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The Role of IT/Business Alignment for Achieving SOA Business Value – Proposing a Research Model

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ABSTRACT

What is the interplay between IT/Business alignment and Service-oriented Architecture (SOA) regarding the achievement of business value in terms of business flexibility? This paper introduces a conceptual model that derives propositions about how IT/Business alignment, IT flexibility, and business flexibility are interrelated and how SOA and alignment interact in order to increase business flexibility. We apply and integrate well-known multi-dimensional concepts of both IT/Business alignment (in terms of strategic alignment, structural alignment, and social alignment) and IT flexibility (technical and non-technical IT flexibility) and map the conceptual components of SOA (architectural and the governance dimension) to this resulting model. This conceptualization will allow for more profoundly structured research on *how* SOA contributes to business value.

Keywords

Service-Oriented Architectures, SOA, IT Business Value, IT/Business Alignment, IT Flexibility, Business Flexibility, Conceptual Model.

INTRODUCTION

Service orientation and service-oriented architectures (SOA) have become a topic of high interest in both academia and business, and are portrayed as a means to increase flexibility (Bieberstein, Bose, Fiammante, Jones and Shah, 2005; Demirkan and Goul, 2006). While the academic literature mainly deals with the technical aspects associated with SOA (cf. Baskerville, Cavallari, Hjort-Madsen, Pries-Heje, Sorrentino and Virili, 2005; Kumar, Dakshinamoorthy and Krishnan, 2007), we follow the suggestion that “the most effective way to cut through the hype surrounding SOA is to consider it in the context of clear and specific cases where generalities are replaced with specific business goals” (Tews, 2007, p. 15). Therefore, we focus our research on the achievement of business flexibility as our endogenous variable because organizations need to be flexible in order to achieve a fit to their environment to increase their long-term success (Milliman, Von Glinow and Nathan, 1991).

Research has emphasized the role of complementary organizational resources in creating business value from IT (e.g. Melville, Kraemer and Gurbaxani, 2004). IT/Business alignment has been identified as an important organizational resource facilitating IT flexibility and business flexibility (Wagner, 2007). Consequently, we do not only analyze the direct impact of SOA on business flexibility but focus our research on the role of IT/Business alignment in this context. The goal of this conceptual paper is to develop a model which is supposed to explain the interplay between SOA, IT/Business alignment and IT business value in terms of organizational flexibility. The guiding research questions of our model are:

- (1) How does SOA influence IT and consequently business flexibility?
- (2) How does IT/Business alignment leverage the effects of SOA on the business value of IT in terms of flexibility?

MODEL DEVELOPMENT

The model development is structured as follows. First, we theoretically frame the concepts of IT/Business alignment and flexibility and derive the interrelations between them from the literature. Second, we introduce SOA as conceptually new argument and focus on its impact on the relationship between IT/Business alignment and flexibility in order to deliver IT business value. Figure 1 gives an overview about the nomological network and the concepts introduced in the following.

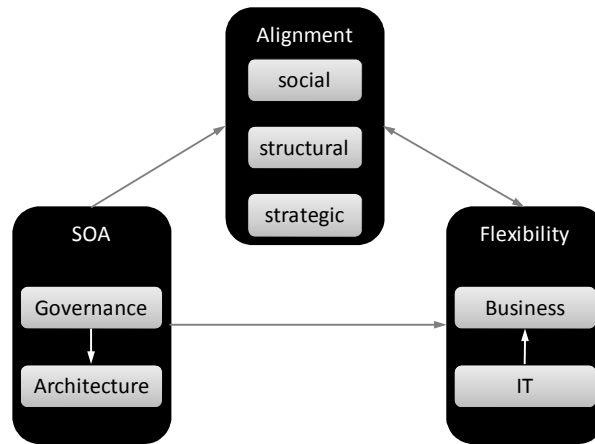


Figure 1. Research Model

IT/Business Alignment

IT/Business alignment (which we refer to as “alignment” in the following) can be broadly defined as “applying IT in an appropriate and timely way, in harmony with business strategies, goals and needs” (Luftman and Brier, 1999, p. 3) or as “fit between the priorities and activities of the IS function and those of the business unit” (Chan, 2002, p. 98). IT can only create business value if this alignment condition is given. Alignment can be primarily understood as congruence between business and IT strategy, but it also can be treated as a concept which encompasses more facets and dimensions, including a structural and a social dimension (Chan and Reich, 2007).

Strategic alignment is the dimension that has been most extensively researched in previous literature. Broadbent and Weill (1993, p. 164) define strategic alignment as “extent to which business strategies were enabled, supported, and stimulated by information strategies”.

