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Assessment of SOA Potentials in B2B Networks – Concept and Application to German Used Car Distribution Networks

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Abstract

Although service-oriented architecture (SOA) is supposed to increase external integration capabilities, it is mostly applied within company boundaries. How companies should apply SOA to improve their inter-organizational relationships is not, as yet, well understood. Although there are several examples of service-oriented concepts in the B2B context, there has been little research in which the different facets of SOA application are analyzed in inter-organizational relationships and B2B networks. This research aims at filling this gap. First, it identifies SOA potentials from literature and classifies them into a conceptual model for B2B networks. Second, it applies the conceptual model to used car distribution as a real-world scenario. This real-world example demonstrates that a SOA business case is highly situational and that key SOA capabilities need to be mapped to the specific industry context.

Keywords: Service-oriented Architecture (SOA), Web Services, Business Networking, Used Car Distribution

1 Introduction

The need for collaboration within value chains is rapidly increasing in many industries, driving enterprises to align and electronically integrate their business processes with those of their business partners. Since the emergence of the Web services paradigm, many scholars have predicted that the general acceptance of open Internet-based standards will dramatically reduce interaction costs within and across organizations, thus generating greater operational flexibility (Alonso et al., 2003; Hagel & Brown, 2001). In the B2B context, Web services and service-oriented architectures (SOA) are expected to stimulate inter-organizational process integration (Daniel & White, 2005) and improve coordination efforts in distributed business networks (Van Heck & Vervest, 2007). There are various examples of the application of service-oriented concepts in B2B networks, for example, in e-tourism (Fodor & Werthner, 2004), the travel industry (Feuerlicht, 2005), the telecommunications sector (Zimmermann et al., 2005), and in the automotive industry (Legner & Vogel, 2008; Viering & Müller, 2007).

However, we still lack a systematic analysis of how SOA and Web services can be leveraged to improve the coordination between distributed actors forming a business network. This research sets out to investigate two basic questions:

- How should SOA be applied in order to strengthen existing business networks and B2B relationships?
- How can SOA potentials be systematically identified and assessed in practice?

Our research process consisted of two stages: First, we reviewed the existing body of research and developed theoretical propositions regarding the role of SOA in business networks. We consequently related concepts from the more technically oriented Web services research to prior studies that have investigated information technology's impact on organizational coordination. In a second step, we applied our propositions to a real-world scenario to demonstrate how SOA potentials can be identified and assessed in practice. Based on the following consideration, we chose the used car distribution network as the real-world scenario: In general, automotive distribution networks have undergone major changes over the last decade due to the emergence of online channels and online brokers (Mercer Management Consulting, 2001; Selz & Klein, 1998). This applies specifically to used car distribution, which has not attracted much research attention. In order to identify and assess SOA potentials for used car distribution, we reviewed prior studies and conducted expert interviews with the representatives of different stakeholders, for example, dealers, OEMs, and online brokers.

The remainder of this paper is structured as follows: Section 2 presents our conceptual model, which builds on finding from prior literature in the fields of SOA and business networking. The model classifies SOA potentials according to business networks' various examination dimensions. Section 3 outlines how our conceptual model can be used to identify and assess SOA potentials in a specific real-world business network. Based on a comprehensive business network analysis of used car distribution, we were able to identify a set of industry-specific SOA potentials and to assess them by means of interviews with industry experts. Section 4 concludes by summarizing the findings and providing an overview of future fields of research.

2 SOA Potentials in Business Networks

In order to identify SOA potentials and their relevance for B2B networks, it is important to understand SOA's capabilities and how they can be applied in inter-organizational relationships. This section derives SOA capabilities from the findings of existing literature (section 2.1) and classifies the resulting potentials for SOA in B2B networks (section 2.2).

2.1 SOA Capabilities: Interoperability, Agility, and Reusability

Recently, SOA has emerged as a new paradigm for solving the many issues related to integration in heterogeneous environments. W3C (2004a) defines a *service-oriented architecture* as "a form of distributed systems architecture." Since technologies for internal and external integration are merging with SOA, service-oriented concepts are regarded as the foundation of the future e-business platform (Dorn et al., 2009; Legner & Vogel, 2008). Whereas the constantly growing body of SOA research has originally been mostly technology-oriented, focusing on architectural principles or on Web services as a specific implementation technology, recent publications take a broader view (Viering et al., 2009). They view SOA in the larger organizational and strategic context and emphasize the specific capabilities that are created by the service-oriented paradigm: Interoperability, agility, and reusability.

According to McGovern et al. (2003) and W3C (2004b), SOA fosters *interoperability* in heterogeneous environments through standardized components. Each service component is defined and documented by a well defined, network-addressable public interface and a formal contract (Erl, 2005; Fritz, 2004; McGovern et al., 2003; Newcomer & Lomow, 2004). Consequently, a SOA supports standardized information exchange between provider and requester agents (W3C, 2004a). Although SOA is not tied to a specific technology, open Web service standards are an increasingly applied approach to overcome platform and vendor-dependency. In addition, the loose coupling of independent, standardized software components promotes interoperability across programming languages and platforms, as well as business processes' dynamic choreography (Demirkan et al., 2008).

Besides its beneficial effects in terms of interoperability, a SOA, which consists of loosely-coupled, stateless, and autonomous services, is considered to be more *agile* regarding meeting new business requirements and adapting to changes (Erl, 2005; McGovern et al., 2003). By means of standardized connectivity, services can be readily integrated and flexibly composed to support entire business processes and scenarios (Baskerville et al., 2005; Fritz, 2004). Furthermore, agility is supported by the possibilities to design services incrementally, for example, by separating presentation, business, and data-access logic as well as by abstracting from the technical implementation (Fritz, 2004; Newcomer & Lomow, 2004; Papazoglou et al., 2006). These factors foster agility with regard to service development and technical capabilities' alignment with changing business needs.

