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Deducing Service Ownerships in Financial Networks

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ABSTRACT

Service-oriented architecture (SOA) is recognized as an enabler to overcome limitations of traditional monolithic application architectures such as efficiently adapting to changing business requirements and external partners with individual systems. However, services within any SOA require broadly accepted service definitions and a systematic management after the design stage. Thus, ownership of these services among the business partners as well as within the enterprise is essential for the implementation, operation and management of SOA and ultimately its business value. This paper enhances existing approaches which mainly comprise roles and management activities on a generic level. It proposes a procedure for identification and allocation of service ownerships from a business perspective which has been applied in the banking industry.

Keywords

Service-oriented architecture (SOA), service ownership, SOA governance, finance industry, business networking

INTRODUCTION

Motivation

Increased networking among companies (business networking) has become a key competitive strategy in many industries. While structures in the automotive industry usually comprise several value-added steps (so called ‘tiers’) with suppliers, a comparable disintegration process at banks and insurance companies is now occurring with banks discussing their core competencies and the option of offering services to other banks (Homann et al., 2004). The competitive, regulatory and technological changes in the finance industry have attracted further attention with the recent crisis. This development will require even more the ability of any enterprise in the marketplace to efficiently adapt to changing customer and/or business requirements. Based on the conceptual work of (Österle, 2001) the notion of networkability has been developed on the level of individual enterprises as well as on the level of entire business networks (Alt and Smits, 2007).

From the technological side the concept of service-oriented architecture (SOA) represents a promising instrument to implement networkability. By separating application functionality into modules and using a standardized interface for invoking these modules (or service), SOA has the potential to link functionality from various providers within a business network. As this also has important business implications, a business-oriented perspective on SOA has emerged. Here, SOA promises a more flexible allocation of business activities, represented as services, among business partners in a value chain. Combining the business and technological perspective of SOA may be one solution to the challenges in several industries. By providing structural enhancements based on the standardization of services within a network SOA can be seen as an enabler for interorganisational information systems (IOIS) (Reimers and Johnston, 2008) to efficiently operate cross-enterprise value chains. A key requirement is the implementation of a supportive organizational structure (roles, responsibilities) as part of SOA governance (Brown et al., 2006), which should consider both the enterprise and the network view. Current contributions depict furthermore high maintenance efforts for reusing services and managing service variants, resulting in lower sustainability of SOA (Schelp and Aier, 2009). Defined ownerships would enhance transparency in service management and therefore contribute to sustainability.

In order to cope with regulations, controllability and service management requirements future business models need to address (1) the responsibility for a business service in a business network, (2) the allocation of business service information within a business network and (3) business service consumer and provider. A cross-industry study undertaken by (Aier and Bucher, 2008) emphasized the need of service ownerships and organizational responsibilities as key for the introduction of SOA. More than 80% of the 300 respondents agreed with this hypothesis. Simultaneously expert interviews stated that service ownership “enables more efficient ways of stakeholder coordination and communication” (Aier et al., 2008, pp. 17). Another recent survey among 31 banks and providers underlines this relevance for service ownership definitions as well as the development of supportive organization models for SOA in the finance industry (Kohlmann and Alt, 2009).

This paper aims to add the existing body on SOA management by proposing an approach for systematically identifying and documenting cross-enterprise (business) service ownerships. The focus will be on the functional-technical ownerships. Strategic and political aspects are excluded. Based upon the emergence of networked business models and the integration of existing application architectures the finance industry has been chosen to apply the proposed procedure.

Research Methodology and Structure

This paper emerged from an applied research approach funded by 18 companies from the banking industry in Switzerland and Germany. The overall goal is to elaborate practice-oriented reference models on a business, process and technological level that aim to foresee future structures in banking. The research team consists of academics from three universities as well as practitioners from various roles in the banking value chain (e.g. regional retail bank, international private bank, outsourcing provider, software provider). The companies contribute actively in steering committee meetings, workshops and expert interviews and are participating in the development of the artefacts as well as verification of their applicability in practice. Consequently the research program follows the paradigm of “emphasizing collaboration between researchers and practitioners” (Avison et al., 1999). Its design applies the guidelines proposed by (Hevner et al., 2004) to ensure a rigorous link to existing research as well as the relevance of the generated artefacts.

The remainder of the paper is structured as follows: Section 2 provides the theoretical foundation. Section 3 presents an approach for the identification of service ownerships. Section 4 applies the approach to the financial industry domain using reference business service architecture as well as a generic *direct bank Switzerland* model. Finally, Section 5 summarizes the results and provides an outlook.

