

# Enabling Long Term Synchronization of ERPs and Businesses through Enterprise Architectures

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## Abstract

*Adoption of standardized software packages such as enterprise resource planning (ERP) systems, demands that either the system is adjusted to existing business processes or that business processes are adjusted to the system's inherited processes, resulting in alignment problems. In current research alignment refer to actions taken during the process of designing and implementing new software. Implicitly embedded in the alignment terminology is a one-shot approach with the objective to harmonize business processes and supporting ICT. This paper explores the idea that instead of alignment, organization-technology synchronization would be a more appropriate concept, since an organization's business processes as well as the technology used are continuously evolving and constantly needs to be re-aligned. The question is then how synchronization could be achieved and if any tools exists that could support this. Enterprise architecture (EA) could be seen as a tool to increase organization-technology synchronization. We theoretically integrate EA and synchronization to arrive at a set of propositions on how the use of EA can enable long term ERP-business synchronization. The conclusion is that EA definitely could be a way of supporting synchronization. However, more research is needed to support the statement.*

**Keywords:** Business processes, Business synchronization, Enterprise architecture, Enterprise resource planning systems.

## Introduction

Organizations today face the challenge of quickly responding to changes in market conditions. They need to have high agility when it comes to their business processes, but also to the information and communication technology (ICT) they use. In addition, contemporary business organizations face a demand of having high interoperability between internally used ICT and the ICT their partners, suppliers, and customers are using. One way to fulfill these demands is by implementing enterprise resource planning (ERP) systems. Implementing an ERP system is, however, a complex and costly endeavor which could result in a lack of alignment between how the business processes are carried out in the organization and how the business processes are supported in the ERP system. There has been a lot of focus both in practice as well as in the academic field on alignment (Chan & Reich, 2007; Luftman et al., 2006; Simonsen, 2007) describing the problem of alignment but also on how to solve what could be described as a misalignment problem (e.g. Davenport, 2005; Soh et al., 2000; Wu, 2007). However, the concept of alignment has a built in flaw. Even if total alignment is achieved the success will still only be temporary due to the constant changes in business processes caused by the dynamic market environment in today's business world. In addition, the technology in ERP systems changes just as fast as the business processes leaving companies with lost opportunities for

competitive advantages enabled by technology evolution, if the companies cannot change their business processes to utilize the new technology.

### Alignment, Synchronization and Enterprise Architecture

*Static* alignment between business processes could result in a lock-in situation, where neither business processes nor systems can be changed once the system is implemented (Koch, 2005; Wei et al., 2005). When such lock-in occurs the problem of alignment shifts from misalignment, at the time of implementation, to misalignment over time. Instead of alignment, the first leg of this paper’s purpose is to *develop and explore the concept of synchronization as a desirable relationship between business processes and the supporting technology*. As its basics, synchronization means that the organization’s business processes and the supporting technology evolves in tandem so that when either of these parts changes the other part is able to adjust to the change. The question is; if this is possible and if so what kind of solution could help to create this synchronization.

As the second leg of this paper’s purpose we look at *different aspects of EA and how EA can increase synchronization between adopted ERP systems and organizations’ business processes*. At the moment, EA attracts high interest both among practitioners as well as among academics and it is often described as the universal solution to many problems. EA address solutions to many problems involving the relationship between business and ICT in general and especially the integration between the two. Table 1 presents a summary of the many flourishing EA definitions. In the rest of the paper we use the definition of EA as a long term strategy that aims at creating alignment between an organizations business processes and supporting ICT, as proposed by Ross et al. (2006). However, before we continue our discussion on how EA could change or need to change for being able to contribute to organization-technology synchronization we discuss EA in relation to enterprise resource planning (ERPs) systems.

