2009

When standards is not enough to secure interoperability and competitiveness for European exporters

Daniel Beimborn
University of Bamberg, beimborn@is-bamberg.de

Nils Joachim
University of Bamberg, joachim@is-bamberg.de

Bjoern Muenstermann
Otto-Friedrich-University of Bamberg, muenstermann@is-bamberg.de

IMPACT OF SERVICE-ORIENTED ARCHITECTURES (SOA) ON BUSINESS PROCESS STANDARDIZATION – PROPOSING A RESEARCH MODEL[1]

Beimborn, Daniel, University of Bamberg, Feldkirchenstraße 21, 96052 Bamberg, Germany, beimborn@is-bamberg.de

Joachim, Nils, University of Bamberg, Feldkirchenstraße 21, 96052 Bamberg, Germany, joachim@is-bamberg.de

Muenstermann, Bjoern, University of Bamberg, Feldkirchenstraße 21, 96052 Bamberg, Germany, muenstermann@is-bamberg.de

Abstract

What is the impact of a Service-oriented Architecture (SOA) on the efficiency and effectiveness of business process standardization (BPS)? The contribution of this paper is the development of a research model around the impact of SOA on BPS in terms of achieving fundamental efficiency and flexibility potentials while covering both the business layer and the IT layer of the firm. Drawing on an accepted and widespread enterprise architecture model, we derive propositions that explain why and how SOA's characteristics help to standardize business processes and how the interplay between SOA and BPS leads to an increased overall business value. Additional moderator arguments, such as the level of service granularity, the centrality of SOA governance, or Business IT alignment, are added to the research model as critical success factors of achieving business value of SOA.

Keywords: Service-oriented Architecture, SOA, business process standardization, BPS, business value, research model.

[1] Authors in alphabetical order of names.

1 MOTIVATION

In 2008, the use of Service-oriented Architecture (SOA) in North-American, European and Asian-Pacific companies increased from 44% to 63% (Heffner 2008). This comes along with a paradigm shift from a strongly process-oriented value chain perspective to a service-oriented perspective, viewing the firm as a set of encapsulated but interrelated services (Demirkan and Goul 2006). This shift, together with the corresponding change in the IT architecture, offers various tremendous potentials such as identifying redundant activities in the firm, supporting insourcing vs. outsourcing decisions and subsequent transitions, identifying core competencies, or changing and managing business processes in a more flexible and consistent manner.

In Business Process Management, one particularly important instrument for enabling and achieving efficiency potentials is standardization of business processes (BPS) (Hadfield 2007; Muenstermann et al. 2009a; Muenstermann and Weitzel 2008; Venkatesh 2006). In this paper, we aim at particularly merging the concepts of SOA and BPS and therefore propose a conceptual research model about the impact of Service-oriented Architectures on the standardization of business processes. There exist many works on how SOA should be designed, implemented, and managed, but there is still a huge gap on what the actual benefits of SOA are, or, whether and how SOA delivers business value in terms of Melville et al. (2004). Therefore, we want to tackle this essential question and restrict our focus on the role SOA plays for achieving efficiency potentials from BPS.

In this paper, we will develop a theoretical research model covering the following research questions:

1. *What is the impact of Service-oriented Architecture (SOA) on business process standardization (BPS)?*
2. *How can the interplay of SOA and BPS increase both business process performance and organizational performance?*
3. *What are the critical success factors required as moderator for an effective interplay of SOA and BPS?*

The result of the research paper at hand is a theoretical research model consisting of a set of propositions which describe the interrelationship between SOA and BPS and the role of critical success factors. This conceptual model is intended to form the basis for future empirical research.

Our paper is structured as follows: section 2 provides the theoretical foundation and a concise terminology which allow a mapping of business processes to SOA and introduce the concept of BPS. Subsequently, we develop a set of propositions explaining the interplay of SOA and BPS as well as both the consequences and necessary success factors of the interplay in section 3. The paper concludes by interpreting the results and discussing potential limitations as well as the planned following research steps in section 4.

At this point, we want to clarify about the following restrictions regarding the focus of this paper: (1) Regarding process standardization, there is often the question about the optimal trade-off between standardization and individualization (Hall and Johnson 2009; Lampel and Mintzberg 1996); nevertheless, this is not our research focus. (2) As formulated in the research questions, we focus on the role of an (already implemented) SOA for process standardization. The reverse question whether or how standardized processes facilitate the introduction of an SOA, is not tackled in this paper.

2 THEORETICAL FOUNDATION

The goal of this section is, firstly, the introduction of a concise terminology to describe organizations and their business activities to then, secondly, allow proceeding with an analysis of the interplay of SOA and BPS in the next section.

The first subsection (2.1) introduces "business process standardization" and shows exemplary value drivers. The second and third subsections (2.2 and 2.3) provide the terminology to describe enterprise architecture and the respective building components. The fourth section (2.4) finally aims at showing the conceptual relationship between SOA and BPS at the different enterprise architecture layers.