SOA is also thought to reduce redundant functionality and to foster *reusability*. Modularization reduces complexity by dividing existing applications into reusable parts (Fritz, 2004). Standardized and comprehensive service specifications, which provide a logical view of business processes, programs, and information, support the deployment of specific service functionality in different contexts (W3C, 2004a). In other words, each service offers specific business functionalities and, at the same time, guarantees that it is replicable (Baskerville et al., 2005). Specific functionality implies that services are meaningful to a service requester, perform discrete tasks, and provide simple interfaces through which their functionality can be accessed in order to encourage reuse and loose coupling (Newcomer & Lomow, 2004). Hence, SOA is an organizing and delivery paradigm, providing more value through the use of locally "owned" capabilities as well as those under the control of others (Oasis, 2006).

2.2 Deriving SOA Potentials in Business Networks

The above-mentioned three SOA capabilities can assist in assessing SOA potentials in business networks. A business network is an entire value creating system and comprises different actors (customers, suppliers, complementors, competitors, service providers) that collaborate to produce value and to achieve customer satisfaction (Iyer et al., 2003). A transformation towards networked forms of organizing requires a good understanding and definition of the relationships between the business network's strategy and structure, and its underlying infrastructure and systems (van Heck & Ververst 2007; Österle, Fleisch & Alt, 2001). Consequently, Alt & Österle (2004) have recommended a comprehensive business networking architecture and a method that supports the alignment of strategic and organizational capabilities with the IS/IT architecture. This approach differentiates three layers (Österle, Fleisch & Alt, 2001): On the business layer, companies define the customers and partners with which they cooperate and the type of linkages they establish with them. This layer covers WHAT the company's business network consists of. The approach is further refined on the process layer by process maps covering activities as well as input and output relationships. The process layer therefore describes HOW business is done within the network. The IS/IT layer covers the means BY WHICH the processes are carried out by describing the application, integration, and infrastructure architecture. Based on this business network architecture, we suggest distinguishing the SOA's first order effects that relate to the IS/IT infrastructure from the second order effects, which are generated by improved IS/IT capabilities on the process and business layers.

Table 1 summarizes our conceptual model, which classifies generic SOA potentials derived from the literature according to the three SOA capabilities and different business network layers:

Table 1: SOA Potentials on different Business Network Layers

	Interoperability	**Agility**	**Reusability**
Business Layer	SOA supports intra-enterprise and inter-enterprise *collaboration* and *coordination* along the whole value chain. (Demirkan et al., 2008; Legner & Wende, 2006).	SOA is an approach to offer and align services according to business needs. SOA supports *new business configurations* through flexible IS infrastructures, reduced complexities, and operating environments' decreased costs (Demirkan et al., 2008; Tafti et al., 2008).	Disaggregated value networks can be realized through the creation of a loosely coupled architecture in which business and technical components provide reusable, dynamically discoverable, and complementary *shared services* (Demirkan et al., 2008).
Process Layer	A process-oriented SOA approach, which also relies on semantic and pragmatic conventions, supports *seamless process integration* (Legner & Vogel, 2008).	In their elemental form, services are business functions or processes that can be called up and executed on demand. Consequently, SOA supports the *implementation of process changes*. (Zhao et al., 2007).	The interaction between business processes and business services is based on a concept of *reusable process components*. (Lublinsky, 2007) The latter can be reused and integrated more readily if *public* business processes are defined and support the outtasking of business functionality (Dreifus et al., 2008).
IS Layer	*Open Internet standards* like XML, SOAP, and WSDL foster interoperability across platforms. This leads to more cost-efficient and scalable ways of external systems integration (Legner & Vogel, 2008), along with internal workflow integration (Baek Kim & Segev, 2005).	As a B2B integration architecture, SOA enables enterprises to communicate *standards-based B2B events* (Bussler, 2002). An event can trigger the invocation of one or many services. Those services may perform simple functions or entire business processes (Demirkan et al., 2008; Michelson, 2006).	The goal of SOA is to expose an organization's private computing assets as *reusable business services*. With SOA, *large and complex applications* can be broken down into a set of constituent components or services that can be easily reused and re-configured (Arsanjani, 2005).

In summary, on the *business layer*, SOA helps improve coordination between independent actors, re-configure the network composition, and helps with the sharing of resources along the value chain.

On the *process layer*, interoperability, agility, and reusability help establish seamlessly integrated processes, align organizational-internal (private) and inter-organizational (public) processes (cf. Legner & Wende, 2006), as well as helping with adapting to changes in the business environment.

On the *IS layer*, SOA contributes to homogenizing distributed information, communicating in a standard-based way, swiftly reacting to events, and flexibly re-configuring services to address new business requirements.

Furthermore, *interoperability* provides companies with the ability to electronically communicate with various business partners, to exchange information on a common basis, and to quickly and efficiently establish digital connections. It thereby increases an organization's ability to integrate business processes with business partners and to collaborate with the different actors along the value chain (Legner & Vogel, 2008).

The *agility* of an enterprise is fostered through a more agile information infrastructure. Moreover, agility is an organization's ability to sense environmental change and respond efficiently and effectively to that change (McCoy & Plummer, 2006). Zhao et al. (2007) point out that if an organization is to remain agile enough to meet continual change in customer demand, it does not only need agility in its ability to manufacture a product with minimal waste, but it also needs agility in its entire value chain. Agility implies that companies adapt or extend business processes according to business requirements, react fast and with little effort to changes, and adjust services independently of each other.

