actual merger was concluded in 1999 the actual IS integration did not start until 2003 and is still going on. The study took place between 2003 and 2004.

The explicit reason for the acquisition was that the production facilities involved were severely outdated and they needed to be replaced with heavy investments as a result. These investments would have created a huge over-capacity within the market and therefore the companies merged to be able to co-ordinate production. Also, the intent was to create synergies through the transfer of knowledge as best-practices were spread across the new company. The production was the only source of synergies, related to economies of scale as well as the transfer of knowledge.

The business activities mentioned in the case are production, sales, inventory, supply, cost accounting and book-keeping as well as human resources. However, as production is the primary business activity of the case, we will focus on this. In terms of business models there is no clear description of these within the case but the division of activities throughout the organization can be seen in figure 9.3. We are also told that all these activities are supported by the new IS but only the factory run activities are utilized. Centrally managed activities are managed via legacy applications.

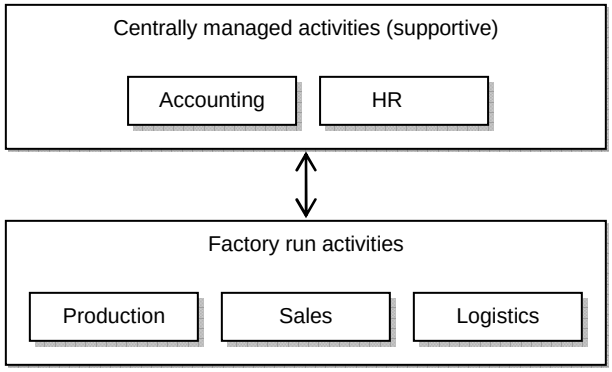

Figure 9.3. Company X business activities

9.3.1 IS Integration analysis

In order to realize the synergies related to economies of scale and 'best practices', the integration would affect both parties: A and the remnants of B. A was the bigger player but B was in possession of the processes that were the object of knowledge transfer. Different factories, however, were allowed to retain some independence and keep separate and different processes when deemed necessary. Hence, as both

units adjusted mutually but there was a visible need for independence among the factories, the integration of the production activity was of a *symbiosis* level.

With regard to other activities such as human resources and finance these were all integrated fully and consolidated into Group A as an absorption-type integration. Typically this was because the potential synergies (although not outspoken) concerned resource utilization and centralization, i.e. administrative functions from F was removed.

Before the integration the production activities of Company A and B was supported by outdated legacy system. It was quickly realized however, that a new IS was key to realizing the sought after synergies. Immediately following the merger a new enterprise system was decided upon. This new system was to be tailor-made to the company. It would be able to support the new organizational structure and business model. The case tells us explicitly that techno-economic benefits of the new enterprise system were not a goal but rather the strategic impact it had on the production activity. Hence the activity had a *dependent* view on the supporting IS.

The other activities that surround production are not described in detail in the case. Where some are covered by the new system, however, we are only told that they are "administered centrally". Given their presence in the case and the fact that they are covered within the tailored system tells us that they are believed to be somewhat important. Probably a *utility* view would be most appropriate.

The enterprise system was at the time of writing, being integrated in an enterprise-wide manner where factory after factory was included in the roll-out of the system. This integration approach is not really questionable, since the case speaks of "full consolidation of the enterprise systems" (Alaranta, 2005a p 148). We are however not told how or to what extent existing factories are integrated to the new enterprise systems while awaiting their implementation.

In the case of the production activity the enterprise-wide approach was chosen as they wanted to consolidate the activity fully. As the case tells us the implementation of the enterprise system also helped to distribute the best-practice processes from the factory at B.

Using the theoretically deduced relationships of IS integration intention the approach would primarily have strategic benefits as it is viewed as being *dependent* upon. The relation Level of IS integration tells us that an application level IS-wise would be preferred as there is a typical *symbiosis*-level integration taking place. Given the desire for an application level integration with strategic benefits – a middleware approach would be the preferred approach (see chapter 5) as can be seen in figure 9.4. In the case of the supporting activities, an *enterprise-wide* approach seem more fitting, as there is clearly only techno-economic benefits to be gained – there is a *utility* view of the IS. Also, as the activities are physically moved and redesigned with an *absorption* level of integration we would suspect a business level of integration IS-wise.

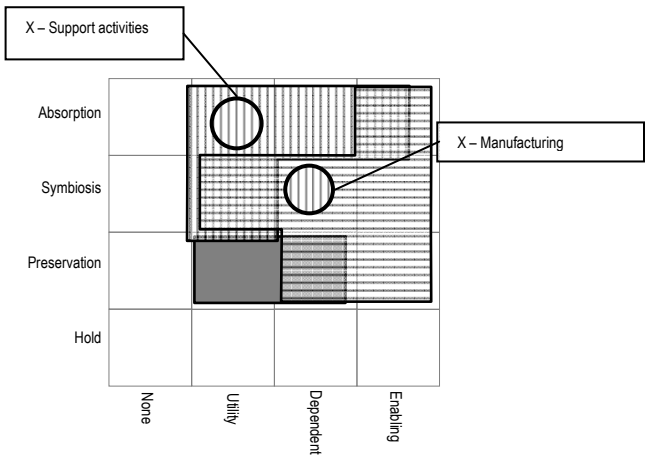

Figure 9.4. Manufacturing company X case relations

9.3.2 Conclusion

As the merger took place a new Company was formed from two different entities. It is therefore not surprising that there was no enterprise architecture present at the time. As the call for an integration of production systems and a new IS was made, the creation of an enterprise architecture was begun. As the integration initiative included the redesign and standardization of processes (activities) and their supportive IS, a major step was taken towards an architecture.