FOUNDATION

Services represent parts of a business process in the form of a function module that can be deployed independently and has a standardized interface (Kohlmann, 2007). Since numerous classification schemes for services as part of SOA have emerged (Bonati et al., 2006, Erl, 2007, Kohlmann, 2007, Rosen et al., 2008) and a consolidated classification scheme is missing (Kohlmann, 2007), this paper assumes that services may be differentiated in business-, application- and infrastructure services (see *Figure 1*). Business services (‘tier 2’ services) represent functionality of a specific business activity and transaction (e.g. *PricingRuleService*, *ForeignCurrencySupplyService*, *RatingCalculationService*) (Bonati et al., 2006). Application services (‘tier 3’ services) are focusing on independently usable and elaborately specified functional components (e.g. *CreateLoanContract*, *ManageBusinessPartnerRole*, *CheckLegitimizingControl*) (Kohlmann, 2007, Rosen et al., 2008). Infrastructure services (‘tier 4’ services) finally encapsulate technical capabilities independent of any business domain, such as *accessDatabase* or *checkIPConnection* (Brown, 2007, Rosen et al., 2008).

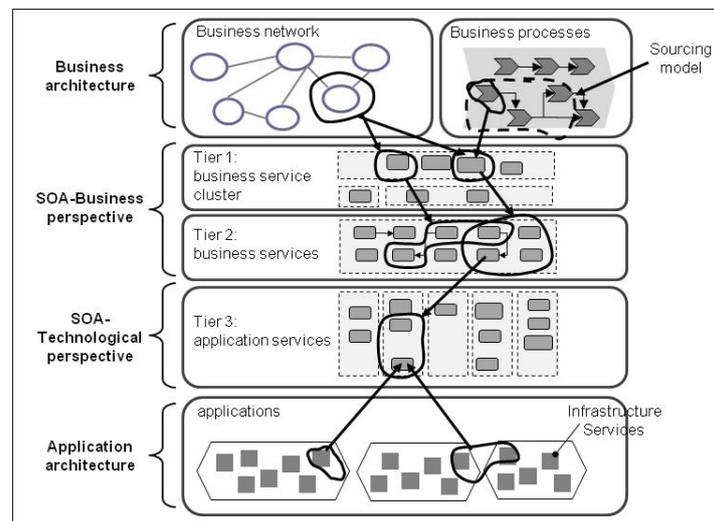


Figure 1: service typology

As SOA is commonly regarded as intermediate architecture layer between business and technological architecture, the alignment with processes and strategy is required. This involves not only cataloging all services in a directory with little structure, but also preconfigured bindings of business services in so-called service clusters (Bell, 2008). The clusters or ‘tier 1 services’ combine several services of finer granularity due to their logical and functional proximity (e.g. *Rating*,

LoansManagement, AcceptabilityCalculation or PartnerManagement). While a directory is closely linked to the application functionalities and therefore enables the systematic development of application landscapes, the business service clusters provide a connection to the company’s business models.

APPROACH FOR SERVICE OWNERSHIP DEFINITION

Existing Approaches

(Nadhan, 2004) is differentiating a centralized and decentralized SOA governance model. While the former centralizes the identification and enhancement of services within a *governing body* with managerial authority, the latter reduces this authority to general recommendations. Every business domain is responsible for a set of business services and retains autonomy. A comparable approach defines a *governance leadership team* as part of the general architecture management holding the authority for service design guidelines while according to the “concept of domain ownership” business domains are responsible for a set of business services as well as their relationships and reuse (Brown and Cantor, 2006). Together with the *Methodology for Enabling Service-Oriented Architecture (MESOA)* which expatiates a framework for SOA governance using a centralization approach for specific roles and boards (Lawler and Howell-Barber, 2008) two assumptions can be derived:

- (1) A central instance delivers guidelines and criteria for service identification, development and enhancements.
- (2) The coordination of business service ownerships should be centralized but the responsibilities itself are decentralized within the business domains of an enterprise

The *SOA governance framework* of CBDI-Forum addresses the organization by differentiating structures, roles and responsibilities but limits to link roles and generic activities via using a R(esponsibility)-A(ccountability)-E(xpertise)-W(ork) matrix. Further publications differentiate R(esponsibility)-A(ccountability)-C(onsulted)-I(nformed) (Office of Government Commerce, 2007). (Kajko-Mattsson et al., 2007) are defining 22 roles with the focus on support and design roles but do neither link them to a firm’s organization nor define responsibilities for specific services types. Furthermore, frameworks such as *The Zachmann Enterprise Framework* (Zachmann, 1999), *TOGAF* (Harrison, 2008) or the *Integrated Architecture Framework* (Capgemini (ed.), 2006) address SOA governance and selected generic roles within their Business/IT Alignment approach but do not provide a service ownership model. *The Information Framework* (Evernden, 1996) addresses (information) ownerships but does not include the required deduction procedure.

To structure the approaches *Figure 2* differentiates scope (governance on the network/supply chain/enterprise level), implementation strategy (centralization/decentralization) and domain (procedures SOA governance/service ownerships, structures/roles).