2.1 Business process standardization (BPS)

Standardization of business processes is increasingly receiving attention from academics and practitioners alike. Since Venkatesh (2006) identified process standardization as one of three broad future research directions, numerous papers dealing with BPS have been published (Bala and Venkatesh 2007; Hall and Johnson 2009; Sánchez-Rodríguez et al. 2006; Wüllenweber and Weitzel 2007). On the practitioner side, companies hope to save significant costs by means of BPS (Hadfield 2007). However, in both academia and industry BPS has hardly been treated as discrete and concisely defined object of research. Even very recent papers claim a lack of research on a concise definition and on the role/impact of BPS (von Stetten et al. 2008). Ungan (2006, p. 136) notices that "despite its great attractiveness, academics' and practitioners' work on [business] process standardization is conspicuously absent". Shaw et al. (2007, p. 92) indeed define BPS as a means to change business processes from where they are to a standard business process and "focus on a meta process: the process of changing a process", but completely leave open the question, how a standard business process should look like and how a given business process at hand can be transformed into a standard business process.

In contrast to that, Muenstermann and Weitzel (Muenstermann and Weitzel 2008) propose a definition of BPS as well as an according conceptualization. They define BPS as a two-staged approach:

(a) *internal BPS*:
Unification (homogenization) of multiple existing business process variants to either one single variant among the existing or to a newly designed target business process, which itself is composed out of selected tasks of the existing business process variants

(b) *external BPS*:
Alignment respectively adaption of unified/homogenized business process variants to an externally available reference business process or an externally available best practice business process

BPS pursues different goals: In the short and medium term, internal BPS focuses on the unification/homogenization of the business processes considered, foremost aiming at eliminating inefficiencies and thereby increasing the business process performance along the dimensions business process time, cost, and quality. In the medium and long term, external BPS aims at aligning/adapting the previously internally standardized business process variants (to an externally available reference business process[2]) to reach and sustainably guarantee cross company validity, reusability, and adaptability. The closer a company adheres to an externally available reference process, the easier it is to react e.g., to market and external change in accordance with the way and speed of competing companies that also have adopted the reference process. Hence, the described alignment/adoption within the context of external standardization on the one hand increases business process performance and on the other hand expands organizational flexibility.

[2] Examples of industry specific reference processes are the "Supply Chain Operation Reference Model (SCOR)" or the "enhanced Telecom Operations Map (eTOM)". See Kindler and Nuettgens (2005) for an overview of reference processes or Malone et al. (1999) for how to design reference processes. Such industry specific reference processes have mostly been adopted by a large amount of companies. Hence, adhering to them can be a necessary condition to allow for easy realizable process changes and consequently expand organizational flexibility within specific industries.

2.2 Enterprise architecture: enterprise plan, business process model and resource model

We base our terminology to describe enterprise architectures on the "Semantic Object Model" (SOM) following Ferstl and Sinz (Ferstl and Sinz 1995; Ferstl and Sinz 1997)[3]. According to the SOM methodology, an enterprise architecture comprises three layers: the enterprise plan, the business process model and the resource model as well as the respective interdependencies and relationships between the layers:

The *enterprise plan* describes the global tasks of the enterprise, a strategy to cope with that global task as well as surrounding conditions relevant to the solution. The *business process model* specifies main and service processes as solutions to realize the enterprise plan. The *resource model* finally provides resources, e.g. personnel, application systems, and machines/equipment necessary to follow the solution path described in the business process model to realize the enterprise plan (Ferstl and Sinz 1997).

Business process models constitute the central layer within the SOM methodology. According to Ferstl and Sinz (1997) they depict a model of the inside view of a business system. They can be interpreted as solution approach for the realization of the enterprise plan. Hence, they combine the enterprise plan – being aware of the business context of the business process at hand – with the resource model and thereby form the basis for the subsequent analysis of the impact of SOA on BPS.

2.3 Components of the business process model and resource model

Figure 1 below displays the building components of the business process model and resource model as well as the respective interdependencies between the building components. The business process model comprises the three building components *"processes"* (layer 1), *"tasks"* (layer 2) and *"sub-tasks"* (layer 3). The resource model (on layer 4) provides *"applications systems"*, *"personnel"* and *"machines/equipment"*.

According to Davenport a business process is a "a set of logically related tasks performed to achieve a defined business outcome" (Davenport and Short 1990, p. 12) or the "specific ordering of work activities across time and place, with a beginning, an end, and clearly identified inputs and outputs" (Davenport 1993, p. 5). Lee et al refer to business processes – according to the SOM methodology – as connecting business goals and resources realizing them as "a vehicle to build and materialize organizational capabilities" (Lee et al. 2004, p. 645). Ferstl and Sinz (1997) summarize prominent features of business processes as event driven chain of tasks" as well as the "mapping and use of resources.

In summary, on layer 1, we define a *business process* to be an event-driven, ordered chain of tasks pursuing the goal of reaching a previously defined business goal[4]. Continuing, on layer 2, we define *tasks* as descriptions of distinguished goals that have to be reached, together with a preceding business event (input) and a resulting successing business event (output). On the next level of detail (layer 3), the SOM specifies sub-tasks, which are defined as business activities realizing parts of a task.

