Building Systems of Engagement to overcome the challenges of digital transformation

Research in Progress

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Abstract

Digital transformation challenges many incumbent companies by technology-driven and data-driven business models which bring along new rules and business models. Service Dominant Architecture (SDA) lies at the core of the digital transformation endeavor of an insurance company in Germany.

Purpose – Digital transformation requires companies to review their strategy. Today, information technologies fundamentally transform whole business models, products and services. Most practitioners perceive a gap and disconnect between design of digital strategies and their execution. Building systems of engagement are central to key industries and evolve to a crucial role for service innovation.

Design/Methodology/approach – The SDA (Service Dominant Architecture), in combination with the Service Dominant Logic (SDL) approach, outlines a set of capability clusters and success factors that companies have to master in order to remain competitive in a digitized world. This is research in progress. SDA constitutes a conceptual framework and design. Results of this research yields from a longitudinal single-case study on the implementation of the SDA in a German insurance company.

Findings – SDL can offer guidance how to overcome challenges of digital transformation. Service innovation lies at the core of a digital transformation. Main contribution of this thesis constitutes the SDA which is based on a service-centered conceptual foundation. Based on its theoretical foundations, the SDL motivates new perspectives on value creation and in this way supplies useful theoretical background and concepts which provides guidance to strategy development and execution.

Research limitations/implications (if applicable) – As the field of SDL and service science evolve, the SDA will continuously evolve and foster service innovations. Yielded results and outcomes are foremost experimental and their broader applicability requires further research activities and evaluation.

Practical implications (if applicable) – Even if our longitudinal case study is providing rich insights into a real life digital transformation process, the chosen explorative approach with focus on action research in the context of a single company is seen as limitation concerning broader applicability and portability. This will require further experiments, research and evaluation.

Originality/value – Digital transformation is challenging companies. Researchers have to understand the problems emerging in real life projects and practice. As IS artifact the SDA has aimed originally to develop new capabilities in the context of EIS but is now expanding to emerge into a more comprehensive methodology and process, which is able to guide companies along their digital transformation process. The originality and value of SDA lies on the one hand in its concreteness and applicability and on the other hand in its link to foundations of SDL and service science.

Keywords: Digital transformation, systems of engagement, digital strategy, IS/IT strategy, enterprise architecture

1 Introduction

Digital transformation requires companies to review their strategy (Kane et al., 2015a, 2015b, 2018). Today, information technologies fundamentally transform whole business models, products and services (Norman 2001, Warg et al. 2015, Warg and Engel 2016, Warg et al., 2018). Most practitioners perceive a gap and disconnect between design of digital strategies and their execution. Building systems of engagement are central to key industries and evolve to a crucial role for service innovation (Weiß et al., 2016, 2018). In this context, service innovations can be seen as an opportune strategy for companies to compete in the digital age (Lusch and Nambisan 2015). Companies need to change their prevailing product-dominant mindset to a service-dominant one to develop digital strategies. (Warg et al., 2018, Weiß et al., 2018, Ross et al., 2017). New technologies introduce capabilities, such as resource integration, that catalyse service innovations (Weiß et al., 2018). Executing digital strategies is a major challenge for many companies as they rely on outdated, monolithic enterprise information systems (EIS). As a result, siloes prevent companies to mobilize and integrate valuable internal and external resources (Warg et al., 2018). Service-dominant (S-D) logic offers valuable concepts and guidance how to overcome challenges of digital transformation. Digital transformation is challenging companies. Executing and implementing digital strategies makes many incumbent companies struggle (Ross et al. 2016). Researchers have to understand the problems emerging in real life projects and practice. Main challenge of incumbent companies is the lack of flexibility of their EIS, often caused by historically evolved IT infrastructures and application systems. This is one explanation for observable inertia and inability to anticipate and react to emerging technologies and digital technology trends (Arthur 2009, Norman 2001). Service Dominant Architecture (SDA) has been proposed by (Warg et al. 2015, Warg and Engel 2016) to overcome some of above challenges. As IS artifact, the SDA has aimed originally to develop new capabilities in the context of EIS but is now expanding to emerge into a more comprehensive methodology and process, which is able to guide companies along their digital transformation process. The originality and value of SDA lies on the one hand in its concreteness and applicability and on the other hand in its link to foundations of SDL and service science. The remainder of the paper is organised as follows. First, we describe objectives and research methodology. Next section reviews relevant literature and presents in condensed way theoretical foundations and relevant concepts. Then, we present the SDA as result of an explorative approach with focus on action research in the context of a single company. Subsequent chapter, introduces required elements, namely the SDA canvas, which shows how the SDA is now expanding to emerge into a more comprehensive methodology and process. After a brief discussion of our research results, the last section summarizes and concludes the paper.