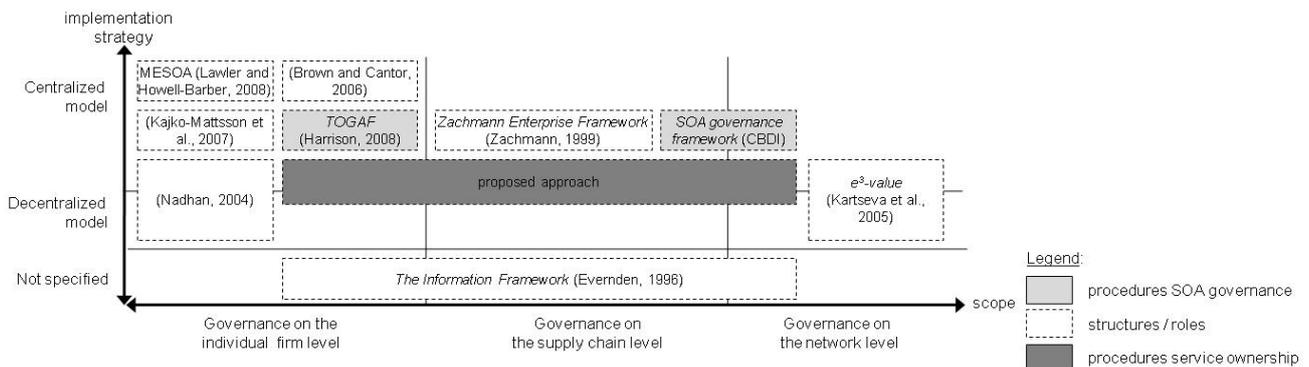


Figure 2: approaches

Summarizing the findings from the existing approaches a procedure to link business services and organizational domains of an industry, business network or enterprise to define service ownerships is not specified. But defined ownerships would enhance transparency in service management and therefore contribute to sustainability of SOA which is currently rather low due to high maintenance efforts for reusing services and managing service variants as shown in several case studies by (Schelp and Aier, 2009). When focusing on the network level complexity for service management increases if the decentralized domain oriented responsible for the business services communicate directly with the corresponding provider. An enhancement would be the establishment of a central coordination board/center (Kajko-Mattsson et al., 2007, Lawler and Howell-Barber, 2008):

- (3) Outsourcing of business services requires internal centralization of coordination.
- (4) Business service variants require a combination of centralization and decentralization.

Moreover approaches such as e^3 -value focus on the value-exchange perspective between firms within networks by defining value objects and ports (Kartseva et al., 2005). The realization of the values can be based on services and *dependency paths* can be used to identify service consumers and providers. If provider and consumer match with the ownerships of the services e^3 -value is an applicable approach for exemplification. Nevertheless if functional accountability rests on a service consumer and only operational responsibility rests on the provider (see *Table 3 transactionDataService*), the limitations of e^3 -value become apparent.

Deduction of service ownerships

This section outlines a first proposition of a procedure to identify service ownerships in business networks and within enterprises. The proposed procedure, shown in *Figure 3*, consists of three phases (level 1) covering (I) the analysis of business and process architecture models, (II) the deduction of service ownerships and (III) the documentation of these ownerships. The procedure comprises process steps for one or both levels. Following a top-down approach the service ownerships are identified first on the network level for the incorporated business roles. Subsequently, the identification on the enterprise level defines the ownerships for each business domain within a certain business role.