As second dimension, we address the *structural dimension of alignment*. In this context, Ein-Door and Segev (1982) examined whether a decentralized business organization entails the use of distributed software and hardware applications. Further, structural alignment was researched in terms of decentralization and centralization of the business and the IT function, and the fit between these two methods of organizational structuring (Raymond, Paré and Bergeron, 1995). Others like Gordon and Gordon (2000) consider issues such as the locus of responsibility for setting IT priorities, setting standards, developing information systems, and operations. Similarly, Bassellier et al. (2001) suggest that IT management should be shared between IT and line managers in order to develop a partnership between them. Drawing on these works, we conceptualize structural alignment as institutionalized involvement of business *and* IT in strategic planning, project prioritization and risk-bearing (cf. also Chan, 2002).

We can argue that structural alignment will be driven by strategic alignment. If the firm has not aligned its business and IT strategies, there will be rather low awareness of implementing organizational structures which bring business and IT people together in order to cooperate in strategy and project planning. Moreover, there will be low awareness of implementing organizational structures to bring business and IT people together.

The *social dimension of alignment*, is defined as “the level of mutual understanding of and commitment to the business and IT mission, objectives, and plans” (Reich and Benbasat, 1996, p. 58). Based on this definition, Reich and Benbasat argue that social alignment embraces different social dimensions, such as interaction, shared domain knowledge, and trust between both sides, which all lead to effective knowledge exchange (Nahapiet and Ghoshal, 1998) and productive collaboration in order to apply IT in a way which is valuable for the firm. If there is a high level of mutually positive perception, respect, and trust, and furthermore communication is facilitated by a high degree of shared knowledge about the firm’s demands, business processes, and IT particularities, at least on the top management level, this will foster the creation of aligned strategies and enable the implementation and use of effective alignment governance structures, such as joint boards and meetings. In turn, these meetings may drive social alignment as well. Summarizing we can argue that the three dimensions of IT/business alignment are highly interrelated.

Flexibility

Prior literature has examined flexibility from different perspectives. Contingency theory views flexibility as a means of achieving a fit between the organization and its environment, thus having a positive effect on performance (e.g. Milliman et

al., 1991). Real options theory considers flexibility as an option on future courses of action (Upton, 1995). Especially in times of high uncertainty about these possible courses of action, holding options enables organizations to adapt better to certain situations as more strategies are feasible (Rese and Roemer, 2004).

Changing environmental circumstances and customer demands point out the need to be flexible in regards to business behavior. This *business flexibility* can be defined as “a set of organizational abilities to proact or respond quickly to a changing competitive environment and thereby develop and/or maintain competitive advantage” (Hitt, Keats and DeMarie, 1998, p. 26). In terms of options, business flexibility comprises the amount of strategic options available to an organization as well as the degree an organization is able to switch from one strategy to another (Nadkarni and Narayanan, 2004). Therefore, business flexibility involves changes in or the introduction of new products or services, or the adjustment of the volume produced (cf. e.g. Vickery, Calantone and Dröge, 1999).

Similar to business flexibility, the *flexibility of IT* is a major managerial concern (Kumar, 2004) and can be viewed as one of the main components that create business flexibility. Based on the resource-based view, IT has been described as organizational capability, consisting of technical IT resources, human IT resources and complementary IT resources (Bharadwaj, 2000; Melville et al., 2004). Consequently, IT obtains its flexibility through flexible technical IT resources, flexible human IT resources and flexible complementary IT resources. In our model we consider a *technical IT flexibility* construct and a (*IT*) *personnel flexibility* construct. Moreover, alignment is considered as important complementary resource which influences the relationship between IT and business flexibility.

Regarding *technical IT flexibility*, Duncan (1995) considers the flexibility of IT infrastructure as determined by the “degree to which its resources are sharable and reusable” (p. 42). Shareability and reusability are used to identify three flexibility criteria which support these aspects: (1) *connectivity* enables components to connect to each other; (2) *compatibility* allows connected components to interact and to share information (Chung, Rainer and Lewis, 2003); (3) *modularity* deals with “isolating and standardizing as many business and systems processes as possible” (Duncan, 1995, p. 48) and applies to data as well as to applications. It can be defined as “the ability to add, modify, and remove any software, hardware, or data components of the infrastructure with ease and with no major overall effect” (Byrd and Turner, 2000, p. 171). An empirical evaluation of the dimensions by Byrd and Turner found a lack of discriminant validity between connectivity and compatibility; therefore, they were merged to a new concept of *integration* (Byrd and Turner, 2000).