2 Research approach and objectives

Service-dominant architecture, SDA in brief, is a new concept that is designed to be subject to ongoing iterations. The SDA Canvas aims to contribute to research in the field of SDA by complementing the theoretical foundations with a structured approach for implementation for practitioners. SDA constitutes a conceptual framework and design. Results of this research yields from a longitudinal single-case study on the implementation of the SDA in a German insurance company. Hence, this is research in progress. Align IT strategy with business strategy (Henderson and Venkatraman, 1999, Applegate et al., 2007, 39) is a pivotal activity of IS

management. Followed research design and methodology is eclectic and grounds on various disciplines and related practices.

Developing an appropriate IS/IT strategy aligned with the company' business strategy lies at the core of a digital transformation. Digital strategies are based on service strategies, and in consequence a digital transformation brings along a service transformation. Last but not least, service strategies need to be supported by a foundation of execution, which necessitates to assess the capacity and performance of the IS/IT landscape. Furthermore, the comparison of available and demanded IS/IT capabilities is required. In consequence, our research embraces IS development as research approach (Nunamaker et al. 1991). The aim is to produce a demonstrator / prototype system as proof-of-concept or proof-by-demonstration as motivated by Nunamaker et al. (1991). The solution constitutes the core of a real life experiment to explore the possibilities and to learn from piloting and testing the SDA.

Thus, subsequently we focus on explaining options and choices made concerning the design and implementation of the IT artifact, namely the SDA. In essence, SDA introduces additional layer(s) above the existing IS layer(s), here named "systems of record". The new additional layers to be introduced form the so called "systems of engagement" (for example as service platform) to enrich and redefine value creation processes of a company. The central aim is to build new enterprise capabilities to readily implement and support strategic business initiatives, such as (1) real-time interaction with the applicant (customer), (2) integration of insurance processes (to provide customer-centric solutions), and (3) connection of external, specialised service providers. As made obvious, our research follows a multi-methodological approach as argued by (Nunamaker et al. 1991: 91-92). Furthermore, we have elements of an action oriented research design (Böhmann et al. 2014, Sein et al. 2011) based on piloting and evaluating results by means of a real world case of an insurance company. Furthermore, we apply a business and information system engineering approach (Krcmar, 2015: 228) and software engineering process models (Balzert 2008; Oestereich 2009). In addition, we incorporate elements and requirements of Design Science Research (DSR) which show significant relevance to achieve our research objectives (Hevner et al. 2004, Peffers et al. 2008, Baskerville et al. 2018, Gregor and Hevner 2013).

SDA intends to become standard practice and an integral element of digitization and digital transformation strategies. However, this requires further research and evaluation.

3 Related research

Subsequently, we review related research and introduce the theoretical foundations and relevant concepts. In this way, we present the theoretical background to understand how we have created the IT artifact. Long term objective is to elaborate a solid and substantial theoretical background for the SDA research initiative. This is in accordance with the Design Science Research approach described by Hevner et al. (2004), Baskerville et al. (2018), Peffers et al. (2008), Sein et al. (2011).