Given the fact the processes was to be transferred and implemented across the implementations, an enterprise-wide approach might have been the better option, while a middle-ware approach could have provided a higher degree of future flexibility. The company did however not have a history of M&As so this was perhaps not an issue. Further, at the time of the decision to go with an enterprise system (1999), this was at the end of a world wide wave of ERP implementations preceding the Y2K issue (Kalling, 2003), and prominent middle-ware techniques such as SOA had yet to reach a breakthrough. Both these factors may well have influenced the decision to integrate by means of an ERP.

There is little support for independence with an enterprise-wide system. This was also experienced by Company X as they ran into serious problems and was forced to delay the roll-out as there was a need for extensive customization on a specific site. This collision could, possibly, have been avoided by choosing a middleware approach instead that did not rely as much on the standardization of processes.

On a final note, it could be suggested that Company X over-integrated as was discussed in the introduction of the thesis. The IS supports several activities that are not utilized. Why this is so is somewhat confusing but it could be because these functions previously was managed locally at the factories and then was included in the IS. However, with the integration, these were consolidated and run centrally instead. Since the enterprise system was designed for the original factories this could be the result of having an IS that is not aligned with the enterprise architecture.

10 Empirical summary

In Chapter 7: 'IS Integration analysis framework', a model visualizing the relations between the dimensions of the framework were introduced. We return to our research question - How does the business model integration in M&A relate to Information Systems Integration ? – and view how these relations have manifested themselves in the cases reviewed. This chapter concludes the empirical part of the thesis that began with chapter 8.

10.1 Empirical relations

Before each identified relation is briefly discussed, a summary of all relations are found below in figure 10.1. We do not make any differences between the relations found in the primary case and the reference cases here but leave that to the following discussion.

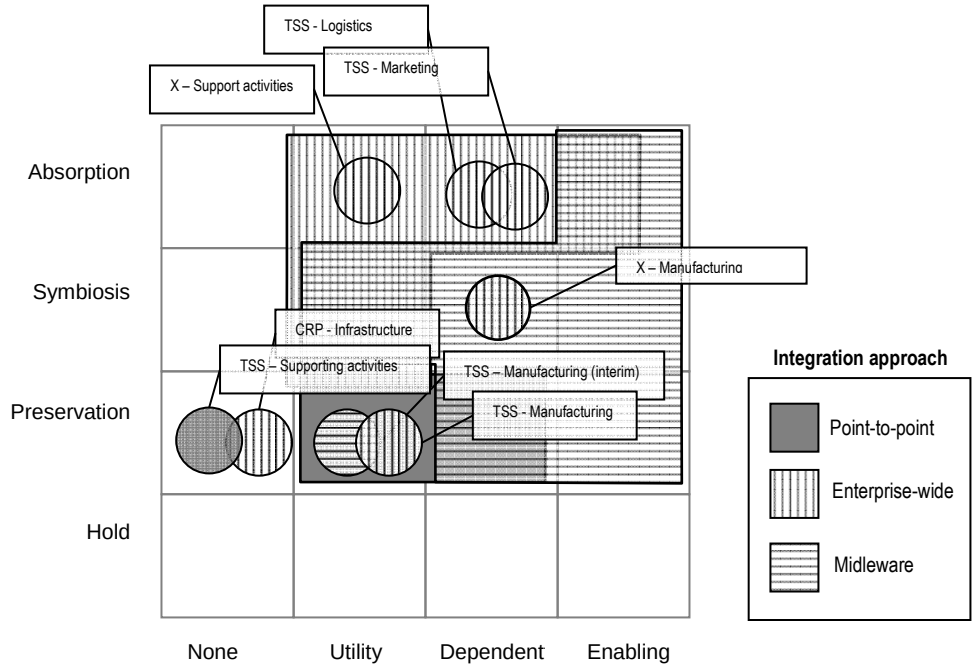

Figure 10.1. Empirically observed relations

10.1.1 Primary case

Preservation-Utility-Enterprise-wide

This relation was observed in the case of TSS where their manufacturing IS was integrated *enterprise-wide*. However, the IS was viewed of low strategic importance – *utility*. Also the very business activity was very much left untouched by means of *preservation*.

Preservation-Utility-Middleware

At TSS this was used as an interim strategy while production sites waited for the roll-out of the manufacturing sites. The business activity integration level and strategic view of IS are identical to that of the relation above, but the integration approach was *middleware* by EDI.