Now we leave the business process model and apply ourselves to the resource model. The resource model comprises the three building components *"application systems"*, *"personnel"* and *"machines/equipment"* and describes how and using which resource the sub-tasks are instantiated.

---

[3] As alternatives to the SOM methodology, several practitioners and researchers offer further approaches to describe enterprise architectures. Among them, one example approach is the "Component Business Modeling" (CBM) approach promoted by IBM (Ramchandani and Harwood 2005). To our knowledge all available other approaches are based on an equivalent underlying internal structure and – along the parts relevant for our research approach – can directly be translated into the terminology used in the SOM approach. As a consequence within this article we can derive our terminology from the SOM approach. Moreover, SOM is a sound and completely integrated approach, which offers in contrast to other approaches the advantage to provide a consistent methodology (cf. Ferstl and Sinz 1998). This methodology guides the modeler through the entire process with concrete rules on how to transform strategic business goals into business process models and then into concrete building components (such as interfaces and objects) of application systems.

[4] *"variant of a business process"* defines a business process similar to a given business process except for some minor tasks of the given business process left out.

As shown in Figure 1, the components of the business process model and the resource model depict consecutive layers of the enterprise architecture, each describing the preceding layer on the next level of detail.

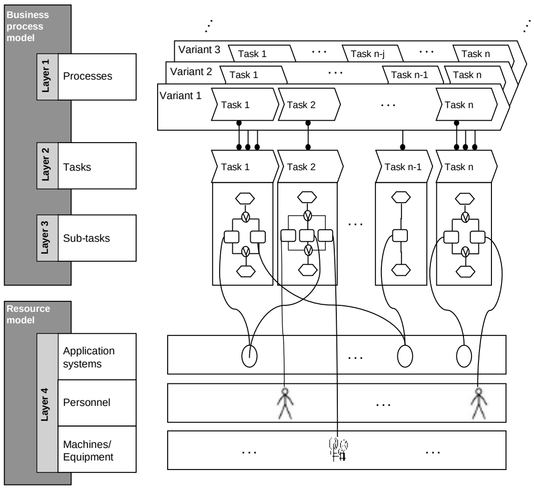

Figure 1. Overview of building components of business process model and resource model.

2.4 Relationships between SOA and enterprise architecture

According to the presented enterprise architecture, SOA is a methodology for designing the application landscape (Siedersleben 2007). According to Erl (2005, p. 54) “SOA can establish an abstraction of business logic and technology that may introduce changes to business process modeling and technical architecture, resulting in a loose coupling between these models. SOA is an evolution of past platforms, preserving successful characteristics of traditional architectures, and bringing with it distinct principles that foster service-orientation in support of a service-oriented enterprise.” Therefore, we distinguish two interrelated paradigms associated with SOA: (1) a technical perspective, which interprets Service-oriented Architecture (SOA) as pure IT paradigm, as well as (2) an enterprise perspective, which models and organizes the entire organization according to a Service-oriented approach, which also includes business processes and workflows in contrast to the first perspective resulting in a so-called Service-oriented Enterprise (SOE) (Demirkan and Goul 2006). If solely applying the technical perspective, SOA serves the design and realization of the resource model (see Figure 1 layer 4).

Combining both paradigms, SOE/A becomes manifest in a three-stages model, consisting of process model, service model, and technology model (Siedersleben 2007). Whereas the process model corresponds to the previous business process modeling, the service model defines not only the services themselves but also the relationship to the business processes. The technology model defines the concrete implementation for realizing the services. Therefore, the service model decouples the business processes from the underlying technological realization in order to avoid that changes in the implementation will affect the business processes. Thus, the technology model enables an efficient implementation of services, whereas the service model facilitates the efficient realization of the business processes (Siedersleben 2007). In ideal circumstances, the upper models define the antecedents for the lower models in order to allow for an Service-oriented Enterprise.

However, there exist also backward links from the lower to the upper models, as organizations still use legacy systems and standard software which do not perfectly support existing business processes. Consequently, organizations make also use of bottom-up approaches for identifying services despite the pure top-down approaches. Whereas *top-down* approaches analyze existing business processes in order to identify adequate services, *bottom-up* approaches examine legacy systems and standard software for the identification of services. While organizations using the former approach may face problems realizing the identified services within an existing infrastructure, the latter approach can lead to too fine-grained (more data-centered than business-oriented) services, which are similar to an application programming interface (API). Therefore, a hybrid approach combining both methods is suggested in order to minimize the problems associated with these approaches (Arsanjani 2004).

Linking the model of SOA according to Siedersleben (2007) to the components of an enterprise architecture (see Figure 2) leads to the following relationships:

The *process model* corresponds to the first layer of the enterprise architecture.

Increasing the level of detail of the process model is the foundation for the *service model*, which is represented on the second and third layer of the enterprise architecture. The increased level of detail allows to derive the services of the service model directly from the sub-tasks (layer 3), which documents the demanded relationship between services and their business process within the service model (Siedersleben 2007).