3.1 Service-Dominant logic and Service Systems

This section reviews and summarizes previous research papers and contributions, namely (Warg et al. 2016, Warg et al. 2017, Weiß et al. 2016, 2018). We have added further research insights and results from our ongoing research activity on SDA. Table 1 shows different capability conceptualizations which are available in selected literature. The list does not strive

for completeness but does show selected contributions which show significant relevance for our research activities which will be further detailed in the remainder.

Table 1: SDL/service capabilities, concepts and aspects

Author(s)	*Contribution/ concept*	*Context/ aspect*
Vargo and Lusch (2004, 2008, 2014, 2016)	-operand resources (physical, e.g. goods, money) -operant resources (intangible, e.g. knowledge, skills, competence)	-value cocreation -value-in-use -value-in-context -resource integration -primacy of operant resources
Lusch and Nambisan (2015)	-service ecosystem -service platform -value cocreation -typology of operant resources (basic, composite, interconnected)	-service innovation -four meta-theoretical foundations
Böhmann et al. (2014)	-service systems architecture -service systems interaction -mobilizing resources (human, physical, information)	-service systems engineering -action design research
Akaka and Vargo (2014)	-technology in dual role (operand and operant resource)	-role of technology in context of service ecosystem and innovation
Grönroos and Voima (2013)	-resource integration -customer experience	-experiential value creation process -value-in-use / customer process
Spohrer and Maglio (2010), Maglio and Spohrer (2008)	-types of resources -service systems / artificats	-four types of resources -artifacts designed with purpose

SDL implies that all social and economic actors integrate various types of resources to create value (Lusch and Nambisan 2015, Grönroos and Voima 2013). In consequence, firms and their customers are thought of "[…] deploying operant and operand resources both to co-create discursively legitimated market spaces and provide inputs for value definition and delivery within them (Arnould 2008). Similarly, Lusch and Nambisan (2015) conceptualize service innovation by drawing from SDL in three specific elements, namely (1) service ecosystem, (2) service platform and (3) value cocreation. They motivate to further "[…] explicate the key characteristics of the three elements of service innovation […]" (Lusch and Nambisan 2015). Furthermore, SDL motivate (1) actor-to-actor networks, (2) resource liquefaction, (3) resource density and (4) resource integration which they characterize as four meta-theoretical foundations of SDL (Lusch and Nambisan 2015). SDL builds a foundation for these approaches and is therefore a major foundation in the development of the SDA (Warg et al. 2015).

In SDL resources are a pivotal concept to the process of value cocreation (Grönroos 2008, Vargo and Lusch 2014, Mele and Corte 2013). From a SDL perspective, resource mobilization is seen as new capability and a "[…] key effect of ubiquitous IS" (Böhmann et al. 2014:

76). Resource mobilization comprises the access to and use of resources and is facilitated by IT-based mechanisms and components, typically implemented by platform-based solution design (Weiß et al. 2018, Böhmann et al. 2014).

Service is the main basis for value exchange and is created with the cooperation of different actors (Vargo and Lusch, 2004; Vargo and Lusch, 2014). Within the SDL, service is defined as "the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself" (Vargo and Lusch, 2004, p. 2). Other service definitions take a similar direction. For example, Grönroos (2008) defines service as "a process that consists of a set of activities which take place in interactions between a customer and people, goods and other physical resources, systems and/or infrastructures rep-resenting the service provider and possibly involving other customers, which aims at assisting the customer's everyday practices." (Grönroos 2008, p. 300).

SDL defines eleven foundational premises that describe the nature of service. As core of these premises, five axioms are emphasized from which the other premises can be derived. The first axiom specifies that "Service is the fundamental basis of exchange" (Vargo and Lusch, 2016). With this axiom, all economic transactions are defined as service. Another axiom claims that "All social and economic actors are resource integrators" (Vargo and Lusch, 2016). Hence, in order to create value, all relevant actors have to integrate their specific resources and thus have to cooperate. A third axiom says that "value is cocreated by multiple actors, always including the beneficiary" (Vargo and Lusch, 2016). Within this axiom, the integration of resources from many different sources is accentuated. The fourth axiom claims that "Value is always uniquely and phenomenologically determined by the beneficiary" (Vargo and Lusch, 2016). By this, the context of the beneficiary is emphasized when discussing the actual value of a customer. The last axiom highlights that "value cocreation is coordinated through actor-generated institutions and institutional arrangements" (Vargo and Lusch, 2016) and thus, the importance of service ecosystems.