Reusability prevents the expendability of resources and IS landscape complexity through component reuse on the IS layer. In the inter-organizational context, reusability does not only imply that services are reusable in different contexts, but also that shared resources are used whenever it is beneficial. This ultimately fosters specialization within a business network and leads to increased levels of external sourcing (Österle, Fleisch & Alt, 2001).

3 Application to Used Car Distribution

The next section first motivates our real-word example by providing a short introduction to the used car distribution in Germany. Building on the conceptual model outlined in **Table 1**, section 3.2 describes a three-step approach to identify and assess SOA potentials in a real-world business network. Sections 3.3 and 0 present the results of our assessment.

3.1 Overview of Used Car Distribution

In Germany, 6.11 million used cars were sold in 2008 compared to the 3.09 million new vehicles (Deutsche Automobil Treuhand GmbH, 2009). Used car sales account for more than 55 billion Euros in revenues, which represents one third of the total automotive revenues (Deutsche Automobil Treuhand GmbH, 2007; Mercer Management Consulting, 2005). Used car purchasing and sales comprise interactions between customers and local dealers (B2C), between dealers (B2B), as well as between individuals (C2C). Over the last years, a shift has been observed from C2C to B2C and B2B interactions: C2C's market share is continuously shrinking – from 57% in 1988 to 45% in 2008 (Deutsche Automobil Treuhand GmbH, 2009). Furthermore, the distribution of used cars has become increasingly important if dealerships are to maintain a certain level of profitability, since it often provides higher gross margins than those of new cars or services (Car Internet Research Program II & Capgemini, 2007).

Additionally, online channels and cybermediaries have significantly altered automotive distribution, which was traditionally dominated by national sales organizations and local dealers (Dudenhöffer & Koster, 2003; Mercer Management Consulting, 2001; Selz & Klein, 1998). Today, more than 89% of potential used car customers use the Internet for product search and information, while 91% of all car dealerships use it to purchase and sale used vehicles (Deutsche Automobil Treuhand GmbH, 2009; Dudenhöffer & Koster, 2003). Online brokers, like mobile.de and autoscout24.de, offer more than 85% (Autohaus Online, 2008) of the used cars available in the German market. However, the online used car market still lacks exclusive Web dealers in the B2C environment, which is probably due to the customers' wish to experience used cars physically.

3.2 Methodology to Identify and Assess SOA Potentials in Used Car Business Network

Starting with an analysis of the business network (Alt & Österle, 2004) for used car distribution, we identified various business challenges faced by this network (e.g., an accurate assessment of used cars) and measures to assist the different actors in the business network in overcoming the identified challenges (e.g., an online service documenting the history of a used car). Section 3.3 will present the results of our business network analysis. The latter forms the basis for relating generic SOA potentials to specific business challenges in used car distribution. The results of this mapping effort will be presented in section 3.4. The remainder of this paragraph will elaborate on the methodology.

In a first step, a business networking analysis was conducted which involved an analysis of secondary sources as well as expert interviews. A solid understanding of the customer process is essential in order to identify the different stakeholders and their relationships within the business network. Consequently, we derived a generic customer process for the purchase of used car from prior work (Cenfetelli & Benbasat, 2002; Heinemann, 2007; Wilke, 2007). We subsequently identified the different actors in the business network as well as their input-output-relationships. By analyzing prior studies and online sources dealing with used car distribution, we collected the business challenges as well as 56 measures with which to solve these issues. Next, experts were asked to validate our conceptualization of the business network (cf. Figure 1) and the business challenges, as well as to assess the suggested measures' relevance and degree of implementation on a five-point Likert scale. Assisted by a structured questionnaire, we interviewed 14 dealer representatives (90 min).

In the second step, we mapped our suggested measures to the generic SOA potentials resulting from our conceptual model, as described in section 2. We followed the argumentation by Heutschi (2007) and Jain et al. (2003), who state that a successful SOA and component development reflect the business domain's specific quality characteristics or requirements. We restricted our analysis to the functional requirements (Balzert, 1998) derived from the business networking analysis.

The mapping was performed as follows: Starting with the 56 measures collected during the business network analysis, we assessed whether each could be related to a generic SOA potential from **Table 1**. If so, we assigned a measure to the SOA potential which addressed this issue best (cf. Jain et al., 2003). Consequently, we not only eliminated 14 measures that were not solvable with SOA, but also clustered function-related measures into industry-specific SOA potentials.

Finally, for our assessment of industry-specific SOA potentials, we calculated the relevance and degree of implementation ratings as based on the expert interviews. The values depicted in **Table 2** were calculated from the average ratings of the underlying measures.

3.3 Analysis of Used Car Business Network

The first step of our methodology as described in paragraph 3.2 is derived from the business networking approach suggested by Alt & Österle (2004) and conceptualizes the business network for used car distribution (Figure 1). The customer process starts with the specification of the customers' requirements. It comprises all activities performed by the customer from the evaluation and purchasing to the use of the car, and ends with the replacement. Attributes like the brand, age and state, technical equipment, and price are the most crucial factors for customer purchasing decisions (Heinemann, 2007).

Dealers play a focal role, since they facilitate B2B and B2C transactions between buyers and sellers. More than 11,000 dealers in Germany (Diez, 2005) offer used cars as well as additional services, like maintenance agreements, financing, leasing, and car and warranty insurance. While they aim at satisfying the entire customer process from the requirements specification and evalution to the replacement of the car, they rely on a network of partners to do so.