Whereas both models mentioned before are independent from the technology used to realize SOA, the *technology model* describes the technology selected to implement and dispose services (Siedersleben 2007). The technology model originates from the assignment of sub-tasks (layer 3) to services, which are located at the fourth layer of the enterprise architecture.

Consequently, distinguishing between tasks, sub-tasks and application systems or services, which perform the sub-tasks supports a separation being compatible with the three-stages model of SOA. This clear separation of sub-tasks and performing services enables flexibility as well as reuse potentials of SOA (Sinz 2008).

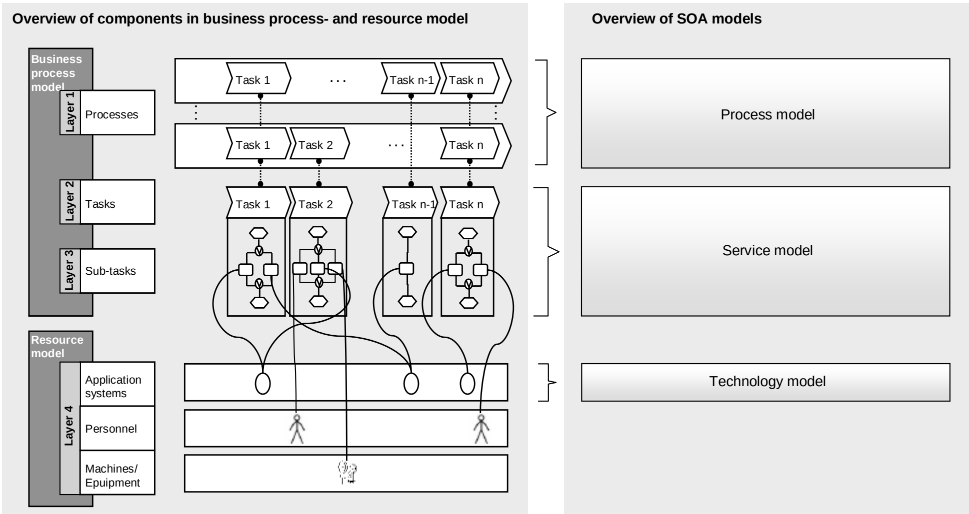

Figure 2. Relationship between the three-stages SOA model (right side) and the components of business process and resource model of the enterprise architecture (left side).

3 SOA AND BUSINESS PROCESS STANDARDIZATION – A RESEARCH MODEL

After showing which layers and components of SOM are influenced by BPS activities (3.1), we develop propositions about the collaboration of SOA and process standardization within the layers of the enterprise architecture (3.2). The last subsection will expand the propositions by moderating success factors with respect to the effective interplay between SOA and process standardization (3.3).

3.1 BPS in the Context of the Enterprise Architecture

On the first layer (processes), internal BPS means reduction of process variants, i.e., different sequences of order and "call" of tasks. Resulting consequences for the second layer (tasks) are (1) the identification of tasks which are redundant, and thus not relevant anymore, and (2) the identification of tasks being elements of different business processes (leading to "reuse" of tasks). Moreover, rather similar tasks can be identified and homogenized as well. Regarding the third layer (sub-tasks), we can argue similarly.

Internal standardization ensures that the same sub-tasks within different tasks are performed from the same service within the resource model.

External BPS focuses on the first and second layer of the enterprise architecture and ensures that the choice, order and interface definition of tasks of processes or process variants correspond to an external reference process or best practice process.

From our point of view, the introduction of a precise terminology of the description of the enterprise architecture and the contained components allows us to point out the area of activity of BPS (internal as well as external).

3.2 Deriving the propositions

With respect to the three characteristic elements of SOA – component orientation (including standardization of interfaces), loose coupling and workflow (2007) – we develop propositions about the influence of SOA (in terms of the extent and the way of an already implemented SOA) on BPS.

As explained earlier, the first step to standardize business processes is to homogenize them internally. SOA supports this internal standardization due to the reuse of the same service (fourth layer of the enterprise architecture) for the same sub-tasks (third layer). However, organizations may face two problems when standardizing their business processes: (1) existing legacy systems may hamper the alteration of business processes, as IT is not flexible enough, or (2) the use of standard software may force an organization to change its processes according to this software (Merrifield et al. 2008; Siedersleben 2007). Due to the service model and the three characteristic elements of SOA, the latter offers the flexibility to support every possible business process. Therefore, IT does not longer hamper the business in their aim to internally standardize processes (process model) as the need to align them with the actual implementation (technology model) is not necessary anymore.

> *Proposition P1: SOA eases internal BPS due to loose coupling of business processes and of the supporting IT.*

Introducing SOA requires a very detailed and precise documentation of business processes. Brahe (2007) shows that the implementation will hold up if tasks are not modeled sufficiently or information flows are not clearly specified. This very detailed process documentation is necessary for internal process standardization activities as well (Ungan 2006).