The actor system perspective and the respective value for each of the actors, is an important concept in SDL. In SDL, service encompasses all economic activities (Lusch and Nambisan, 2015). This includes goods that serve as alternatives to a direct service provision (Lusch and Nambisan, 2015). In particular, the ex-change of a good has no direct value (value-in-exchange); rather, value is created by the application of a good (value-in-use) in a specific context (value-in-context) (Lusch and Nambisan, 2015). From the SDL perspective, service is viewed as a "[…] transcending mental model for all types of forms of innovations (intangible and tangible)" (Lusch and Nambisan, 2015). An additional concept in SDL describes the resource liquefaction. It "[…] refers to the decoupling of information from its related physical form or device" (Lusch and Nambisan, 2015) and emphasizes the importance of knowledge and skills. Knowledge and skills are operant resources and the basis of strategic benefit (Vargo and Lusch, 2016). As far as a network of actors institutionalize resources, they be-come a service ecosystem. SDL contributes concepts and building blocks (as capabilities) to develop compelling digital strategies and novel value propositions. SDA realizes a conceptual framework to develop systematically solution designs.

3.2 Digital Transformation and New Digital Capabilities

Digital transformation brings new requirements and challenges for companies to respond to market opportunities and to take advantage of new digital technologies. A majority of companies, which aim to address the digital transformation, face challenges in developing a digital strategy to shift from a traditional goods-based to a service-based focus. In part, companies

also struggle with the SDL, which is sometimes perceived as rather too theoretical. The first practical-oriented contribution has been the SDA: It provides companies with guidance in developing service-based, digital transformation strategies (Schlegel 2018). Table 2 shows SDL and its core concepts which inspired the design of the IT artifact on basis of purposed subsystems which take focus on operationalizing SDL axioms and foundational premises. The aim is to achieve desired effect and demonstrate related functionality.

Table 2: SDL delivers core elements for the design of the SDA (adapted from Vargo and Lusch (2014, 2016))

Axiom (A) / Foundational premises (FP)	*Concepts/ Capabilities*
-A1/FP1: Service is the fundamental basis of exchange -FP2: Indirect exchange masks the fundamental basis of exchange -FP3: Goods are a distribution mechanism for service provision -FP4: Operant resources are the fundamental source of competitive advantage -FP5: All economies are service economies	-Service-for-service exchange -Operand resources -Operant resources -Service provision -Service economies
-A2/FP6: Value is cocreated by multiple actors, always including the beneficiary -FP7: The enterprise can only make value propositions -FP8: A service-centered view is customer oriented and relational	-Value cocreation -Interaction -Relationship -Learning -Customer orientation -Value propositions
-A3/FP9: All social and economic actors are resource integrators	-Resource integration -Resource orchestration
-A4/FP10: Value is always uniquely and phenomenologically determined by the beneficiary	-Value-in-use -Value-in-context -Service experience
-A5/FP11: Value cocreation is coordinated through actor-generated institutions and institutional arrangements	-Coordination -Value cocreation -Service ecosystem -Collaboration -Actor-to-actor network

SDA as architecture operationalizes the core elements of SDL by focusing on cocreation and resource integration. Aim of this development is to facilitate the systems of engagement (Moore 2011) by introducing an additional architectural layer above the "systems of record" by instantiating service platforms to enrich and redefine value creation processes by new integrated capabilities. For example, SDA expands relational and contextual capabilities that enable responsiveness towards emerging customer needs and market changes. From a research point of view, SDA addresses thereby three specific research challenges, namely, engineering of service architecture, service systems interaction and resource mobilization, as suggested by Böhmann et al. (2014). Hence, we see service innovation as an opportune strategy to overcome the challenges of digital transformation and to arrive at novel value propositions and unique customer experiences.