Car manufacturers, which are often denoted as OEM (Original Equipment Manufacturer), play a secondary role in the used car business network. They are, however, increasingly interested in customer brand retention, the price value and brand image's stability, and the effective stock management of their cars' fleet. The main challenges lie in finding a balance between dealerships' and manufacturers' interests, as well as the conflict of interest between the sales of new and used cars. OEMs support their authorized dealerships' used car distribution with technical and sales trainings, software, and used car programs. In some cases, for example, when fleet cars are sold directly to customers (Mercedes-Benz Deutschland, 2009), OEMs also interact directly with the customer. They have established online used car locators and use their websites as an entry point to search for branded used cars within their dealership.

Online brokers play a focal role in the early phases of the customer process, notably the information and matchmaking phase. As cybermediaries (Selz & Klein, 1998), they advertise used car offerings, providing search as well as lead management services. Consequently, online brokers have to ensure easy information retrieval and access for their customers (Scout24 Media, 2008). Whereas an online broker supports matchmaking in the early phase, commercial transactions are usually directly negotiated between buyers and sellers. In the case of B2B transactions, online brokers also facilitate payment and delivery (kfz-betrieb.de, 2008). Online brokers' competitive factors are a vast used car offering and a large user basis. Together, the two German market leaders offer more than 1.9 million used cars (CAR-Center Automotive Research, 2008; Steiler, 2009) and have high user rates (e.g., 3.52 million monthly users at autoscout.de (Scout24 Media, 2008). Smaller online brokers, like gebrauchtwagen.de or bidgo.de, try to differentiate themselves, for example, through better integration with financial service providers, quality assurance for their used car offering, or Web 2.0 community features.

Financial and leasing institutions, as well as insurance companies complement used cars sales with financing, leasing, and insurance offerings. These additional services often generate profit margins of around 4%, which are higher than the margins of a used car sale (Mercer Management Consulting, 2001). The main challenge lies in integrating those complementary services into the various partner environments.

Car assessors, like Dekra or TÜV, are important influencers in the decision-making process, since they increase the transparency regarding risks and deficiencies for the customer. Consequently, car assessors are interested in a good reputation, swift and credible assessments, as well as revenue generation through their assessments.