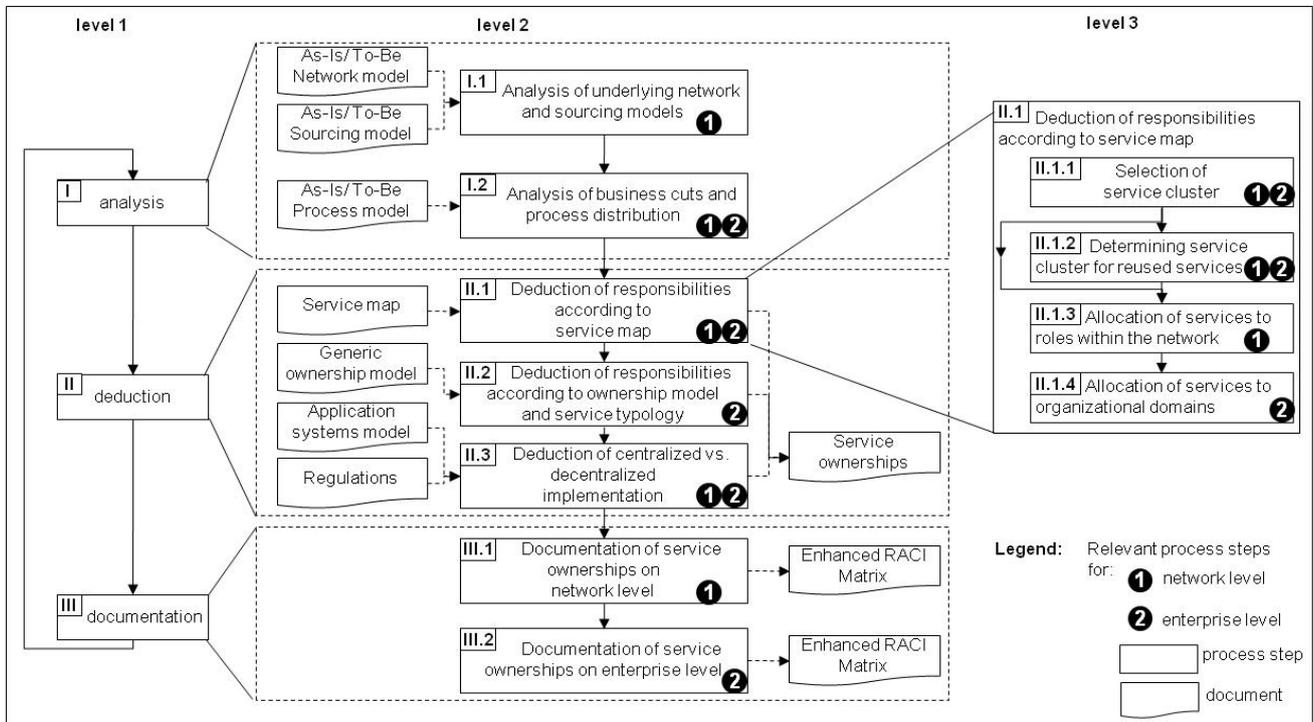


Figure 3: procedure for service ownership identification

Part of the *analysis* phase is a breakdown of the business network (I.1). Regarding the analysis scenario a differentiation has to be made between as-is and to-be models. A network model describes the business roles and relationships (information flow, cash flow, equity holdings or operational market relationships) within a community or market. A reference network model distinguishes generic business roles for a certain industry implying generic sourcing models (e.g. *full outsourcing*, *trade* or *securities processing* for the business process securities). A sourcing model substantiates a comprehensive sourcing strategy for one or more business processes of a bank by describing assessed process cuts. This process distribution can be analyzed to identify allocations between business roles and business services as each business process represents a specific business service orchestration (I.2).

Based on the information of process distribution and business process cuts the service ownerships are specified in the *definition* phase. Service maps, which structure services along with their relationships and dependencies, are used to allocate business services and business roles (network level) or organizational domains (enterprise level) (II.1).

As business service clusters (tier 1) structure business services (tier 2) in a user-oriented view aiming at the exemplification of the reuse of services, they can reduce complexity within the deduction process. Additionally a service map should define for each service the responsible cluster. As business service clusters map a certain part of an organization (capability), e.g. *partner management* or *loans management* the accounted business services of this cluster can be assigned to the business role which incorporates the capability (II.1.3) or to the same organizational domain within an enterprise or business role (II.1.4). For all reused business services within a certain business service cluster the allocation has to follow the responsible cluster (II.1.2). This procedure via business service clusters maintains the flexibility and generalization of the approach itself as organization charts are traditionally differentiating.

Based on the existing approaches and several structured interviews with banks and providers a generic ownership model was derived. This model allows for identifying service ownerships (II.2) based upon a service typology (see Section 2) and the allocation to committees and/or business domains (see Table 1). Two additional committees are defined: SOA architecture team with no managerial authority and a *business-service-architecture-coordination-center* reflecting assumption (1), (2) and (3) of Section 2.

committees	SOA architecture team		- Defines fundamental criteria and guidelines for service design, enhancement and retirement. - Defines the service lifecycle activities and roles.
	business-service-architecture-coordination-center (BSACC)		- Central coordination of all business services (internal and external) (tier 2). - Responsible for business service architecture. - Responsible for services with multiple cross-business domain variants. - Responsible for tier 1
existing organization architecture	business domains		- Responsible for tier 2 except services with multiple cross-business domain variants. This includes budgeting and business requirements definition.
	IT domain		- Responsible for tier 3 and tier 4
service typology	(Tier 1) business service cluster		- Accounted by BSACC
	(Tier 2) business services	process services	- Accounted by business domain regarding process responsibilities - Services with multiple cross-business domain variants accounted by BSACC
		rule services	- Accounted by business domain regarding business rule management system
		entity services	- Accounted by business domain regarding business entities
	(Tier 3) application services		- Accounted by IT domain analog application systems responsibilities
	(Tier 4) infrastructure services		- Accounted by IT domain analog application systems responsibilities

Table 1: service ownership model

Finally (II.3), implementation scenarios are deduced based upon (1) the application systems architecture as well as (2) regulations and (3) strategic requirements. Influencing regulations are related to access to customer or transaction data (e.g. banking secret, data privacy protection) or supervising of providers (Swiss Financial Market Supervisory Authority FINMA, 2009). Additionally the exemplified reuse of the business services in the service map can be applied to analyze (de-)centralization strategies. In general four generic scenarios are possible:

- centralized implementation at provider site: access to external service
- centralized implementation at third party site: access to external service by provider and client
- centralized implementation at client site: external access of the provider to an internal service
- decentralized multiple implementation at provider, third party and/or client site.