4 Building Systems of Engagement

The SDL concept constitutes a key element of the service transformation perspective for a digital transformation. Based on its theoretical foundations, the SDL depicts a logic, or concept that serves as guidance for strategy development. The foundational premises and axioms have been analysed in detail to illustrate the potential implications on strategy development (Schlegel 2018). The SDA complements the SDL from a practical and strategy execution perspective. The concept and structure of the main elements were outlined and introduced. SDA brings new capabilities which are summarized subsequently as set of key digital capabilities as a foundation for strategy execution (Schlegel 2018).

4.1 Systems of Engagement

“Systems of record (SoR)” describes traditional enterprise system that stored and managed data and transactions or enterprise IT 1.0. Today, they are "[…] no longer a source of competitive differentiation for organizations" (Moore 2011). SoR are the ERP (Enterprise Resource Planning)-type systems companies rely on to run their core operations (business transactions, such as financials, manufacturing, CRM, HR). Transactions have to be "correct" and "integrated" so all data is consistent (single source of truth). SoR were traditionally designed for people who have no choice but to use them. Table 3 summarizes the attributes and main characteristics of systems of engagement (see Moore 2011, Bersin 2012,Schadler, McCarthy 2012).

Table 3: Systems of Engagement: Attributes and Characteristics (Moore 2011:5)

Consideration	Systems of Record	Systems of Engagement (Social Business Systems)
Focus	Transactions	Interactions
Governance	Command and control	Collaboration
Value	Single source of the truth	Open forum for discovery and dialog
Performance Standard	Accuracy and completeness	Immediacy and accessibility
Content	Authored	Communal
Primary Record Type	Documents (Text, Graphics)	“Conversations” (Text-based, Images, Audio, Video)
Searchability	Easy	Hard
Usability	User gets trained on system and has access to follow-on support	User “knows” system from consumer experience
Accessibility	Regulated and contained	Ad hoc and open
Retention	Permanent	Transient
Policy Focus	Security (protect assets)	Privacy (protect users)

In a complementary way, Systems of Engagement (SoE) are seen as "the next stage of enterprise IT" (Moore 2011). They aim at enabling companies to engage with their customers and

suppliers, and vice versa, with a focus on communication to enable collaborative business in real-time with all the benefits of mobility and speed (Moore 2011). SoE are systems which are used directly by employees for "sticky uses" like email, collaboration systems, and new social networking and learning systems. Besides customers they engage employees (Bersin 2012). Digital transformation treats "[…] content as the material of their ongoing business life" (Moore 2011:6). SoE are "[…] open, spontaneous […]. The content generated […] is […] termed social rather than enterprise because […], some or even all of the contributors are external to the enterprise" (Moore 2011:6). In this way, this new generation of enterprise systems shifts focus on interactions with the customer and engaging actor-to-actor networks. In summary, SoE bring companies new communication and collaboration capabilities. "These are IT-enabled services that allow groups of people to interoperate both synchronously and asynchronously, and they include wikis, collaborations tools, chat, crowd-sourcing, web conferencing, video streams, video conferencing, and similar services" (Moore 2011:4). In consequence, SoE brings SDL to the fore as this type of systems will foster interactions and relationships with communities and in more general resources that are outside the enterprise. Hence, resource integration turns into a core business capability to run what Moore (2011) phrases social business systems.

Customer focus is achieved through seamless customer experience journeys across channels, inclusion of the customer in value creation processes for value co-creation, and a shift from transaction to interaction. Collaboration includes opening previously closed business processes for partners and customers to act as a central resource integrator. Furthermore, complexity of the IT infrastructure is to be contained in terms of process definition, organizational structures, and systems. In addition, agility is required to develop capabilities in the organization, to enable timely responses to changes in customer needs and the competitive environment (Schlegel 2018). In the next section, we introduce the SDA, which allows building customer-centric capabilities.