> *Proposition P2: Firms that have established an SOA will more easily conduct internal BPS since the necessary process documentation is already available.*

Whereas component orientation focus on the design of a single application system, SOA focuses on the design of entire system landscapes (Siedersleben 2007). Therefore, an enterprise wide SOA aims at modularizing services of the technology model (Sanchez 2004) in order to implement them only once for reusing them at different locations, guaranteeing freedom of redundancy and minimizing maintenance costs of the IT landscape (Baskerville et al. 2005; Siedersleben 2007). For example, the use of WSDL (Web Service Description Language) promotes loose coupling and component orientation as it offers clearly defined interfaces for using a business functionality encapsulated in a service. Consistently implementing the three-stages model of SOA down to the technology model leads to a reduction of variants of tasks and sub-tasks within the service model, which in turn promotes the standardization of business processes. This results from a reduction of unplanned redundancies of business functionality within heterogeneous, historically grown system landscapes (Siedersleben 2007).

> *Proposition P3: Due to the concepts of modularization and reuse, SOA facilitates a reduction of redundancies within the technology model which in turn leads to enhanced BPS.*

Moreover, SOA also affects external BPS (on the business process layer). While, from an enterprise perspective, the sequencing of services along a business process is primarily standardized by internal BPS (see *Figure 2*), the centralization of the process flow control by implementing an Enterprise Service Bus (ESB), which orchestrates the service calls, facilitates the integration of external best practices (external capabilities) – in form of services offered and provided by external providers – into firm-internal business processes. Consequently, the flexibility of the service model allows to optimize the business process model because tasks which are executed by external services can be integrated more easily. Here, adapting the business process model is not necessary; only the relationship between the service model and the resource model have to be changed (Beimborn et al. 2008). Thus, the following proposition (P4) follows the same argumentation as P1, but applies it to the integration of external capabilities instead of firm-internal standardization.

Proposition P4: SOA facilitates external BPS by enabling the integration of firm-external capabilities (in form of services).

By contrast, we can also argue the opposite way: if business processes have been standardized *before* an SOA is introduced, redundant software can be eliminated and IT costs can be saved (Merrifield et al. 2008). But, the causality is difficult to determine because both BPS and SOA represent requirements for achieving a business value in terms of more efficient business processes and more strategic flexibility (e.g., faster and easier implementation of new business models etc.). Without revising the business processes, we cannot realize technical potentials as well (Davenport 1993; Hammer and Champy 1993). On the other side, BPS without an SOA in place can only be as broad as the used applications and legacy systems allow for. By separating the business process model, the service model, and the resource model, SOA enables step-wise evolutionary process optimization, which is different to the "classical" big bang business process reengineering (BPR) approaches proposed in the early 1990s (Davenport 1993; Hammer and Champy 1993). This flexibility advantage is even more important in times of frequently changing business and regulatory environments which require fast adaptations of the business. Consequently, we can argue that both elements, BPS and SOA, show high synergies when applied together.

Proposition P5: There exists a positive interaction effect between SOA and BPS, leading to super-additive benefits in terms of organizational efficiency and increased strategic flexibility.

3.3 Moderating effects

After deriving theoretical propositions which explain the interplay between SOA and BPS, additional moderator arguments which serve as critical success factors for achieving business value from SOA and BPS are developed. These are (1) the level of service granularity, (2) the centrality of SOA governance, and (3) Business IT alignment.

The first aspect focuses on one of the most important and most difficult questions of efficient and effective SOA design: determining the optimal degree of service granularity (Acharya et al. 2005). During service design and implementation, there are different options to determine the scope of tasks and sub-tasks and their services on the resource layer. If the "size" of the service is chosen too fine-grained, coordination and orchestration may get very complex (Baskerville et al. 2005). Moreover, the technical performance can be negatively affected since the network has to carry out higher workloads than the services themselves. In this context, several authors speak about "chatty services" (e.g. Woodley and Gagnon 2005). From a BPS perspective, fine–grained services would allow maximal standardization, theoretically, but the administrative complexity would, in many cases, prevent the identification of an existing and appropriate service within the firm’s SOA and thus lead to a redundant implementation. This will threaten the objective of BPS.

Proposition PM1a: If the functional scope of the implemented services has been defined too fine-grained, this will hinder internal BPS on the task layer.

By contrast, if the service size is chosen to coarse-grained, reusability potential will decrease. The higher the functional range encapsulated by a service, the more it is fitted to the specific demands of the related task on the business process layer (Baskerville et al. 2005; Brahe 2007). From a BPS perspective, the problem of specifying too large services is that slightly different process requirements from different contexts always result in new service implementations which, in turn, reduce internal standardizability on the task layer.

Proposition PM1b: If the functional scope of the implemented services has been defined too coarse-grained, this will hinder internal BPS on the task layer.

Thus, in both cases, there is a threat of repeatedly implementing similar business logic – which is contrary to the objectives of BPS (Woodley and Gagnon 2005).