The third phase documents the service ownerships using an enhanced **RACI** matrix. The extension encompasses the **RE**alization, **U**talization and **CO**ordination of the services. On the network level the business roles/ enterprises are linked with the services (III.1). III.2 details the service ownerships and allocates business services and organizational domains.

APPLICATION AT THE FINANCE INDUSTRY

Current Situation in the Finance Industry

Several studies reported that the European financial industry is in transformation towards less vertical integration and more networking among banks and service providers. A recent empirical study among more than 90 executives indicates a fundamental change in application systems architecture of banks (Augenstein et al., to appear in 2009). In particular, universal banks increasingly rely on distributed systems architecture as well as standard application systems. SOA will influence the further development of existing core banking systems. The reasons for the current transformation can be outlined by six main drivers (Geiger and Hürzeler, 2003, IBM Global Services, 2005, Homann et al., 2004): (1) *market changes*: increased competition based upon globalization and changes in market structures (e.g. regional banks overcome provincial borders, market entry of non-banks) as well as market concentrations and, more recently the crisis in the financial industry; (2) *regulations*: increased regulation efforts based upon emerging international guidelines such as SEPA (single European payment area) as well as following the current market crisis; (3) *customer structure*: increased customer expectations based upon internet based banking solutions such as online brokerage, higher transparency and more widespread comparison shopping; (4) *product complexity*: increased product diversity lead to higher costs for product listing; (5) *technology*: former development of proprietary applications resulted in intricate serviceable, mainframe-based and monolithic application landscapes; (6) *competitiveness*: decreasing margins based upon additional cost pools deteriorate cost income ratios.

Application at direct bank Switzerland

The following section applies the proposed procedure at a typical ‘Direct Bank Switzerland’ (DBS). This model bank has been defined to ensure comparison and transparency. As former universal bank, *DBS* decided to source parts of the securities and payments process as well as support processes such as output management, digitalization and IT (application management, data center, software development). Before the outsourcing the bank had 1.890 personnel (sales:1.374, operations:275, corporate center:126, IT:97, internal revision:8 and management:10), a cost income ratio of 61%, a return on equity of 9%, 610.800 customers (71% retail, 11% affluent, 18% business and institutional), 790.000 securities and 12,78 million payments transactions annually.

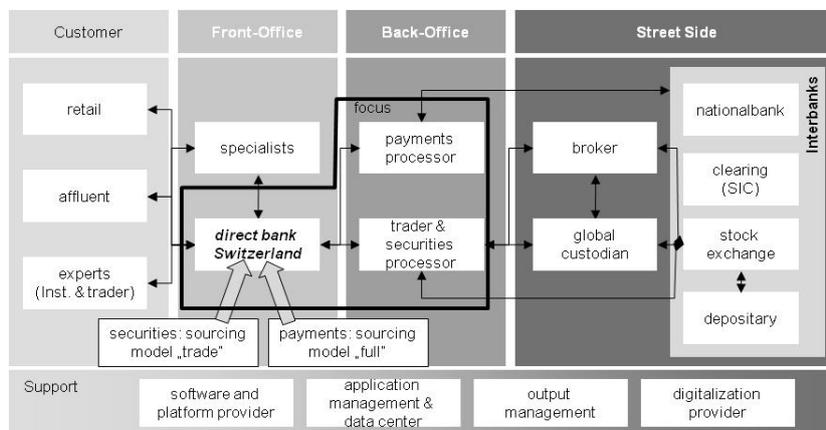


Figure 4: future business network of DBS

Service ownerships on the network level

The future network model (see Figure 3, I.1) as shown in Figure 4 comprises 14 roles with activities from front-office, back-office, street side and support. Additionally, the customer structure distinguishes retail, affluent and expert (institutional) clients. The differentiation of roles is comparable to existing reference models (Reitbauer et al., 2008) as well as market typologies (e.g. in Switzerland). *DBS* selected two sourcing models for the business processes securities and payments execution (see Figure 5). The sourcing model ‘full outsourcing payments’ includes the order entry, order checking, authorization and processing (except booking). The sourcing model ‘trade’ of the securities process includes routing, pooling and placement of securities orders.