Regarding the relationship between IT flexibility and business flexibility we adopt the view of IT as a generator of digital options (Sambamurthy, Bharadwaj and Grover, 2003). Sambamurthy et al. (2003) posit that IT is a factor required to generate more competitive actions and a more complex action repertoire. For example, Zhang and Liu (2005) found positive effects of IS support for product flexibility on ROS and sales growth, and a study of Chung et al. (2005) confirmed the positive impact of IT infrastructure flexibility on an organization’s capability to mass-customize products. Palanisamy (2005) argues that changes in the environment of an organization have to be reflected in the information systems of that organization. Thus, a more flexible IT will enable the organization to better adapt to environmental changes.

Proposition 1 (P1): A higher level of IT flexibility leads to a higher level of business flexibility.

The Relationship Between Alignment and Flexibility

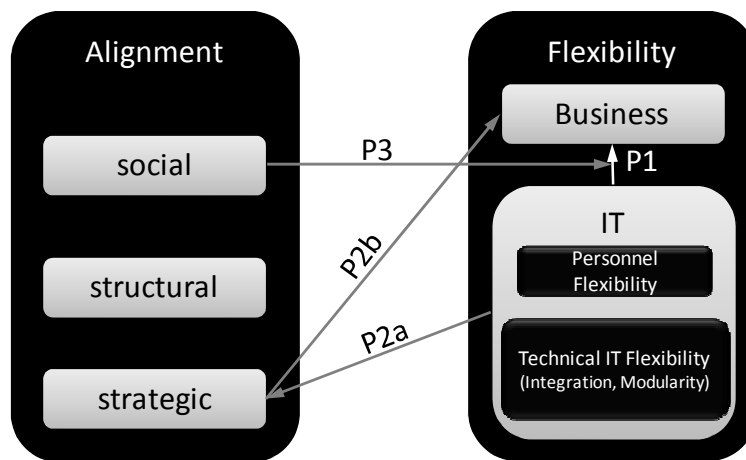


Figure 2. The Relationship Between Alignment and Flexibility

Following Henderson and Venkatraman (1993), strategic alignment should not be considered as state, but as a process of continuous adaptation and change. Tallon & Kraemer (2003) adapt this perspective when conceptualizing strategic alignment in terms of IT shortfall (IT does not support the business strategy to the fullest extent possible) and IT under-utilization (business strategy does not utilize existing IT resources to the fullest extent possible). If IT is flexible and if strategies are aligned, both concepts together are able to provide a remedy against IT shortfall and IT under-utilization. In case of an IT shortfall because of a change in business strategy, aligned business and IT strategies will help to direct a flexible IT in order to expand and adapt its capabilities until the shortfall is resolved. In case of IT under-utilization, the business does not use the full potential offered by the flexible IT. Therefore, strategic alignment can ensure that the existing flexible IT will be used with respect to the chosen business strategy. In turn, when IT shortfall and IT under-utilization have been resolved by a flexible IT driven by aligned business and IT strategies, business is able to pursue new strategies. Therefore, strategic alignment can be viewed as mediator between IT flexibility and business flexibility.

Proposition 2a+b (P2a+b): Strategic alignment positively mediates the impact of IT flexibility on business flexibility.

While a flexible IT provides options, i.e. potential, realizing this potential in a business-oriented manner requires social alignment. Interaction, shared domain knowledge and relational aspects like trust are important within this relationship. For example, Tiwana et al. (2003) found that knowledge integration positively influences flexibility in IT projects. They argue that flexibility can be seen as the ability to incorporate modifications in response to new information. In that regard, it is important that information about requirements of business is a) known to IT, b) understood by IT, and c) valued and trusted by IT. After the information is known to IT, interaction makes sure that IT reacts to the requests of business in an effective and efficient manner. Moreover, through communication IT may get access to important information earlier and thus may be able to pro-actively organize its resources in a way that it can provide flexible support for business operations. Thus, we propose that social alignment positively influences the impact of IT flexibility on business flexibility.

Proposition 3 (P3): Social alignment moderates the impact of technical flexibility on business flexibility.

Having explained the basic part of our research model (relationship between alignment and flexibility), which is well-grounded in existing literature and theories, we now introduce *service-oriented architectures* as the third main concept and propose possible effects it may have on alignment and flexibility. This represents the intellectual core of our paper and to the best of our knowledge, these linkages have not been studied in detail, yet.