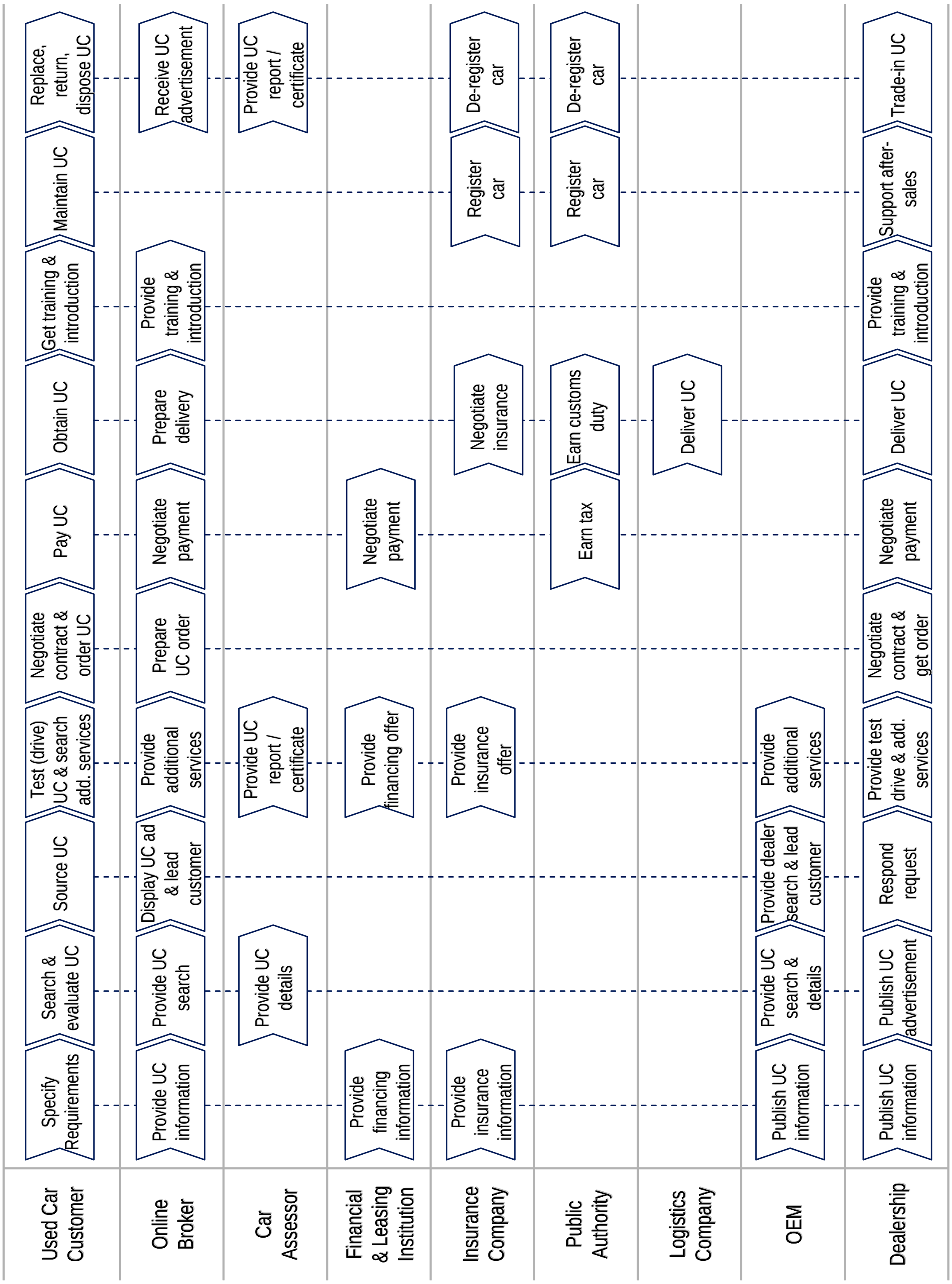

Figure 1: Roles and Relationships in Used Car Business Network

The used car distribution network faces difficulties due to the increasingly saturated markets, customers making greater demands, high marketing and distribution costs, as well as equity financing challenges (Diez, 2005; IBM Global Business Services & Roland Berger Strategy Consultants, 2007). Prior studies on used car distribution (Arbeiter, 2005; CG Car-Garantie Versicherungs-Aktiengesellschaft, 2007; Koller & Löwenstein, 2008; TÜV SÜD AG, 2007) emphasize the following five business challenges in the business network from the dealer perspective:

(1) Stock management: Currently used cars remain with the dealer for on average of about 110 days (Autogazette.de, 2008; Koller & Löwenstein, 2008), which results in high inventory carrying costs.

(2) Assessment of cars: The correct assessment of the used car when accepting it for sale (Koller & Löwenstein, 2008) is a prerequisite to prevent financial loss for the dealers and to realize higher stock turns.

(3) The general sales approach: The emergence of the Internet and online brokers has generated full market transparency for customers, thereby enforcing new approaches in used car sales (Selz & Klein, 1998).

(4) The bundling of complementary services: Although service bundles are an important instrument to generate higher profit margins (Mercer Management Consulting, 2001), the organizational and administrative burden to combine offerings from different partners is still high.

(5) Process efficiency: Dealers need to optimize their internal and external processes (TÜV SÜD AG, 2007). Internal optimization focuses on streamlining operations and relies heavily on the use of information systems. External optimization relates to coordination with partners in respect of offering cars on the market (e.g., via online brokers) or service bundling (e.g., via financial institutions).

3.4 SOA Potentials in Used Car Distribution

Based on the methodology outlined in section 3.2, we have derived a set of SOA potentials for used car (UC) distribution. **Table 2** provides a summary and displays the relevance and implementation ratings in respect of each SOA potential, as well as the number of clustered single measures (in brackets). Our results outline promising areas for possible SOA deployments in used car distribution, namely those with high relevance and a low degree of realization with prior technologies. An example is II3: An integrated workflow management system based on standardized internal and external services would improve a dealer's day-to-day business operations significantly. This is underpinned by a 4.42 average relevance and 2.40 average implementation rating. Since the implementation rating is low, we deduce that such workflow management systems have not yet been realized. Given the relevance of the associated measures from a business perspective, this points to a significant potential for SOA.

From **Table 2**, we found that interoperability is an issue in the used car distribution network where SOA might contribute to a smoother collaboration between dealers and their business partners. Our assessment reveals that interoperability is highly relevant on all layers, which is demonstrated by relevance rankings that lie between 3.50 and 4.48. Nevertheless, interoperability issues are only partly addressed in the used car business network: While collaboration with online brokers (IB2) is strongly realized, a more extensive collaboration between OEMs and dealers, for example, in the area of customer referral management (IB1), is lagging. In addition, interoperability through external process integration is strongly realized in respect of operational process integration (IP2) (e.g., car reconditioning), but less so regarding customer process integration (IP1). On the IS layer, we identified interoperability potentials such as the standards-based exchange of used car advertisements and product information (II1), and the exchange of customer information (II2). As an example, dealers and online brokers could seamlessly integrate their customer-facing processes if standards-based services for exchanging customer referrals were provided.

Agility potentials were considered more relevant on the business and IS layers, attaining average rankings of between 3.96 and 4.61, than on the process layer. This demonstrates the potential of SOA to facilitate changing business configurations and event-driven decisions in order to strengthen competitiveness and adaptability in respect of used-car distribution. On the business layer, partnerships for service bundling (AB2) are currently realized more often than purchasing partnerships for the sourcing of used cars (AB1). On the IS layer, the usage of market signals for event-driven decisions (AI1) are, on the one hand, considered very relevant and applied by nearly all the interviewees. On the other hand, the usage of event-driven processing to react to changing customer demands (AI3) is still low. Another IS agility potential lies in event-driven business process support for car assessment with partners, which has a medium implementation value of 3.08. Conversely, agility process potentials (e.g., virtual car sales (AP1)) received a lower rating regarding their relevance. Selling by means of various channels, such as cross-border sales (AP2), received a less relevant rating.