As a further argument, we introduce the establishment of an SOA governance as moderator. Since introducing SOA often is a firm-wide change of the IT architecture and since it affects all layers of the firm, establishing a central and powerful organizational unit is a critical success factor (Yoon and Carter 2007). Similarly, standardizing business processes across the firm has to be managed by a central and superordinate instance as well (Muenstermann and Weitzel 2008). Moreover, this central unit has to be capable of administering the implemented services in order to ensure a maximum degree of reusability and reuse (Bieberstein et al. 2005). With sometimes more than thousand services implemented by a firm's SOA (Brahe 2007), this represents a highly complex management task, which not only requires a central SOA governance, but also equipping it with adequate management, power, and documentation tools and mechanisms (Brahe 2007). Without a central SOA governance, SOA cannot be a driver of BPS. Moreover, the positioning of the SOA governance within the firm's organizational structure will also be an adequate unit for setting up and managing firm-wide BPS activities. Since both SOA and BPS affect the whole enterprise, we propose a joint and central SOA and BPS governance to be best suited in order to capture the potential super-additive benefits from both initiatives. This joint governance can enable and ensure a consequent top-down procedure from business process via task to resource layer when implementing SOA (Vinoski 2005).

> *Proposition PM2: A centrally established SOA governance has a positive impact on the relationship between SOA and BPS.*

> *Proposition PM3: Merging SOA governance and BPS governance facilitates achieving the goals of SOA and BPS (i.e., P5).*

In order to implement an IT architecture which efficiently, effectively, and flexibly supports a firm's business processes, the organization has to establish and to maintain a sufficient level of Business IT Alignment. Business IT Alignment is a multi-dimensional concept, not only covering the alignment of business and IT strategy, but also the alignment of structures, in terms of processes, capabilities, routines, and resources (Henderson and Venkatraman 1993) – which is also reflected by the SOM introduced above. Further, Reich and Benbasat distinguish an intellectual dimension and a social dimension of alignment. The first covers the congruence of explicated and documented knowledge, such as strategies, project plans etc., while the social dimension captures the "shared mindset" and a common understanding between the managers and staff from business and IT departments (Reich and Benbasat 2000). This social dimension can again appear on the strategic level (i.e., between executives or top management), such as measured by Reich and Benbasat, and on the remaining levels of the firm such as trust and mutual understanding between IT and business managers and employees involved in joint projects or even during daily business (Beimborn et al. 2006; Franke et al. 2005).

All decision problems discussed earlier, such as the optimal level of granularity or the implementation of an adequate SOA governance, ideally incorporating the BPS governance as well, emphasize the critical need for having sufficient alignment between business and IT both on the strategic and on the structural level, and along the intellectual and the social dimension. Without good alignment, which has to be adopted and carried out by each individual involved (social dimension), neither a successful SOA implementation nor effective BPS activities are possible. Exchanging knowledge and establishing a common understanding of "service" and the firm's business processes is necessary for collaborating on process modularization, deciding about the level of service granularity, and standardizing business processes. Ideally, the firm establishes alignment engineers which show high expertise both on the business side (process layer) and on the IT side (resource layer) (Brahe 2007). This will greatly ensure the mapping between the sub-tasks of the process layer and the service implementations on the resource layer.

> *Proposition PM4: Strategic and structural Business IT Alignment is critical for successfully implementing an SOA and for its impact on BPS.*

Figure 3 summarizes the derived propositions:

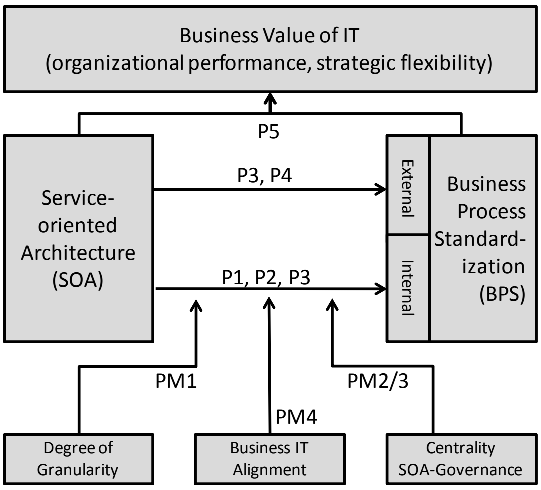

Figure 3. Conceptual research model about impact of SOA on BPS.

4 CONCLUSION AND NEXT STEPS

In this paper, we developed a research model consisting of propositions regarding the impact of Service-oriented Architecture (SOA) on business process standardization (BPS). Both concepts represent important factors for increasing a firm's performance and strategic flexibility. Drawing on the main design concepts of SOA, we propose a positive effect on BPS resulting from loose coupling and modularity which helps to disconnect the business logic of the business processes from their supporting IT. Moreover, modularity and reuse help reducing unwanted redundancies of implemented business logic, which makes BPS easier as the same business logic does not have to be altered at different implementations. These relationships and the potential to integrate external capabilities are moderated by governance design as well as by the level of granularity, which has a direct effect on the potential to reuse services. Additionally, Business IT Alignment is expected to be a critical success factor moderating the direct effects as well as affecting the moderating effects mentioned before. Overall, we expect a combined positive influence of both SOA and BPS together on a firm's performance and strategic flexibility.