Preservation-None-Point-to-point

Acquired units at TSS sometimes had supporting activities that had to be integrated. These activities were of no special importance to the TSS business model – a strategic view of *none.* In these cases, a *point-to-point* interface was erected between the *preserved* unit and TSS.

Absorption-Dependent-Enterprise-wide

When TSS acquired Chase-Walton all supply-chain activities and marketing were absorbed into the new business model. Logistics was also physically moved. As the TSS business-model is highly dependent and built upon on their IS, JDE, the integration approach was typically enterprise-wide.

10.1.2 Reference cases

Absorption-Utility-Enterprise-wide

In the case of Manufacturing Company X the supporting activities of the factories such as cost accounting and human resources were integrated in an absorption manner, they were moved into a central administration. The IS support for these activities was however not deemed to be very important due to the fact that they were given little attention from the IS integration.

Symbiosis-Dependent-Enterprise-wide

Manufacturing Company X was formed through a merger were the individual sites was allowed to remain a high degree of independence. This made the integration of *symbiosis* type. However, the new organization relied heavy on the new ES to manage their, in part, new business model. Hence the IS was viewed as *dependent.* The system was to be deployed in an *enterprise-wide* manner throughout all factories.

Preservation-None-Enterprise-wide

As CRP was acquired by TES the only integration that was planned and delivered was the *enterprise-wide* integration of e-mail and security systems. CRP was never integrated into TES but continued to live their own life as a *preserved* unit in whole. The infrastructural technologies integrated had strategic view of *none* as they were mere technical infrastructure.

11 Discussion

This chapter begins with a review of what the thesis set out to do in the introduction. A discussion follows regarding to what extent the study has fulfilled its purpose and how the research questions have been answered. Following is an evaluation of the framework against the criterion stated in the introduction - the ability of the framework to analyze and describe real-live cases. Based on this evaluation as well as taking current IS industry trends into account, an enhancement of the framework is suggested by lifting up the sub-category of SOA. This is concluded with a discussion of the applicability of the framework from an academic, as well as a practical point of view. Suggestions to future research are expressed, and finally our reflections on the research process wraps up the thesis.

11.1 Purpose revisited

In the introduction chapter this thesis set out: *To create a synthesized framework from existing theory and for analyzing and describing IS integration on a business activity level in an M&A context, and to test this against empirical data.* We also explicitly stated that an Enterprise Architecture perspective would be applied, with the purpose of communicating a vision of how the business activity and IS components could be integrated. The framework came about by starting off with the wider organizational level framework created by Henningsson (2006). Derived from this, the theoretical dimensions were selected and arguments were made for re-conceptualizing these (see chapter 3, 'A theoretical baseline'). The theoretical review led to the IS integration analysis framework presented in chapter 7. However, we considered this framework to be more of a combination than a synthesis. To mitigate this, the relations were further investigated and the model taking these relationships into account was suggested (see chapter 7, 'IS integration analysis framework'). With this relational model of the framework in place, we consider the first part of the purpose to be fulfilled.

The overarching research question was formulated on an organizational level: *How does the business model integration in M&A relate to Information Systems Integration?* The investigations regarding this began by reviewing the theoretical dimensions. We came to the conclusion that this would be answered only by using a finer, more granular level of analysis; for the business dimension, as well as the IS dimension. The second research question was formulated with this in mind: *How does the integration need on a business activity level relate to the characteristics of different IS integration approaches?* These questions were addressed theoretically as well as empirically.

The theoretical foundation of the framework describes how business activities are related to IS integration approaches. As these levels of analysis are intertwined with the business model organizational level - they both affect the other – these two questions have been addressed more or less simultaneously. The analysis on the business activity level can be aggregated to the organizational level of business model. The same goes for the IS integration approaches, which combined can be said to make up Information Systems Integration in a whole.