Table 2: Assessed SOA Potentials in Used Car Distribution

	Interoperability	Agility	Reusability
Business Layer	**IB1 [3.50 / 2.75 / 1]:** *Collaboration and coordination* (between OEMs and dealers) for the mediation of referrals. **IB2 [4.35 / 4.46 / 2]:** *Collaboration and coordination* between dealerships and online brokers in respect of used car advertisement. .	**AB1 [3.96 / 3.55 / 3]:** *Changing business configurations* for sourcing, (e.g., purchasing cooperation between dealerships) and selling highly demanded cars. **AB2 [4.03 / 4.76 / 5]:** *Changing business configurations* for service bundling (e.g., combined financing and maintenance contract).	**RB1 [4.29 / 3.46 / 2]:** *Shared services* to provide single-car-specific information (e.g., equipment details / repair history). **RB2 [4.28 / 3.36 / 4]:** *Shared services* to retrieve car-type-specific market information (e.g., regional prices, tax and regulation information, broken down statistics).
Process Layer	**IP1 [3.69 / 3.29 / 1]:** *Customer process integration* with partners (e.g., between online brokers and dealers in respect of online shopping or buying additional services from financial institutions). **IP2 [4.48 / 4.08 / 2]:** *Operational process integration* with partners (e.g., between dealerships and online brokers or in respect of car reconditioning).	**AP1 [2.42 / 1.85 / 1]:** Virtual car sales in B2B-environments with the *integration into different partner processes*. **AP2 [3.63 / 3.71 / 3]:** *Process changes* to sell on various channels (e.g., cross-border sales via online brokers).	**RP1 [3.93 / 3.39 / 2]:** *Reusable process components* (e.g., virtual tours, used car configurators) to support used car marketing efforts. **RP2 [3.77 / 1.77 / 2]:** *Reusable process components* from third party service providers (e.g., logistics company / public authorities for registration).
IS-Layer	**II1 [4.13 / 3.65 / 2]:** *Standards-based data exchange* for used car advertisement and product information. **II2 [3.76 / 2.88 / 2]:** *Standards-based data exchange* of customer information (e.g., contract data, search preferences). **II3 [4.42 / 2.40 / 1]:** Integrated used car workflow management system based on *standardized internal and external services*.	**AI1 [4.61 / 4.90 / 3]:** *Event-driven processing* to adjust prices and stocks based on market signals. **AI2 [4.08 / 3.08 / 1]:** *Event-driven processing* to support car assessment. **AI3 [4.15 / 3.08 / 1]:** *Event-driven processing* to react to customer demands / requests.	**RI1 [4.32 / 3.46 / 4]:** *Reusable multi-channel business services* for third party product integration (e.g., insurance / financing bundles).
Legend: SOA potentials are assessed on a five-point Likert scale from 1 – low to 5 – high [Avg. relevance rating / Avg. degree of implementation (without SOA) / Number of single measures]			

With regard to reusability, which has relevance ratings between 4.28 and 4.32, the empirical results suggest that SOA potentials are most relevant on the business and IS layers. As reusability potentials on business layer, shared services emerge for information provision, for example, to retrieve car-specific information (RB1) or used car market information (RB2). The latter is, to some extent, offered by specialized service providers (e.g., EurotaxSchwacke, DAT) and comprises detailed information regarding the used car price, demand, and offering developments. On the IS layer, experts see an increasing need for services that can be created and reused across different channels. Among these are services for integrating products from multiple partners (RI1). With reusable process components, customer contact (RP1) can be supported more efficiently (e.g., upgrading used cars with online configurators), while, on operational side (RP2), third party integration (e.g., car delivery by logistics companies) can be realized as many-to-many instead of one-to-one relationship.

4 Summary and Conclusion

Improved external integration capabilities are often cited as a major benefit of service-oriented architectures. However, little research has thus far been conducted with regard to analyzing the different facets of SOA application in inter-organizational relationships and B2B networks. This research aims at filling this gap. Its contribution is three-fold:

As the first contribution, **Table 2** presents a set of industry-specific SOA potentials for used car business networks. Our assessment shows that used-car-specific SOA potentials are relevant for realizing changing business network configurations, streamlining inter-organizational processes as well as for improving information exchange. Hence, the identified set of SOA potentials assists the different actors in the used car business network to prioritize starting points for a SOA deployment. However, this real-world example also demonstrates that a SOA business case is highly situational regarding different functionalities and services, and that SOA's key capabilities may have very different meanings in different industries.

The conceptual model and a set of generic SOA potentials in B2B networks (cf. **Table 1**) present the second contribution of this research. These potentials relate to three key SOA capabilities, as described in section 2.1, which are relevant in the context of B2B collaboration: interoperability, agility, and reusability. Existing SOA literature often does not differentiate technical impact from operational and strategic impacts, thereby combining the first-order effects of SOA as integration technology with second-order effects that are generated by improved technical integration and reduced transaction costs. In order to improve the explanatory power of our model, we categorize the identified set of SOA potentials and assign them to the layers and major design areas in business networking.

The third contribution consists of a three-step methodology for identifying and assessing industry-specific SOA potentials that build on the conceptual model. Given that technology potentials are highly situational, we suggest building on a business network analysis and map business measures to the generic potentials that SOA may provide. This methodology allows to better cope with the service-oriented concept's versatility and to decide on the SOA applications' specific focus in the B2B context.

As our research is work in progress, we have obtained a first insight into SOA potentials in used car business networks. In a next step, the specific SOA potentials will be more thoroughly explored, especially in respect of SOA deployment. This research is meant to be a first step towards a more fundamental analysis of SOA deployments in B2B networks. In order to improve our understanding of SOA in B2B networks, we encourage researchers to explore the different facets of SOA deployment in inter-organizational settings and the factors that influence the adoption of the service-oriented concept.

References

Alonso, G., Casati, F., Kuno, H., & Machiraju, V. (2003): "Web Services: Concepts, Architectures and Applications", Springer, Heidelberg.

Alt, R., & Österle, H. (2004): "Real-Time Business: Lösungen, Bausteine und Potentiale des Business Networking", Springer, Berlin.

Arbeiter, F. (2005): Gebrauchtwagen erfolgreich verkaufen, 33 Bundestagung des Kfz-Gewerbes, Dresden, 10.10.2005.

Arsanjani, A. (2005): Toward a pattern language for Service-Oriented Architecture and Integration, Part 2: Service composition, Retrieved from http://www.ibm.com/developerworks/webservices/library/ws-soa-soi2/.