**Table 1 Summary of definitions of Enterprise Architecture (EA)**

<b>Authors</b>	<b>Definition</b>	<b>Key concepts</b>
(Sessions, 2007)	A description of the goals of an organization, how these goals are realized by business processes, and how these business processes can be better served through technology.	<ul style="list-style-type: none"> <li>• An ongoing process</li> </ul>
(Shah & El Kourdi, 2007)	A widely adopted approach for coping with the ever-increasing complexity and ensuring that technical resources are used in an optimal way in organizations	<ul style="list-style-type: none"> <li>• Alignment between business and IT</li> </ul>
(Sessions, 2006)	An architecture in which the system in question is the whole enterprise especially the business processes, technologies, and information systems of the enterprise	<ul style="list-style-type: none"> <li>• System complexity</li> <li>• Business alignment</li> </ul>
(Bucher et al., 2006)	A collection of architectural layers	<ul style="list-style-type: none"> <li>• Business, process, integration, software, and technology or infrastructure</li> </ul>
(Ross, 2004; Ross, 2005; Ross, 2006; Ross et al., 2006)	A long term organizing logic or strategy for business processes and IT infrastructure	<ul style="list-style-type: none"> <li>• Going from “as-is” to “to-be”</li> <li>• A process or a result</li> <li>• Maturity and capability model of EA</li> <li>• The ICT engagement model</li> </ul>

## **Enterprise Resource Planning systems and Enterprise Architecture**

ERPs are standardized packaged software designed with the aim of integrating the entire organization (Kumar & Van Hillegersberg, 2000; Lengnick-Hall et al., 2004; Rolland & Prakash, 2000; Wier et al., 2007). That ERPs are supposed to integrate the organization (both inter-organizationally as well as intra-organizationally) and its business process into a one package feeds the complexity of ERPs when it comes to both development and implementation as well as usage. Millman (2004) posit that ERPs are the most expensive but least-value-derived implementation of ICT support. The reason for this, according to Millman, is that a lot of ERPs functionality is either not used or is implemented in the wrong way. That it is wrongly implemented results from ERPs being customized to fit the business processes, instead of changing the process so that it fits the ERP (Millman, 2004). This situation is basically what the alignment problem is about, adjusting either the software or the process so that these in a static situation is synchronized with each other. From a more dynamic perspective this implies that there is a need for developing ERP systems that are easier to adjust to existing business processes but also that there is a need for developing ERPs that supports synchronization between ERPs and business processes.

Wu (2007) suggests that some organizations answer to the alignment problem and the call for EA by acquiring ERPs. However, he also state that existing ERPs do not solve the stovepipe problem, instead it create a larger stovepipe solution which contains small stovepipes. The claim Wu gives is that EA could be seen as the next generation ERPs, which should be generic ERPs that does not lock in customer into a specific vendor.

A major problem implementing ERPs is the misalignment between ERP functionality and business requirements. Soh et al. (2000) describe a gap between functionality offered by the package and functionality required from the adopting organization. Askenäs and Westelius (2000) describe this in the following way: “Many people feel that the current ERP system has taken (or been given) a role that hinders or does not support the business processes to the extent desire”.

One suggested relation between EA and ERP system could then be the potential ability to achieve alignment between organizations business processes and the supporting ERP system. As ERP systems are constantly refined and improved (Botta-Genoulaz & Millet, 2006) EA should also have the ability to cope with the necessary adoptions in technology and organizations – what we call organization-technology synchronization. The next section will analyze this in more depth and suggest some propositions on the subject.

## **Suggesting and Discussing Propositions on Alignment and Synchronization**

Creating total alignment may be impossible and even not desirable. The market conditions are continuously evolving and so does also technology. Total alignment could result in a lock-in situation for the organization, where neither business processes nor systems can be changed. Instead of alignment, we suggest synchronization as a better term of the desirable relationship between organization and the supporting technology. Synchronization means that the organization’s business processes and the supporting technology evolves in tandem so that when either of these parts changes the other part adjust to the change. In the paper we describe the basic difference between alignment and synchronization as being dynamic instead of static. This means that if synchronization is in focus it can be said that technologies used and organizations’ business processes always is aligned but they are so in what also could be described as a dynamic alignment status. From this the following proposition could be formulated:

**Proposition 1:** By emphasizing on synchronization instead of alignment it becomes more clear that both organizations as well as technology changes.

So, the questions are then if this is possible and if so what kind of solution could be of help when discussing how to create organization-technology synchronization. One tool, method or concept (definitions vary) that has the potential to address this is EA. EA attracts high interest both among practitioners as well as among academics.