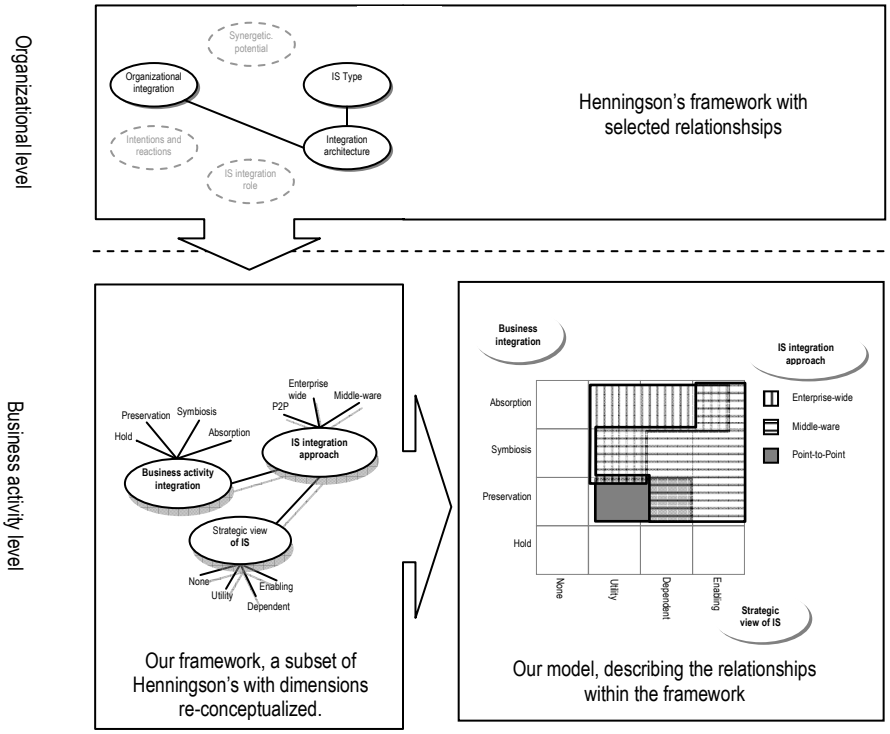

Figure 11.1. The framework from a research process perspective

This thesis has an outspoken Enterprise Architecture perspective. In this, communicational abilities are crucial, as architecture is concerned with the communication of a vision. This communication can be aided by the relational model as it makes it possible to address the research questions visually. This is possible both on an organizational level, as well as the business activity level. If the different business activities and their IS integration approaches are placed simultaneously in the matrix, the enterprise architecture perspective in an M&A is possible to address.

Relating to the second part of the purpose '*to test this against empirical data', t*he research questions were addressed empirically as well. This was firstly carried out by analyzing and describing the findings from the primary case on basis of the IS integration analysis framework. This empirical testing of the framework is grounded in analysis and description on a business activity level, which was possible to aggregate to the organizational business model level as well – this being the enterprise architecture perspective. Following, for the reference cases, the same procedure was carried out, in order to raise the theoretical replicability of the framework.

11.2 Evaluation of the Framework

In the introduction, the criterion to evaluate the framework was stated as the ability of the framework to analyze and describe real-live cases of IS integration in M&As from an Enterprise Architecture perspective. Following, is this evaluation based on the three cases it was tested on.

11.2.1 Level of analysis

In the primary case, an outspoken business model with different activities was present. These activities were all subject to different degrees of integration, and a description or analysis simply on an organizational level would therefore have missed several important aspects such as the middleware/enterprise-wide integration of the group suppliers. Neither would the interim-strategy or the point-to-point interfaces have been noticed. With the reference cases the story was somewhat different. None of the cases provided us with an explicit business model or the relevant IS of different activities. The business activity level then allowed us to focus on the activities that we deemed interesting and that were substantially covered in the case, such as 'production' in the case by Alaranta. Interestingly, just as we argued in the introduction, business activities are quite easy to identify, such as in the CRP case where a distinction was made between solution-oriented activities and supply-chain activities.

Concluding, the business activity level worked well as a means to describe the cases for two main reasons. Firstly, it enabled an aggregation that can cover the business model organizational level. Secondly, because the activities were used with similar conceptualizations by the case companies; the identification of these did not present any challenges.

11.2.2 Dimensions and taxonomies

The framework consists of three dimensions, each with its own taxonomy. As these were theoretically grounded, this raises questions regarding their usefulness for analyzing and describing the cases. How useful were these dimensions and how well did they capture the richness of real life?

The dimension of *business activity integration* was the one dimension that was the most straight forward in relation to the empirical data. The cases were somewhat polarized, in the sense that they were either 'fully integrated' through *absorption* or 'not integrated' by *preservation*. One of the reference cases came up with a symbiosis integration. This taxonomy was not significantly challenging to use and we consider it to cover at least all situations we have come across.

The *Strategic view of IS* was somewhat harder to use as a dimension when describing. Categorizing the IS of an activity as a *utility* or *dependent* view proved to be harder than we first imagined. Here however, the business activity also aided. It proved much easier to describe an IS in the light of the activities and resources it supports. Once the criterion of coordination was used on the activities and IS, the analysis was not so difficult anymore even though it was much less straightforward than the previous dimension.

IS integration approach was also a bit harder to clearly identify within the cases. The fine line between an enterprise-wide solution and middleware is not always that fine; take for example the case of the ForthShift software in the TSS case. This could potentially be argued to be an enterprise-wide approach as all sites have the same system supporting the same activity. But then again it could be argued to be middleware as it serves as a link to the ERP software of the supply chain. Nor is the line between point-to-point and middleware very clear. What can be argued to be middleware and what is not? The levels of integration in terms of technology and/or data and processes were used in the determination of specific approaches. The category of middleware is the one that we consider to have the biggest improvement potential (see11.3). The SOA integration approach involves a whole new way of viewing and designing IS from the bottom up - in fact a paradigm shift is involved (see 5.8).