Service-Oriented Architectures

SOA, as a catchword, is subject to a magnitude of different interpretations. Definitions which view SOA as “framework for integrating business processes and supporting IT infrastructure as secure, standardized components - services - that can be reused and combined to address changing business priorities” (Bieberstein et al., 2005, p. 5) clearly consider business aspects to be part of an SOA. Drawing on this perspective, SOA can be seen as management tool for aligning business strategy and enterprise architecture (Walker, 2007). On the other hand, SOA can be viewed technically as *architectural style* that supports service orientation (Open Group, 2006). Consequently, SOA consists of multiple interacting services and an Enterprise Service Bus (ESB) which is an architectural construct fulfilling tasks such as routing, mediation, logging and ensuring security (Bieberstein et al., 2005). Additionally, service orientation is a design paradigm consisting of a specific set of design principles (Erl, 2007). For Keen et al. (2004) these principles include the use of implementation-independent interfaces, loose coupling and encapsulation. For example, using web services supports realizing these principles¹. On the other hand, SOA can also be seen as a management tool for aligning business strategy and enterprise architecture.

In order to achieve alignment between the business strategy and the enterprise architecture, the effective and efficient implementation of SOA and the service-orientated principles have to be ensured through a sophisticated *SOA governance* (Walker, 2007) where concerns such as decision rights and responsibilities as well as policies for service design and service management (Brown, Moore and Tegan, 2006; Schepers, Iacob and Eck, 2008) are addressed. Concretely, governance in this context is related to how decisions about e.g. IT infrastructure, processes and IS are made, who is involved in and in charge of these decision processes. In this paper, these areas of concern will be used as a starting point to identify fields in which service orientation may contribute to IT/Business alignment.

¹ However, it should be noted that an SOA can be realized without web services and that the use of web services does not automatically constitute an SOA.

The Influence of Service Orientation on IT-Business-Alignment and Flexibility

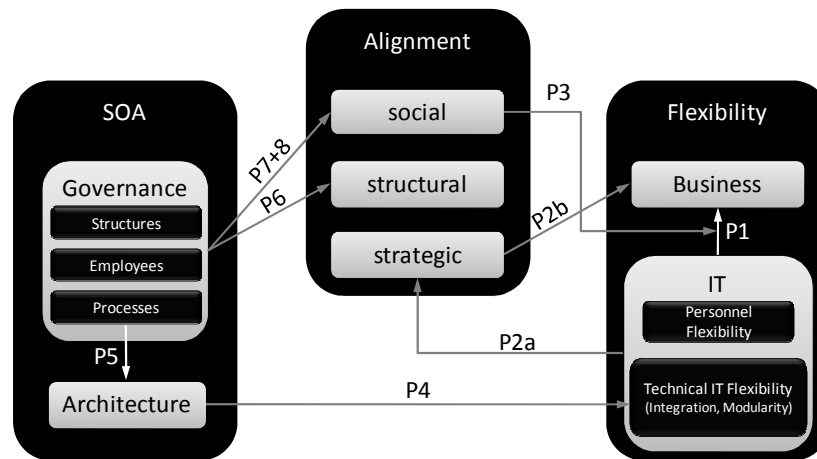


Figure 3. The Influence of SOA on Flexibility and Alignment

As explained before, SOA is associated both with technical aspects and with governance issues. We will start with SOA's technical principles influencing the *modularity* aspect of technical IT flexibility. SOA principles directly contribute to modularity since a service can be considered as an independent component which is developed and operated separately (Heutschi, 2007) and because business processes are broken down into smaller modular parts – namely services – which can be managed more easily (Sanchez, 2004). In that regard, we posit that service abstraction (a comprehensive and consistent service specification), stable and managed service contracts, high level of cohesion within a service, and loose coupling of communication between services contribute to modularity (Heutschi, 2007). Moreover, due to the encapsulation concept of services, functionality can be reused, but does not have to be implemented again (Baskerville et al., 2005), which additionally increases technical IT flexibility.

Further, the *integration* aspect of technical IT flexibility is directly tackled by the SOA paradigm as well. The use of standards for service description, data types and communication protocols, the use of an integration infrastructure, and designing the granularity of services in a way that they become reusable, directly increase technical IT flexibility in terms of integration. Also, the use of service-oriented facades around existing IT systems is regarded as mechanism to easier integrate existing information systems (Baskerville et al., 2005). Summarizing, we can propose that:

Proposition 4 (P4): An appropriate architectural design positively influences technical IT flexibility.

After focusing on the technical characteristics of SOA, we focus on the role of SOA *governance*. We draw upon an SOA governance model developed by Kohnke et al. (2008) which identifies three main fields of activity within SOA governance: processes, structures and employees:

Processes: SOA governance processes deal with the management of the service life-cycle and ensure that services are designed properly and goals such as reuse are achieved (Kohnke et al., 2008). Different methodologies on how to design services have been proposed (cf. e.g. Erl, 2005). However, no matter which service design methodology is used, they all serve a common purpose: to ensure that the services created follow certain principles. As a result, governance processes help to ensure that SOA will deliver the features required of an organization.