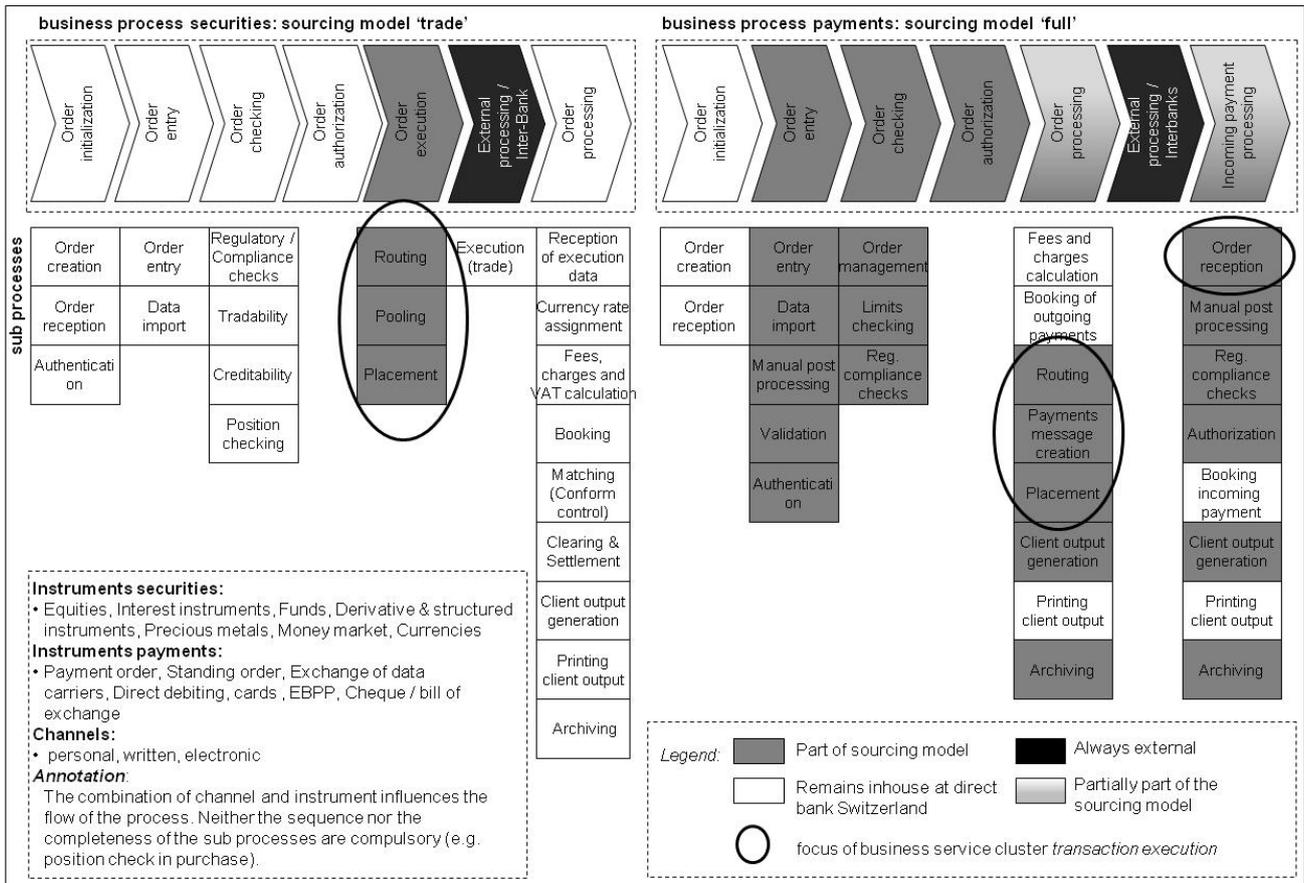


Figure 5: business processes securities and payments, sourcing models and focus of business service cluster transaction execution

Based upon the distribution of the activities (see Figure 3, I.2) an allocation of roles and business services was deduced on the network level. The business service cluster *transaction execution* as one of 36 business service clusters (part of a reference business service architecture for the finance industry) was chosen to exemplify the ownership identification in detail. *Transaction execution* comprises 8 of the 130 specified business services incorporating the following functionalities: (1) routing, pooling, formatting and placement of securities orders, (2) routing, message creation and placement of payment orders (see Figure 5). A detailed description can be found in Table 2 as well as the allocation to process steps, the reuse within further business processes, such as loans management or sales and the allocation to the three selected roles of the business network (see Figure 4).

business service	business service description	allocation to securities process	allocation to payments process	allocation to specified roles based on sourcing model	reuse in further processes
transaction formatting service	Formats a specific transaction before routing to correspondence bank; includes the formatting of execution instructions.	placement	payments message creation, order reception	payments processor, trader & securities processor	N.A.
formatting rule service	Encapsulates all conditions to prepare a transaction for routing.	placement	payments message creation, order reception	payments processor, trader & securities processor	N.A.
transaction execution service	Triggers the execution of a transaction. This includes the placement of orders or payments instructions to SWIFT, SIC, PostFinance and placement of subscription orders of external issuances.	placement	placement correspondence bank	payments processor, trader & securities processor	N.A.
routing service	Defines the route for a specific transaction considering deposited rules as well as defines the market place.	routing	routing	payments processor, trader & securities processor	N.A.
routing rule service	Encapsulates all rules for routing definitions of transactions, such as transactions exceeding an amount of X are routed to NYSE via trader Y.	routing	routing	payments processor, trader & securities processor	N.A.
pooling service	Combines transactions with identical counter parties' dependant on transaction type, business type and stock exchange.	pooling	N.A.	trader & securities processor	N.A.
partner master data service	Provides (CRUD) all information of a customer.	routing, pooling, placement	routing, order reception, placement correspondence bank	DBS, payments processor, trader & securities processor	sales or client account mgt.
transaction data service	Provides (CRUD) all information of a specific, not completed transaction.	routing, pooling, placement	routing, order reception, placement correspondence bank	DBS, payments processor, trader & securities processor	client account mgt., client analysis, liquidity mgt.