Concluding, the dimensions and their taxonomies fulfilled their purpose but can be refined. The business activity integration dimension was the most straight forward to use. A question that could be raised is whether to include the Hold category in the taxonomy. The argument against is that no integration is needed, the argument for is that the relational model can take into account the visualization of such business activities as well. This would then cater to an Enterprise Architecture encompassing all business activities, even those who do not require integration. For the strategic view of IS which category to place an IS relies more on who is making the analysis and how different categorizations are made. For IS integration approach the lack of definition of terms in IS integration approaches in the research field can make this difficult as well.

11.2.3 Relationships between dimensions

In three cases, the observed relation was different from that of the theoretical relation. However, only in one case did the outcome of the integration signal that something might have been done in a better way. Manufacturing Company X had chosen an integration approach that was not supported by our theoretically grounded relations. They also experienced severe difficulties in implementing this integration.

In comparison with the enterprise-wide approach at TSS they use significantly more resources. At TSS the process of IS integration could raise some doubtful concerns as this is given very little attention by management – and the opposite was found in Manufacturing company X. Why?

We believe that this is due to the fact that TSS had their Enterprise Architecture in place to a significantly greater extent beforehand while Manufacturing company X set out to integrate without this in place. Consequently, since they lacked a vision, more resources were used in the integration and also with a more troublesome result. This reasoning is in line with Ross et al. (2006), who argue that organizational maturity Enterprise Architecture wise is linked with better performance in regards to leveraging IT in a business context such as the above.

Concluding: the relations identified and visualized in the model could be argued to stand their ground. We have tested them with real-life cases and the theoretically deduced relations have turned out to be correct as far as we can tell from the data collected. As these relations work to analyze and describe the cases we consider this criterion to be met.

11.2.4 The Enterprise Architecture perspective

The developed framework should enable the enterprise architecture perspective on our theories and also on our use of the framework developed. One of the basic ideas behind the framework was to use it as an aid in analyzing the complete enterprise architecture of an organization. As only one of the cases had what we would describe as a well-defined and working architecture this proved more complicated. The framework did however allow for an analysis of *discrepancies* and *bad fit* in what would be an architecture. This was especially apparent in the case of Manufacturing Company X with their enterprise system. Concluding: As the relational model of the framework with the business activity level and the categories of '*hold*' and '*none*' allow for the analysis and visualization of these categories as well, all business activities, IS and integration approaches we consider this criterion however to be met.

11.3 Improved framework

After having evaluated the framework, we suggest improving this in one dimension: the IS integration approach. The improvement consists of the lifting out the Services Oriented Architecture (SOA) approach from the middleware category, thereby raising its importance. As none of the empirical findings were related to SOA, the rationale for this builds on two other foundational strands: one is related to the logic behind the taxonomy, the other is grounded in current industry trends, and a glance towards the near future.

When conceptualizing the dimensions, one category presented particular difficulty in the conceptualization of the categories involved; the middleware category in the dimension of IS – integration approach. This was considered to lack in distinction between the two sub-categories: the traditional middleware, commonly built as a hub and spoke architect, and the Services Oriented Architecture. In fact, the latter differs from the other as it involves fundamental differences in viewing and designing Information Systems. SOA is process driven as opposed to data driven. It builds on the definition of interfaces creating loose coupling with high levels of reusability. In doing so, it involves a paradigm shift, moving away from client-server based enterprise wide infrastructures towards more flexible Service Oriented ones. Although SOA can be considered to be middleware, due to the enabling technologies used (see 5.8), in hindsight we consider the differences to outweigh the similarities.

This importance of this paradigm shift is further emphasized by current industry trends. SOA offers possible benefits highly sought after by actors in the business market place: the combining of strategic flexibility with possible techno-economic benefits related to reusability and scalability. These advantages have caught the eyes of leaders in the software and IS industry. Based on research by Accenture Technology Labs, where 150 industries and 17 technologies were assessed, Accenture conclude: "No technology advance on the horizon will have a more profound impact on information technology than the emergence of service-oriented architectures" (SOAs) (Accenture, 2006a). This also suggests that SOA may be increasingly used as an IS integration approach in the foreseeable future, and there is no indication that this would not be the case in M&As.

As is common with new technology or business paradigm shifts there are challenges to be overcome before the business related benefits manifest. Industry driven efforts made are being made in this area in order to overcome the challenges and to accumulate knowledge - academically as well as industry best-practice wise. A recent alliance between major software and IS consulting businesses indicates that such knowledge is being built. Oracle, SAP, IBM, and SUN Microsystems, among others, have created the alliance of Open SOA Collaboration (OSOA, 2007). This industry collaboration is aimed at developing industry best-practice knowledge by defining programming models related to enterprise development leveraging the SOA characteristics. Accenture, again, has set out to invest 450 million US dollars in developing SOA related capabilities over the next three years (Accenture, 2006b). Microsoft, the giant in software industry, is also involved in a SOA initiative with their INDIGO platform. Paolo Malinverno, analyst of the Gartner Group, claims that SOA is the most vivid integration trend today (Computer Sweden, 2006). Forrester and McKinsey concurs that SOA is likely to play a significant part in Enterprise Integration (Ciber, 2006). All in all, the above is pointing to one clear direction: *SOA is likely to have a considerable impact on future IS integration in M&As.* For the above mentioned reasons, we raise the importance of SOA by making it a IS integration category on its own merits.