Proposition 5 (P5): SOA governance processes are necessary to direct the implementation of SOA and service management to fit an organization's needs.

Structures: SOA governance requires organizational elements such as committees, tasks and roles as well as SOA policies (Kohnke et al., 2008) which are developed by the SOA organization. No matter whether the governance approach is centralized or decentralized (cf. Weill, 2004), the implementation of an SOA within an organization demands the introduction of new or the adaption of existing roles and tasks (Kohnke et al., 2008). An organizational element often mentioned is the SOA Center of Excellence (Keen, Allison, Dan, Falkl, Hately, Peng and Richter, 2008; Kohnke et al., 2008) which represents an example of a more centralized governance approach. According to Keen et al. (2008) the CoE consists of SOA experts as well as business domain owners. Furthermore, Kohnke et al. (2008) propose to establish SOA committees with gradual SOA implementation progress which should be staffed with experts from both, IT and business. Similarly, Bieberstein et al. (2005, p. 64) suggest to establish a cross-unit "SOA business transformation architecture council" where business requirements are

gathered and analyzed in order to provide support through corresponding services². In summary, the introduction of new SOA-related committees and roles introduces additional IT/business liaison roles and thus increases the amount of interfacing points between both sides; thus we can propose that:

Proposition 6 (P6): Well established SOA governance structures positively influence the structural dimension of IT/Business alignment.

Besides the influence on structural alignment, the described organizational changes also have an effect on the social dimension of alignment. Committees staffed with representatives from both, business and IT as well as organizational roles which emphasize cooperation between business and IT may be able to increase the interaction frequency between the two sides. Moreover, one can expect that when business and IT work together in an SOA context, this will lead to an increase of aspects like trust and mutual understanding (addressing the relational dimension of social alignment) as people get to know and rely on each other. Finally, such teamwork will facilitate the creation of shared domain knowledge, since employees from both sides will have to explicate (at least parts of) their knowledge and work routines.

Proposition 7 (P7): Well established SOA governance structures positively influence the social dimension of IT/Business alignment.

Employees: Kohnke et al. (2008) suggest to include concerns such as skills and knowledge as well as performance management in this domain. Focusing on the skills and knowledge aspects, we intend to highlight the connecting role of the concept of services. The concept of service orientation has been received with interest not only by the IT domain but also within business (Kontogiannis, Lewis, Smith, Litoiu, Muller, Schuster and Stroulia, 2007). Bieberstein et al. (2005) apply service orientation to organizational structuring and propose the “Human Services Bus” as an alternative to traditional methods of organizational structuring. Moreover, considerations to extend the concept of service orientation to the whole organization have led to the coinage of the term Service-Oriented Enterprise (SOE) (cf. e.g. Demirkan and Goul, 2006). These examples illustrate that the concept of services may serve as linking element between business and IT and can represent a form of shared knowledge between business and IT. Krafzig et al. (2004, p. 68) highlight: “being able to talk about the specific nature of different services at an abstract level will enable the different stakeholders in an SOA project [...] to communicate their ideas and concerns more effectively”. This way, services can be viewed as a means to bridge the cultural gap between business and IT, bringing IT closer to their business “customers” (Chen, 2008). Consequently, we propose a positive effect of SOA adoption on social alignment:

Proposition 8 (P8): Employee-related activities within SOA governance positively affect the social dimension of IT/Business alignment.

DISCUSSION AND CONCLUSION

In this paper, we developed a conceptual model which proposes how SOA affects a firm’s business flexibility, mediated by IT flexibility and by potentially improving several facets of IT/business alignment. Our contribution is meant in a deductive way, since all arguments have been derived and merged from existing literature. The goal was to provide a first step towards a more integrative view on SOA business value and especially on the role of IT/business alignment. However, we are aware that more work is necessary in order to generate a deeper understanding of how the different concepts are interconnected, and to provide better justification for the propositions. Although we see significant potential in the model presented, it should be refined and assessed in its parts in more detail before an overall evaluation can be put forward. Also, due to the restrictions regarding a conference paper, the reasoning of our propositions is partly limited in length. Currently, the propositions are evaluated in a series of case studies with large German firms which have already restructured substantial parts of their IT infrastructure towards the service-oriented paradigm. Based on these case study results, we intend to transform our model to a empirical research model which can be tested by a quantitative approach, subsequently.

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² Bieberstein et al. (2005, p. 83), for instance, suggest to introduce the roles of a service modeler and a process flow designer who collaborate with business analysts in order to design service interfaces or to model business processes, respectively.

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