4.2 Service Dominant Architecture

SDA as architecture operationalizes the core elements of SDL by focusing on cocreation and resource integration. Aim of this development is to facilitate the systems of engagement (Moore 2011) by introducing an additional architectural layer. SDA proposes to operationalize requirements and characteristics for the planning, designing and building of customer centric solutions, which are characterized by value in use. Thereby giving the structure for integrating and arranging operant resources. Following SDL, SDA consists of at least three distinct service systems and a "data lake" (Figure 1). The service systems are system of interaction, system of participation, system of operant resources. External resources can be integrated via fix coupling with SDA-external platforms or flexible, lose coupling with resources out of the service ecosystem (Warg and Engel, 2016). The first purposed service system is the System of Interaction (SOI). It comprises all artifacts that are located at the customer interface and thus, enable cocreation with the customer by using multiple communication channels. Based on services at the customer interface, the service provider can identify actual needs and requirements of the customer and implement context-specific solutions.

The second purposed service system is the System of Participation (SOP). This system comprises all software artifacts for the integration of partners on the service platform, in which resources for the development of new value propositions are orchestrated.

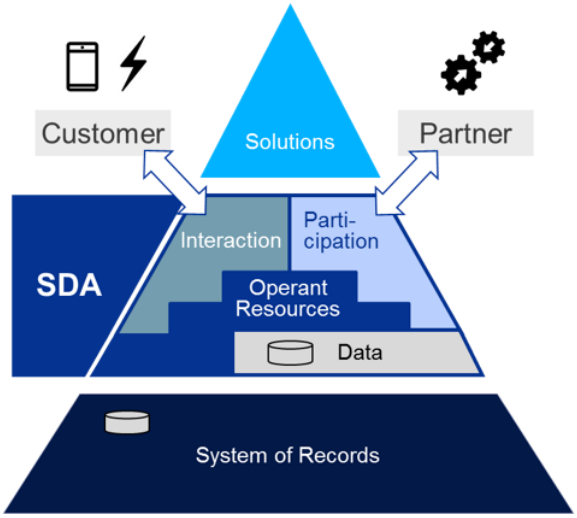

Figure 1: Service Dominant Architecture (Warg et al. 2015, Warg et al. 2016)

Furthermore, existing resources from the System of Records (SoR) are transformed into dynamically applicable information resources in the System of Operant Resources (SOOR). To enable the application of all information and resources in real-time, a supplementary data lake is established (Warg et al. 2016). The data lake enables a data fueled understanding of the customer and his preferences.

Table 1. Purpose of SDA service systems

Service System	*Purpose / Function*
SOI	-customer interaction; value cocreation; service provision -multiple communication channels (omnichannel) -customer-specific needs / preferences -customer services
SOP	-integration of partners -configuring of resources (external) -resource orchestration -value proposition
SOOR	-information resources; knowledge -customer data (relationship); customer record / history -configuring of resources (internal) -real-time access to the SoR

In essence, SDA is the technical implementation of the SDL and one of the most important elements for strategy execution to create valuable service experiences, called “value in use”. By combining a set of service systems, the SDA provides a technical environment that combines external resources from customers and partners, for example user data or market data, with internal resources, for example customer relationship management data, or services. Therefore, the SDA links the architecture of the business with that of the IT. Objectives of SDA design are reflecting business needs on the technical side, including customer and service focus, collaboration, complexity containment, and agility.

SDA enables resource mobilization through integrating and orchestrating relevant resources (such as processes, data, applications, functions) (Weiß et al. 2018, Alter 2013) into agile,

flexible and collaborative services in real-time. This facilitates the use of existing resources and thus, supports the implementation and development of service innovations. To generate customer-centric solutions, the SDA implements capabilities to capture (integration, participation), exchange (interaction), and orchestrate relevant resources.