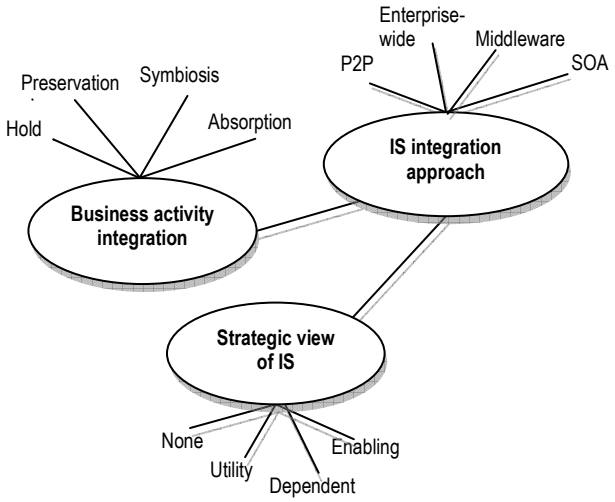

Figure 11.2. Enhanced framework with SOA

11.4 Implications for practical use

When viewing where the empirical findings were placed in the matrix, it is apparent that the theoretical foundation did not cover all possible explanations or decision grounds that may be relevant. This is not what the framework set out to do, rather it is to be considered as one way of analyzing and describing certain aspects of an IS integration in M&As. As noticed in the evaluation of the framework above, two dimensions were considered to be lacking in clarity. One is the IS integration approach, the other is the Strategic view of IS. Academically, this is not trivial to carry out, as there is little control of the agenda regarding conceptual consensus. For organizations, however, this is a different matter. As TSS had a clear view of their Enterprise Architecture, it was easier for them to make decisions regarding how integration was to be carried out compared to Company X. If an organization would consider the usage of our framework, we would argue it beneficial to provide a clear ontology regarding their definitions for IS integration approaches, as well as explicit criteria for each of the categories within Strategic view of IS.

The possible benefits of using the model are highlighted by the TSS case. Ross, Weill & Robertson (2006) argues that Enterprise Architecture could be seen from a maturity perspective where, as organizations develop a more mature architecture, their flexibility increases. This is exactly what we would argue the case to be at TSS. However, in order for corporations to heighten their enterprise architectural maturity, theoretically and empirically grounded supporting tools are called for. Once such supporting tool may well be the framework presented in this study.

11.5 The pragmatic use of our research

One consequence of this thesis is the possibility to spark subsequent research, but it is also thought to be possible to use in a practical context. However, as we shall see later, this may require additional research as the primary goal of this theory is to analyze and describe the relations within the framework. For future

and current use, we have identified four major areas of use of the model within research as well as practice;

As a theoretical framework it is possible to further develop understanding of the relationships and to empirically test these. It may also enable a theoretical as well as visual comparison of integration architectures in different M&As. This is where we are today.

As a tool for analyzing a current situation as in a post-acquisition review to see what the information systems integration architecture looks like in comparison to what it *ideally* should look like from the three theoretical legs.

As a guide when deciding upon a new information systems integration architecture when performing an M&A. Decision makers could use this model analysis on a case by case basis to provide a foundation for decisions regarding what IS to integrate how within an M&A. Here it may provide a foundation to foresee consequences involved in defecting from these theoretical recommendations - something that may well be for sound reasons: for example to capitalize on a recent large IS investment in a target company, or to wait for a planned IS initiatives may be such reasons.

As an evaluation tool for IT integration strategy in terms of M&As. In the situation where a company repeatedly acquires companies, the framework might be a good help when developing an integration strategy but also, in the case of a tightly integrated corporation, the global IT strategy. However, to be able to use in a prescriptive context, more research into this specific area is needed.

11.6 Limitations

The framework presented here is subject to some limitations. One of the major limitations is the lack of a 'none' integration approach. There are situations where there will be no integration as there will be no business integration or there are no IS to support the resource. We have chosen to deal with this so that whenever an activity is subject to any of theses conditions, there is always the possibility of the "no integration" approach.

Also, the framework is grounded in contemporary integration technologies – the foundation of the possible approaches. Even if the three conceptually different approaches are very general and should be of less subject to technological innovations it can not be eliminated. Remember that they have themselves evolved over a period of time, thanks to technological innovations. We aim to mitigate this limitation somewhat by taking current industry trends into account and raising what we consider to be around the corner: the SOA paradigm shift.

Finally, the model could be claimed to be a rather blunt tool. There is a myriad of possible situations out there and we duly recognize the fact that each attempt to cover all possible situations will result in a simplified abstraction. This is less of a self criticism of our framework. It is more to make clear that the framework is aimed at a hugely complex and rich part of the world. Therefore, we do not rule out the possibility that it might prove to be somewhat of a mirage to develop normative theory in this area; simply because the situation specific factors influencing decisions are of too large numbers.