As the next step, we intend to refine the theoretical model developed in this paper by conducting case studies Based on interviews with managers responsible for SOA governance in large firms, we get insights into the different service design parameters and management mechanisms. Moreover, accompanying the whole process from specifying a certain demand for a new service on business side (process layer) to its final implementation and integration within the firm's SOA (resource layer) will sharpen our understanding how reusability is determined and how reuse is finally achieved. Thus, the relation from SOA to BPS can be explored from an SOA-driven perspective (i.e., exploratory approach). In other case studies, we will explicitly interview managers involved in firm-wide process standardization activities and will examine – if an SOA is available – whether our propositions can be indicatively justified (i.e. confirmatory approach). After refining our theoretical model, we will transform it into an empirical model, consisting of testable hypotheses and measurable constructs. In this stage, it might be necessary to split single theoretical propositions into several hypotheses which can be quantitatively validated. Moreover, the rich concepts of SOA and BPS need to be unfolded to multi-dimensional constructs which are represented by measurement models each. For example, BPS has been operationalized as a two-dimensional construct, consisting of internal and external BPS, each being represented by a multi-item measurement model, in e.g., (Muenstermann et al. 2009b). Subsequently, we intend to conduct a survey in order to measure our constructs and to validate our hypotheses by using common SEM approaches.

Ultimately, this research project will clarify basic relationships between SOA and BPS and uncover essential success factors for realizing both of them. Thus, we hope to contribute to the research on the business value of flexible and modular IT architectures as well as to managerial reality.

References

Acharya, M., Kulkarni, A., Kuppili, R., Mani, R., More, N., Narayanan, S., Patel, P., Schuelke, K.W., and Subramanian, S.N. (2005). SOA in the Real World - Experiences, In Proceedings of the 3rd ICSOC, Amsterdam: Springer.

Arsanjani, A. (2004). Service-oriented modeling and architecture. IBM developerworks, cited 12/01/2008, from http://www.ibm.com/developerworks/library/ws-soa-design1/

Bala, H., and Venkatesh, V. (2007). Assimilation of interorganizational business process standards. Information systems research, 18 (3), 340-362.

Baskerville, R., Cavallari, M., Hjort-Madsen, K., Pries-Heje, J., Sorrentino, M., and Virili, F. (2005). Extensible Architectures: The Strategic Value of Service-Oriented Architecture in Banking, In Proceedings of the 13th European Conference on Information Systems. Regensburg, Germany.

Beimborn, D., Franke, J., Gomber, P., Wagner, H.-T., and Weitzel, T. (2006). Die Bedeutung des Alignments von IT und Fachressourcen in Finanzprozessen: Eine empirische Untersuchung (The Importance of Alignment Between IT and Business in Financial Processes). Wirtschaftsinformatik (Business & Information Systems Engineering), 48 (5), 331-339.

Beimborn, D., Joachim, N., and Weitzel, T. (2008). Drivers and Inhibitors of SOA Business Value – Conceptualizing a Research Model, In Proceedings of the 14th AMCIS. Toronto, ON, Canada.

Bieberstein, N., Bose, S., Walker, L., and Lynch, A. (2005). Impact of Service-Oriented Architecture on Enterprise Systems, Organizational Structures, and Individuals. IBM Sys. J., 44 (4), 691-708.

Brahe, S. (2007). BPM on Top of SOA: Experiences from the Financial Industry, in: Business Process Management, P.D.G. Alonso and M. Rosemann (eds.). Springer, Heidelberg, 96-111.

Davenport, T.H. (1993). Process innovation: reengineering work through information technology. Harvard Business School Press, Boston, MA, USA.

Davenport, T.H., and Short, J.E. (1990). The new industrial engineering: information technology and business process redesign. Sloan Management Review, 31 (4), 11-27.

Demirkan, H., and Goul, M. (2006). AMCIS 2006 Panel Summary: Towards the Service Oriented Enterprise Vision: Bridging Industry and Academics. CAIS, 18 (1), 546-556.

Erl, T. (2005). Service-Oriented Architecture: Concepts, Technology, and Design. Prentice Hall, Upper Saddle River, NJ.

Ferstl, O., and Sinz, E.J. (1998). Modeling of Business Systems Using SOM, in: Handbook on Architectures of Information Systems, P. Bernus, K. Mertins and G. Schmidt (eds.). Springer, Berlin et al., 347-367.

Ferstl, O.K., and Sinz, E.J. (1995). Der Ansatz des Semantischen Objektmodells (SOM) zur Modellierung von Geschaeftsprozessen (The Semantic Object Model (SOM) approach to model business processes). WI (Business & Information Systems Engineering), 37 (3), 209-220.

Ferstl, O.K., and Sinz, E.J. (1997). Re-Engineering von Geschäftsprozessen auf der Grundlage des SOM-Ansatzes (Re-engenineering business processes based on the Semantic Object Model (SOM)). Otto-Friedrich-Universität Bamberg, Lehrstuhl für Wirtschaftsinformatik.

Franke, J., Wagner, H.-T., and Weitzel, T. (2005). The role of IT business alignment for value creation: a multiple case study among German banks, In Proceedings of the 26th International Conference on Information Systems (ICIS), Las Vegas, NV, USA.

Hadfield, W. (2007). BP to save £600m in global IT process standardisation. Computer Weekly, 5.