Table 2: allocation of business services and business roles on the network level for transaction execution cluster

In case of multiple allocations such as for *partnerMasterDataService* or *transactionExecutionService* the realization characteristics have to be deduced (see Figure 3, II.3) before the ownership can be defined. As mentioned in section 3 considerations concerning regulations and strategy are necessary. In case of the *partnerMasterDataService* the regulations regarding privacy and controllability of customer data lead to centralization at DBS and real-time access by the two providers (payments processor, trader & securities processor). Therefore, responsibility and accountability remain within DBS. The *transactionExecutionService* is realized (RE) at both providers separating the execution of securities and payment orders resulting in multiple accountabilities (A): each provider is accountable for the respective order type – payments/securities. Table 3 provides the enhanced RACI matrix for the 8 business services on the network level (see Figure 3, III.1).

business service \ business role	DBS	trader & securities provider	payments provider	implementation scenario
transactionFormattingService	-	R,A,RE,U(securities)	R,A,RE,U(payments)	decentralized multiple implementation
formattingRuleService	I	I,U	I,U	centralized implementation at third party site
transactionExecutionService	-	R,A,RE,U(securities)	R,A,RE,U(payments)	decentralized multiple implementation
routingService	C	R,A,RE,U(securities)	R,A,RE,U(payments)	decentralized multiple implementation
routingRuleService	R,A,RE	C,U	C,U	centralized implementation at client site
poolingService	I	R,A,RE,U	-	centralized implementation at provider site
partnerMasterDataService	R,A,RE,U	I,U	I,U	centralized implementation at client site
transactionDataService	A,C,U	R,RE,U	R,RE,U	decentralized multiple implementation

legend: Responsibility, Accountability, Consulted Informed, REalization, Utilization, Coordination

Table 3: service ownerships on the network level

Service ownerships on the enterprise level

Figure 6 shows the integration of the defined committees into the organizational structure of the bank and exemplifies the allocation of business services via the responsible business service clusters to the organizational domains of the bank at the transaction execution service cluster (see Figure 3, II.1.4). The cluster holds functional responsibility for the process services: routing, pooling, transactionFormatting and transactionExecution as well as for the rule services: routing and formatting. As the specification of these services holds functionality for payments and securities execution the relevant organizational domains can be mapped.