Autogazette.de (2008): Lange Standzeiten von Gebrauchtwagen, Retrieved 03.11.2008 from http://www.autogazette.de/Lange-Standzeiten-von-Gebrauchtwagen/artikel_1197580_11.htm.

Autohaus Online (2008): Börsenanalyse - Mobile.de bei Pkw-Angeboten vorne, Retrieved 18.11.2008 from http://www.autohaus.de/nachrichten/644906/ah_artikel_kommentar.

Baek Kim, J., & Segev, A. (2005): A Web Services-enabled marketplace architecture for negotiation process management, Decision Support Systems, Vol. 40, No. 1, pp. 71-87.

Balzert, H. (1998): "Lehrbuch der Software-Technik, Band 2 - SW-Management, -Qualitätssicherung, Unternehmensmodellierung", Spektrum, Heidelberg, Berlin.

Baskerville, R. L., Cavallari, M., Hjort-Madsen, K., Pries-Heje, J., Sorrentino, M., & Virili, F. (2005): Extensible architectures: The strategic value of service-oriented architecture in banking, European Conference on Information Systems (ECIS), Regensburg, May 26-28, 2005.

Bussler, C. (2002): The Role of B2B Engines in B2B Integration Architectures, SIGMOND Record, Vol. 31, No. 1, pp. 67-72.

CAR-Center Automotive Research (2008): CAR-Studie Gebrauchtwagen-Börsen, Retrieved 02.02.2009 from http://www.fh-gelsenkirchen.de/fb11/homepages/CAR/Download/Studie%20GW-B%F6rsen%20April%202008.pdf.

Car Internet Research Program II, & Capgemini (2007): The Anatomy and Physiology of the Used Car Business, Retrieved 02.02.2009 from http://www.de.capgemini.com/m/de/tl/Anatomy_and_Physiology_of_the_Used_Car_Business.pdf.

Cenfetelli, R. T., & Benbasat, I. (2002): Measuring the E-Commerce Customer Service Life Cycle, European Conference On Information Systems (ECIS), Gdansk, June 6-8, 2002.

CG Car-Garantie Versicherungs-Aktiengesellschaft (2007): Die "richtigen" Gebrauchtwagen, 8 Tag der Automobilwirtschaft, Geislingen, 22.11.2007.

Daniel, E. M., & White, A. (2005): The future of inter-organisational system linkages: findings of an international Delphi study, European Journal of Information Systems, Vol. 14, No. 2, pp. 188-203.

Demirkan, H., Kauffman, R. J., Vayghan, J. A., Fill, H.-G., Karagiannis, D., & Maglio, P. P. (2008): Service-oriented technology and management: Perspectives on research and practice for the coming decade, Electronic Commerce Research and Applications, Vol. 7, No. 4, pp. 356-376.

Deutsche Automobil Treuhand GmbH (2007): DAT Report 2007, AUTOHAUS, Retrieved from http://www.dat.de/products/products_printed/DATReport.page.

Deutsche Automobil Treuhand GmbH (2009): DAT Report 2009, AUTOHAUS, Retrieved from http://www.dat.de/products/products_printed/DATReport.page.

Diez, W. (2005): Die Zukunft des Automobilvertriebs, Retrieved 18.11.2008 from http://www.top-career-guide.de/autoren/bilder/diez.pdf.

Dorn, J., Grün, C., Werthner, H., & Zapletal, M. (2009): From business to software: a B2B survey, Information Systems and E-Business Management, Vol. 7, No. 2, pp. 123-142.

Dreifus, F., Leyking, K., & Loos, P. (2008): Systematisierung der Nutzenpotentiale einer SOA, "Service-orientierte Architekturen", pp. 19-38, V. Nissen, M. Petsch & H. Schorcht, Gabler, Dudenhöffer, F., & Koster, S. (2003): Internet im Gebrauchtwagen-Geschäft nicht mehr wegzudenken, Retrieved 18.11.2008 from http://www.fh-gelsenkirchen.de/fb11/homepages/dudenhoeffer/studien/2003/OnlineGW-Studie.pdf.

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

Feuerlicht, G. (2005): Design of service interfaces for e-business applications using data normalization techniques, Information Systems and E-Business Management, Vol. 3, No. 4, pp. 363-376.

Fodor, O., & Werthner, H. (2004): Harmonise: A Step Toward an Interoperable E-Tourism Marketplace, International Journal of Electronic Commerce, Vol. 9, No. 2, pp. 11-39.

Fritz, F.-J. (2004): An Introduction to the Principles of Enterprise Services Architecture (ESA), Retrieved from http://www.sapinsideronline.com/spijsp/article.jsp?article_id=37906&volume_id=5147.

Hagel, J., III, & Brown, J. S. (2001): Your Next IT Strategy, Harvard Business Review, Vol. 79, No. October, pp. 105-113.

Heinemann, J. H. (2007): "Nutzung von Elektronischen Marktplätzen im Hersteller-Distributionssystem - dargestellt am Beispiel des Automobilvertriebs," Universität St. Gallen, Nürtingen.

Heutschi, R. (2007): "Serviceorientierte Architektur - Architekturprinzipien und Umsetzung in der Praxis", Springer, Berlin.

IBM Global Business Services, & Roland Berger Strategy Consultants (2007): The automotive industry's last pot of gold - Pan-European Automotive Sales Excellence Study, pp. 1-112.

Iyer, B., Freedman, J., Gaynor, M., & Wyner, G. (2003): Web Services: Enabling Dynamic Business Networks, Communications of the AIS, Vol. 11, No. pp. 525-554.