Hall, J.M., and Johnson, M.E. (2009). When Should a Process Be Art, Not Science? Harvard Business Review, 87 (3), 58-65.

Hammer, M., and Champy, J. (1993). Reengineering the corporation. HarperBusiness, New York.

Heffner, R. (2008). SOA Adoption: Budgets Don't Matter Much. Forrester Research.

Henderson, B.D., and Venkatraman, N. (1993). Strategic Alignment: Leveraging Information Technology for Transforming Organizations. IBM Systems Journal, 32 (1), 4-16.

Kindler, E., and Nuettgens, M. (2005). Business Process Reference Models, In Proceedings of the Workshop on Business Process Reference Models (BPRM 2005), Nancy, France.

Lampel, J., and Mintzberg, H. (1996). Customizing Customization. Sloan Man. Rev., 38 (1), 21-30.

Lee, O.-K.D., Lim, K.H., and Wei, K.K. (2004). The roles of information technology in organizational capability building: an IT capability perspective, In Proceedings of the 25th International Conference on Information Systems (ICIS), Washington, D.C., USA, pp. 645-656.

Malone, T.W., Crowston, K., Lee, J., and Pentland, B. (1999). Tools for inventing organizations: Toward a handbook of organizational processes, Management Science, 45 (3), 425-443.
Melville, N., Kraemer, K.L., and Gurbaxani, V. (2004). Review: Information Technology and Organizational Performance: An Integrative Model of IT Business Value. MISQ, 28 (2), 283-322.
Merrifield, R., Calhoun, J., and Stevens, D. (2008). The Next Revolution in Productivity. Harvard Business Review, 86 (6), 72-80.
Muenstermann, B., Eckhardt, A., and Weitzel, T. (2009a). Join the standard forces - Examining the combined impact of process and data standards on business process performance, In Proceedings of the 42nd HICSS 2009, Big Island, Hawaii, USA.
Muenstermann, B., Joachim, N., and Beimborn, D. (2009b). An empirical evaluation of the impact of process standardization on process flexibility and process performance, in: Forthcoming in Proceedings of the 15th AMCIS, San Francisco, USA.
Muenstermann, B., and Weitzel, T. (2008). What are process standards?, In Proceedings of the 2008 International Conference on Information Resources Management. Niagara Falls, ON, Canada.
Ramchandani, K., and Harwood, K. (2005). New competitive weapons in the insurance business - Insurance component business model (CBM). IBM Business Consulting Services.
Reich, B.H., and Benbasat, I. (2000). Factors that influence the social dimension of alignment between business and information technology objectives. MIS Quarterly, 24 (1), 81-113.
Sánchez-Rodríguez, C., Hemsworth, D., Martínez-Lorente, Á.R., and Clavel, J.G. (2006). An empirical study on the impact of standardization of materials and purchasing procedures on purchasing and business performance. Supply Chain Management, 11 (1), 56-64.
Sanchez, R. (2004). Creating modular platforms for strategic flexibility. Design Management Review., 15 (1), 58-67.
Shaw, D.R., Holland, C.P., Kawalek, P., Snowdon, B., and Warboys, B. (2007). Elements of a business process management system: Theory and practice. BPM Journal, 13 (1), 91-107.
Siedersleben, J. (2007). SOA revisited: Komponentenorientierung bei Systemlandschaften (SOA revisited: Component-Orientation in System Landscapes). Wirtschaftsinformatik (Business & Information Systems Engineering), 49 (Special Issue), 110–117.
Sinz, E.J. (2008). SOA und die bewährten methodischen Grundlagen der Entwicklung betrieblicher IT-Systeme (SOA and the proved development fundamentals of business IT-systems). Wirtschaftsinformatik (Business & Information Systems Engineering), 50 (1), 70 -72.
Ungan, M.C. (2006). Standardization through process documentation. BPM Journal, 12 (2), 135-148.
Venkatesh, V. (2006). Where To Go From Here Thoughts on Future Directions for Research on Individual-Level Technology Adoption with a Focus on Decision Making. Decision Sciences, 37, 497-518.
Vinoski, S. (2005). What SOA Isn’t: Debunking the Myths of Service Orientation, in: Business Integration Journal. April.
von Stetten, A., Muenstermann, B., Eckhardt, A., and Laumer, S. (2008). Towards an Understanding of the Business Value of Business Process Standardization – A Case Study Approach, In Proceedings of the 14th AMCIS, Toronto, ON, Canada.
Woodley, T., and Gagnon, S. (2005). BPM and SOA: Synergies and Challenges, in: Web Information Systems Engineering – WISE 2005. Springer, Heidelberg, 679-688.
Wüllenweber, K., and Weitzel, T. (2007). An empirical exploration of how process standardization reduces outsourcing risks, In Proceedings of the 40th HICSS, Waikoloa, Big Island (HI), USA.
Yoon, T., and Carter, P.E. (2007). Investigating the Antecedents and Benefits of SOA Implementation: A Multi-Case Study Approach, In Proceedings of the 13th AMCIS, Keystone, Colorado, USA.