11.7 Directions for future research

Our framework needs to be further validated and developed. This study was however concerned with the creation of a framework for describing and analyzing and as it is used for this purpose, it will hopefully become more mature and robust. The field as such is also immature and needs extensive research. We would like to present a few topics that we believe would need additional attention:

- The relations in our framework that are visualized in the model. These need to be examined empirically to test them and to discover new relationships.
- The dimensions of our framework may need additional work as, just as we previously argued, they proved to be somewhat fuzzy to work with sometimes. This specifically concerns the dimension of *Strategic view of IS* as this was especially hard to use to categorize the cases.
- By conducting a quantitative study the framework could be statistically tested and made more robust. Relations found could also be tested with quantitative studies.
- The area in general needs further research, especially the dimension that we labeled IS Integration approaches. There is much confusion in the field and a meta study of concepts and taxonomies would be helpful for future researchers.
- We invite researchers to further the understanding of categories not used in our cases, such as the *SOA* category of *IS integration approach*.

11.8 Reflections on the research process

At the start of research process we had a general idea about what problem areas we wanted to explore. These were then passed on to our research mentor and as we together decided to investigate the field of IS integration approaches a somewhat troublesome journey began. Not long after an initial literature review the idea about relational models surfaced along with the notion of an architectural perspective. With what was thought to be a well defined goal, the process of gathering and reviewing relevant research theories as well as motivating our problem area and approach.

Early on, it became evident that the problem area of IS integration in M&As was a particularly complex and rich part of the world. In hindsight, an earlier focus on a smaller part of the area would have been beneficial to us. The significant amount of theory created additional problems apart from only grasping and reviewing it. A major problem was how to motivate and justify the use of theories and perspectives in our work. This was not only due to the amount of theory but also the relative immaturity of the field.

Apart from the difficulties of limiting ourselves and our study there were also some issues regarding the collection of data. It has been rewarding to work with a real case, although an initial misunderstanding due to the failure to adhere to formal routes of communication, our collection of data was delayed for several weeks. These weeks were instead used to deepen the theoretical understanding of the subject, which further explains the amount of theory we decided to include in the thesis.

The enhancement of the framework came about late in the process. This was in fact due to a discussion following questions raised by one of the examiners, Erik Wallin. In this study we did not encounter a case where SOA was applied as one IS integration approach among others. Due to the paradigm shift that is

taking place, moving away from current client-server architectures towards service-oriented ones, we are confident that the likelihood of encountering SOA in similar studies in the future is significant. We consider the fact that a large part of the IS and software industry is investing in SOA efforts to be a clear indicator of its relevance in the framework.

Finally, the research process is a creative process where insights and knowledge may appear in a far less sequential nature than what the written product should connote. For example, the framework that we set out to deliver was actually a later product than the first version of the model – the visual representation of the framework. When this was conceived, the enterprise architecture perspective came without effort. The efforts involved were rather linked to scientifically motivating our choices by grounding these in existing research. That part of the thesis was more related to hard work, rather than inspiration. However, two months later and several lessons learned, we consider this study to have been a rewarding journey in many ways. It is also our hope that this thesis has peaked the readers' curiosity regarding what we consider to be an intriguing area of investigation.

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Appendix A Pilot Interview Guide

- Explain about our thesis:
- Trelleborg's funding of two PhD students
  - Stefan Henningsson – Lund University
  - Anders Grahn – Trelleborg
  - David Brown; Finance Director at Trelleborg Sealing Solutions

- Purpose of interview: Pilot to gain pre-understanding of context…
- Recording of interview, OK?

TSS/CW

- Could you tell me about your role in the Acquisition and integration of Chase Walton?
  - When did you become involved?

- Could you tell me about the background of the acquisition of Chase Walton Elastomers?
  - What was the business rationale?

- The press release talks about an intention to integrate Chase Walton "fully". Explain! What does this mean?
  - In terms of business integration?
  - In terms of IT integration?

- How has this Acquisition and Integration project been conducted?
  - How has this project been staffed in terms of managers?
    - IT? Business?
    - TSS?
    - CW?

- How far has the integration come?
  - What is left to do?

Informants

- **We need:** two to three informants at TSS and CW.
  - Someone from TSS involved in the early stages (pre-planning) of the acquisition.
  - IT and business managers involved in the Post Acquisition Project.
  - IT project manager?

- **TSS**
  - Are these informants in Trelleborg at all?
  - Planned interviews: Starting next week – The sooner, the better!

- **CW**

- Planned interviews: Starting around the 20th and onwards – The sooner, the better!

- **Secondary data** regarding the Acquisition and integration:
  - Power points regarding project planning?
  - Memos?
  - Organizational charts?

Appendix B Interview Guide

Alexander Jarosh
Wed December 6th, 14.00 – 15.30

Introduction

- Firstly, is it ok if we record this interview for later transcription?
- (You will have the opportunity to review the transcript and make comments)

Warm up

- What is your position in TSS?
  - Main tasks?
- How long have you been with TSS?
- Educational background?