Jain, H., Vitharana, P., & Zahedi, F. M. (2003): An assessment model for requirements identification in component-based software development, SIGMIS Database, Vol. 34, No. 4, pp. 48-63.

kfz-betrieb.de (2008): Der Autopilot fürs Internet-Business Die bedeutendsten Internet-Marktplätze 2008 - eine Übersicht, Retrieved 01.12.2008 from http://www.aricars.de/dl.php?dl=onlineplayer.pdf&ariCookie=9e67bd1ac29eeb0ca45ccded2da0685a.

Koller, W., & Löwenstein, V. (2008): Erfolgreiche Sanierung im Automobilhandel (Dekra Studie 2008), Retrieved from http://www.dekra.de/5575.

Legner, C., & Vogel, T. (2008): Leveraging Web Services for Implementing Vertical Industry Standards: A Model for Service-Based Interoperability, Electronic Markets, Vol. 18, No. 1, pp. 39-52.

Legner, C., & Wende, K. (2006): Towards an Excellence Framework for Business Interoperability, 19th Bled eConference eValues, Bled, Slovenia, 07.06.2006.

Lublinsky, B. (2007): Defining SOA as an architectural style, Retrieved from http://www.ibm.com/developerworks/library/ar-soastyle/index.html.

McGovern, J., Tyagi, S., Stevens, M., & Mathew, S. (2003): Service-Oriented Architecture, "Java Web Services Architecture (The Morgan Kaufmann Series in Data Management Systems)", pp. 35-63, J. McGovern, S. Tyagi, M. Stevens & S. Mathew, Morgan Kaufmann, San Francisco.

Mercedes-Benz Deutschland (2009): Mercedes-Benz Deutschland - Online-Kauf, Retrieved 10.02.2009 from gebrauchtfahrzeug.direktvertrieb.mercedes-benz.de.

Mercer Management Consulting (2001): Value Growth in Automotive, Retrieved 15.05.2009 from http://www.pret-a-press.de/wolfgangseeger/download/MercerAutomotive.pdf.

Mercer Management Consulting (2005): Systemprofit Automobilvertrieb 2015, Retrieved 18.11.2008 from http://www.presseportal.de/showbin.htx?id=44902&type=document&action=download&attname=Mercer_Themen.pdf.

Michelson, B. M. (2006). Event-Driven Architecture Overview - Event-Driven SOA Is Just Part of the EDA Story: Patricia Seybold Group.

Newcomer, E., & Lomow, G. (2004): "Understanding SOA with Web Services", Addison-Wesley,

Oasis (2006): Reference Model for Service Oriented Architecture 1.0, Retrieved from http://docs.oasis-open.org/soa-rm/v1.0/soa-rm.pdf.

Papazoglou, M. P., Traverso, P., Dustdar, S., Leymann, F., & Krämer, B. J. (2006): Service-Oriented Computing: A Research Roadmap, Dagstuhl Seminar Proceedings 2006 Internationales Begegnungs- und Forschungszentrum für Informatik (IBFI), Schloss Dagstuhl, Deutschland, 04.07.2006.

Scout24 Media (2008): Autos per Mausklick 2008/I, Retrieved 18.11.2008 from http://about.autoscout24.com/de-de/autos_per_mausklick_2008_i.pdf.

Selz, D., & Klein, S. (1998): The Changing Landscape of Auto Distribution, Hawaii International Conference On System Sciences, Kohala Coast, HI, USA, 06.01.1998.

Steiler, G. (2009): Mobile.de hält größten Fahrzeugbestand, Retrieved 20.04.2009 from http://www.kfz-betrieb.vogel.de/handel/freierhandel/articles/184499/?nl=1&cmp=nl-125-7900-1-210409.

Tafti, A., Mithas, S., & Krishnan, M. S. (2008): The Effects of Information Technology and Service-Oriented Architectures on Joint Venture Value, ICIS 2008, Paris, 14.12.2008.

TÜV SÜD AG (2007): Gebrauchtwagenmanagement - Nur eine Modeerscheinung, 8 Tag der Automobilwirtschaft, Geislingen, 22.11.2007.

Van Heck, E., & Vervest, P. (2007): Smart Business Networks: How the Network Wins, Communications of the ACM, Vol. 50, No. 6, pp. 29-37.

Viering, G., Legner, C., & Ahlemann, F. (2009): The (Lacking) Business Perspective on SOA – Critical Themes in SOA Research, 9 Internationale Tagung Wirtschaftsinformatik, Vienna, Austria, 25.02.2009.

Viering, G., & Müller, B. (2007): "Economic Potential of Service-Oriented Architecture", JOSEF EUL VERLAG,

W3C (2004a): Web Services Architecture, Retrieved 01.02.2009 from http://www.w3.org/TR/2004/NOTE-ws-arch-20040211/.

W3C (2004b): Web Services Architecture Requirements, Retrieved 06.02.2009 from http://www.w3.org/TR/2004/NOTE-wsa-reqs-20040211/.

Wilke, O. (2007): "Reifegradmodell für Prozesse im Automobilhandel," Universität St. Gallen, St. Gallen.

Zhao, J. L., Tanniru, M., & Zhang, L. J. (2007): Services computing as the foundation of enterprise agility: Overview of recent advances and introduction to the special issue, Information Systems Frontiers, Vol. 9, No. 1, pp. 1-8.

Zimmermann, O., Doubrovski, V., Grundler, J., & Hogg, K. (2005): Service-Oriented Architecture and Business Process Choreography in an Order Management Scenario: Rationale, Concepts, Lessons Learned, OOPSLA'05, San Diego, 16.10.2005.