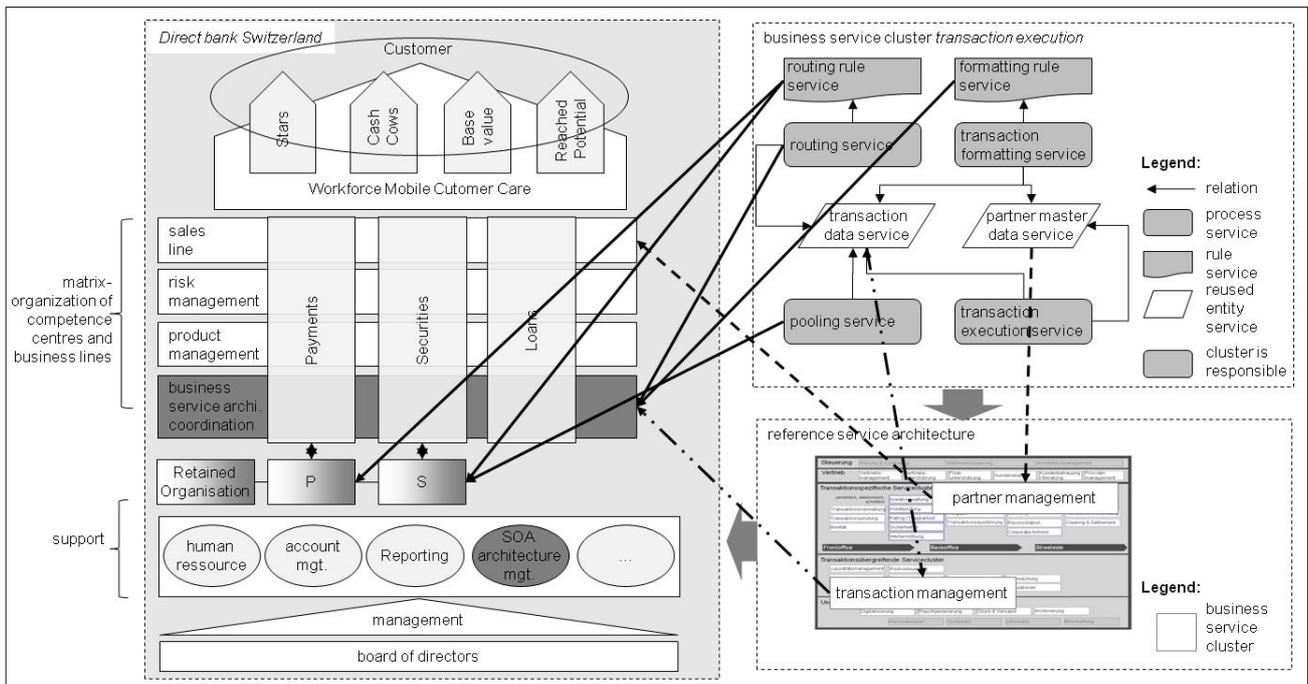


Figure 6: allocation of business services and organizational structure

To establish distinct ownerships for services allocated to more than one business domain, such as the routingService (defines routes for payment and securities transactions), the business-service-architecture-coordination-center holds responsibility for these services (centralization) and coordinates the variants internally. Simultaneously both business domains keep responsibility for the additional domain specific functionality rules used for defining the routes (assumption (5)).

relevant organizational business service domain	business coordination	securities (retained organization)	payments (retained organization)	sales line	IT (by provider)
transactionFormattingService	-	-	-	-	-
formattingRuleService	CO,I	I,U	I,U	-	-
transactionExecutionService	-	-	-	-	-
routingService	CO	C(variant securities)	C(variant payments)	-	
routingRuleService	R(overall),A,CO	R(variant securities),C,U	R(variant payments),C,U	-	RE
poolingService	CO,I	I	-	-	-
partnerMasterDataService	CO,I	I,U	I,U	R,A,U	RE
transactionDataService	R(overall),A,CO	R(variant securities),C,U	R(variant payments),C,U	I, U	-

Legend: Responsibility,Accountability,Consulted,Informed,REalization,Utilization,COordination

Table 4: service ownerships on the enterprise level of direct bank Switzerland after outsourcing

To identify the responsibilities for the two data services: partnerMaster and transaction the responsible business service clusters need to be consulted (step II.1.2 in Figure 3) as shown as well in Figure 6. Based upon the service ownerships on the network level the ownerships on the enterprise level are documented in Table 4.

CONCLUSIONS

Industries such as the finance industry face transformation in market structure, business models and IT-architecture. Flexible service-oriented network architecture can be one solution for value chain decomposition and cross-enterprise collaboration. A transparent organization and documentation of business service ownerships is required to enhance transparency in service management and therefore contribute to sustainability of SOA. This includes (1) the responsibility for a business service in a business network, (2) the allocation of business service information within a business network and (3) the allocation of business service consumer and provider. Existing approaches are basically focusing on the definition of generic roles and activities for SOA governance without structured procedures for defining the inherent ownerships (cf. *Section 3.1*). Therefore this paper developed a procedure to identify, specify and document service ownerships on the business network and on the enterprise level to enhance SOA governance and controllability (cf. *Section 3.2*).

The finance industry was chosen to exemplify the procedure (cf. *Section 4*). The model of *Direct Bank Switzerland* showed the allocation of service ownerships, business roles and organizational domains. Several internal workshops and interviews over a two month period were necessary to define the ownerships for all 130 business services. It has been beneficial to start on the network level as general sourcing decisions of the firm are expatiated there influencing the ownerships. *Table 5* provides lessons learned and limitations obtained by applying the procedure to *DBS*.

lessons learned	transparency	Based on the documented service ownerships bank and network can increase transparency about (1) provider dependencies, (2) realization inefficiencies, (3) impacts of sourcing, (4) compliance fulfillment and (5) (customer) data accessibility.
	standardization	A standardization of the service map would reduce efforts for service ownership definition and facilitate decentralized scenarios.
	organizational flexibility	The allocation of business services to business service clusters is an applicable step to assure flexibility in organizational structure while providing resilient ownerships.
	benefits	Besides the structured identification further benefits of the procedure can be seen in medium-term management and documentation of services.
limitations	strategic-political influences	The current approach focuses so far on the functional-technical aspects and should be enhanced by considering political implications.
	procedure application	The proposed procedure should be applied to further networks and banks differentiating in terms of scale and scope to further enhance the procedure.
	service lifecycle	Service responsibilities are varying along the service lifecycle. These variations are currently not considered by the procedure.
	service level management	Integration into dynamic service level management methods has not been operationalized yet, but would contribute to SLA negotiations.

Table 5: lessons learned and limitations

The procedure is a first step of the research on the way to integrated SOA governance in financial networks. Further research will focus on the application of the proposed procedure at universal and private banks as well as within several reference models for banking in the future. Besides the strategic-political influences onto the ownerships will be operationalized and integrated into the procedure.

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