Definitions of alignment range from very conceptual to more down to earth descriptions. On a conceptual level most authors agree upon alignment to be about harmonizing the way an organization work with its supporting ICT. According to Huang and Hu (2007) alignment is a mindset for which include matching system operations with the company's goal and strategy in order to ensure that ICT work for and with the business. Luftman (2006) propose that "Alignment means applying IT in an appropriate and timely way, in harmony with business strategies, goals, and needs."

It could be asked if and if so how EA could be used to synchronize or at least increase the synchronization between organizations adopted ERP and its business processes. However, in EA there is a bunch of different methods for "creating" the optimal EA as well as for describing the best structure of an organization. In an ERP systems context EA could be related to modules and functionalities and so on, and from this the following proposition could be suggested.

**Proposition 2:** It can be stated that there is a need for a more dynamic alignment status between supporting ICT and organizations business processes, and it could be asked how different parts of an EA approach could increase business-technology synchronizations.

Alignment in practice has become a matter of ensuring that ICT is adapted during the design and implementation phase. However, not all authors agree to this static view of the alignment process being the most appropriate. Maes, et al., (2000) define alignment as a dynamic process: "the continuous process, involving management and design sub-processes, of consciously and coherently interrelating all components of the business – IT relationship in order to contribute to the organization's performance over time".

When we introduce the concept of synchronization it is closely related to the conceptual interpretation of alignment as described above. However, with synchronization we distance the term from the interpretations of a static process that occur once (or at least in discrete phases) when designing and implementing ERP-systems. We contend that since the term alignment is when it comes to ERP implementations already associated with a set of actions that builds upon the view that system and business is aligned once and not an continuous re-alignment process there is a need for a new term that can be associated with a new set of actions; synchronization. The term is already used with a sense of ongoing adjustments in for example computer science (coordination of parallel processes), mathematics (or a set of simultaneous equations share variables), and music (more than one complete musical texture occurring at the same time).

**Proposition 3:** With a focus on synchronization there is a need to have a dynamic process on the relationship between business processes and supporting technology.

From the suggestion that there is a need for having a dynamic process on the relationship it can be suggested that also methods for ERP implementation needs to change if it should be possible to have organization-technology synchronization between ERPs and organizations business processes in the future, resulting in the following proposition.

**Proposition 4:** Methodologies for ERP system implementations should not only specify approaches for putting the system into place once but also approaches for developing the system in the future.

Since long, a number of methodologies and approaches for ERP implementations have flourished. Some, like SAP's ASAP, are specific to a specific ERP system while others are of more general character. The implementation methodology is an important, almost

integrated, part of the ERP system offering. ERP developers and implementers are living in symbiosis. Not equally common, but in the light of our focus on synchronization equally or even more important, are approaches to ERP systems modification. When considering a new ERP system, parameters as support and availability of knowledge on the system are important factors. We propose that the availability of modification methodologies should be added to the evaluation criteria before deciding upon any ERP system.

## Conclusions and Future Research

We have in this paper presented an overview of how EA could be used when developers of ERP systems aims at developing future ERPs. We also provide propositions that suggest new insight on the potential of how to improve organization-technology synchronization.

It can be concluded that even if EA could be seen as a way forward when it comes to increase synchronization between implemented ERPs and organizations business processes there is still a gap. When analyzing EA approaches it can be concluded that from a synchronization perspective there still exists problems. One problem is related to what Ross (2005) describes as a risk with focusing too much on EA and the risk is that EA focus on alignment. ICT as such becomes reactive instead of being proactive and thereby focus on fulfilling implemented business strategy and not creating new. This could be described as a lack of synchronization between supporting systems and organization business processes. A mutual reference between the ERP system and the organization is needed to ensure that the ERP system can adjust to the surrounding organization and not only vice versa. The lack of adjustment from the system side is by no means a new challenge within IS but the dynamic nature of organizations and business processes and the often high dependence on the ERP systems does amplify the challenge. Introducing a dynamic reference model from the system to the business processes in the organization could be a proposal for enhancing synchronization.

For future research, we recommend more research on what actually is EA in practice and what potential benefits it may lead to. As noted in the paper, there are a number of different definitions of EA circulating. To improve future research, it is necessary to unravel the use of the term in order to be able to compare and contrast research on EA. Finally, we also see a need for more research on organization-technology synchronization. Not only from an EA perspective, but also from other perspectives that can shed light on how organizations are supposed to evolve in tandem with the technology.

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