Main session

TSS and IS infrastructure

- How are business activities supported by IS?
- Business activities not mentioned (R&D, HR, finance), how are these covered?
- How does the current infrastructure lack in support of BM?
- Today there is large diversity in Manufacturing, Marketing and Logistics. Is ongoing integration taking place?
- How does your current ERP systems support your business model? Differs between business areas? Automotive? Aerospace?
- Business model and IT support.
- Could you describe your IT strategy?
-

TSS Hudson and integration issues

- IT infrastructure and linkage at TSS Hudson – system changes and reasons for this, decisions/analysis during the acq process, importance of the pre-acquisition systems condition. Differences in the Hudson case compared to if marketing or logistic activity
  - How does the existing ERP systems at target company affect the IS integration?
  - If they have a working ERP system of good quality?
  - If significant investments recently have been done at target?
  - If target company have to dis-integrate from an previous organization?
  - Does the integration process differ: Big bang? Incremental?
  - Differs in modules or other functional areas?
- Was the integration typical?
- How are business activities prioritized in an integration?
- Strategic / economic concerns in terms of IS integration? What matters the most?
- Does IT integration differ depending on what business activity one aims at acquiring?
- Chase Walton was fairly small. Does size matter? Differences between small and large companies.
- How is IT due diligence performed?
- Ongoing development/maintenance of interfaces. What type of interfaces – P2P?
-

TSS in the future

- ERP nextgen
  - How does integration needs affect the choice of ERP vendors?
  - What business activities will be covered / affected by ERP nextgen
- Other alternatives of integration: EAI systems? SOA? In the future?

Cool-off session

- Is there anything further you would like to add in regards to IS integration when conducting M&As?

Closing session

- We would like to thank you for taking your time for this interview.
- Transcripts will be sent via e-mail, as well as an electronic copy of the final thesis (before publication?)

David Brown
Thu December 7th, 9.00-10.30

Introduction

- Firstly, is it ok if we record this interview for later transcription?
- (You will have the opportunity to review the transcript and make comments)

Warm up

- What is your position in TSS?
  - Main tasks?
- How long have you been with TSS?
- Educational background?
-

Main session

Business Model in relation to IT strategy.

- Could you describe the TSS Business model to us?
  - (In terms of business activities).
- Business strategy in relation to business model?
  - (In terms of business activities).
- How does IT relate to your business model?
  - (In terms of business activities).
  - If not covered: Solutions orientation – how does that work? Exemplify!
- How does other business activities fit into your business model? R&D for example?
  - What is the role of R&D in TSS?
- Is the TSS business model conventional?
- European business model vs. American / Asian? (From annual report 2005)
- How does your competitors work?

The acquisition process

- Are there differences between acquisition of marketing/logistic/manufacturing units?
- What would you say are the key issues?
  - Does this differ between acquisitions?
- IT during due diligence and rational for involvement?
- Does TSS acquire R&D companies as well?
- Are there differences in planned growth between business areas? (Aerospace, Automotive, Industrial applications)
- Does the view on IT differ depending on which business activity is at hand?
- Does your acquisition process differ today compared to, say two years ago?
- What have your main lessons been in acquiring and integrating companies?
  - In relation to IT?
  - Have you encountered severe IT problems at any time?
    - If so, elaborate…!

The Chase-Walton acquisition rationale

- Why was Chase Walton bought?
  - What were the desired synergies behind the acquisition of Chase Walton?
  - Expected added value to TSS?

TSS in the future

- Future business model and IT strategy?

Cool-off session

- Is there anything further you would like to add in regards to IS integration when conducting M&As?
- How do you foresee the future?

Closing session

- We would like to thank you for taking your time for this interview.
- Transcripts will be sent via e-mail, as well as an electronic copy of the final thesis (before publication?)

Mathieu Dubreucq
Thu December 7th, 11.00 -12.30

Introduction

- Firstly, is it ok if we record this interview for later transcription?
- (You will have the opportunity to review the transcript and make comments)

Warm up

- What is your position in TSS?
  - Main tasks?
- How long have you been with TSS?
- Educational background?

Main session

Business model

- What activities constitute the business model?
- What parts of the bm are affected by an acquisition?
- How is the fit between the targets BM and TSS BM evaluated?
-

Valuation of target companies

- What aspects of the target company are evaluated?
- How are these evaluated?
- Risk?
- Synergetic potential?
- Is level of integration needed discussed?
- How are IT concerned in due diligence, in detail?
-

TSS Hudson / CW acquisition

- Could you elaborate on the Potential synergies in the case of Chase Walton?
  - Market share?
  - New business areas (medical industry?)
- Valuation results
- Valuation effects on integration

Cool-off session

- Is there anything further you would like to add in regards to IS integration when conducting M&As?

Closing session

- We would like to thank you for taking your time for this interview.
- Transcripts will be sent via e-mail, as well as an electronic copy of the final thesis (before publication?)