These capabilities allow to design and develop service systems (Spohrer and Maglio 2010) of different granularity (micro, meso, and macro) (Akaka and Vargo 2014, Vargo and Lusch 2016). For this, the SDA arranges and integrates resources, processes, and internal and external components needed for developing new solutions. Technically, SDA represents a further information system layer that is established on top of the existing EIS layer, the so-called systems of record. The new information system layer is based on theoretical foundations from service science to develop and implement a service platform. This two-speed architecture combines stability in the system of records, and agility in the systems of engagement of the service-dominant architecture. Objective of the service platform is to create and distribute reusable services across the company (Schlegel 2018).

4.3 SDA Capabilities

Capabilities reflect how well a firm performs each of its core processes and in designing and managing related sub-processes (Srivastava et al. 2001). Enterprise capability is defined as organizing and coordinating elements such as customer base, brand, core competence, infrastructure, and employee's ability to change into an integrated group of resources […]" to achieve strategic agility (Weill et al. 2002). Figure 2 shows our research approach to arrive at desired resource framework and model to conceptualize SDA capabilities.

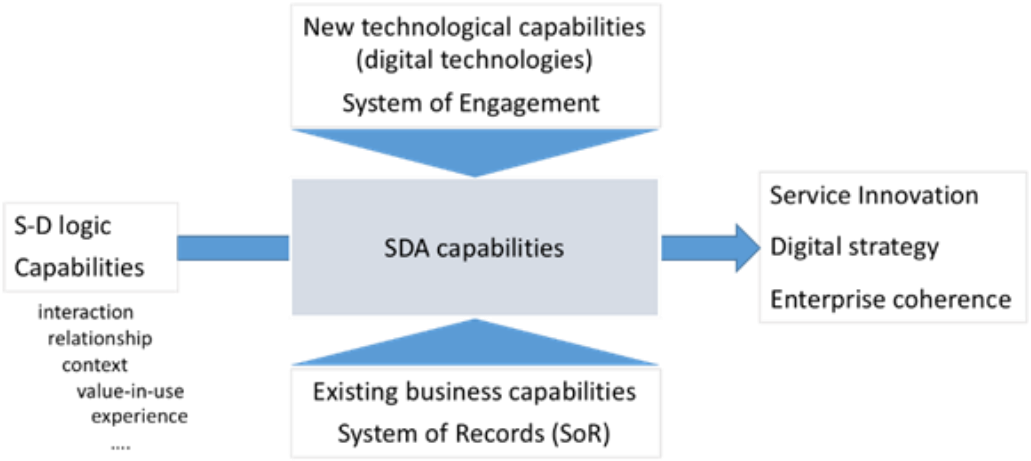

Figure 2: Conceptualizing SDA capabilities

"Strategic agility is defined by the set of business initiatives an enterprise can readily implement" (Weill et al. 2002). Related business initiatives can be classified into three sets: (1) internally focused, (2) supply-side focused, (3) demand-side focused initiatives (Weill et al. 2002). (Mele and Corte 2013) argue that well-fitting, efficient and efficacious set of activities, when rare and difficult to duplicate, can become a source of value (Mele and Corte 2013). In Srivastava et al. (2001) assets are referred to "[…] organizational attributes that an organization can acquire, develop, nurture, and leverage for both internal (organization) and external (marketplace) purposes". SDA gather all necessary capabilities and resources to develop new value propositions incorporating (digital) services to the customer. For this, the SDA encapsulates existing capabilities from the SoR, capabilities from new digital technologies, and sug-

gested capabilities from SDL. Resources are often treated in abstract and not sufficiently specific manner to provide concrete guidance in implementation projects. Hence, we aim to develop a resource framework and model which yields of a deeper understanding of SDA capabilities and which informs about relevant attributes and dimensions to characterize resources. As a result, enterprise architecture (EA) is increasingly recognized by organizations as important instrument to steer and influence transformations (Proper and Lankhorst, 2014). In context of EA, TOGAF proposes an applicable content model that conceptualize and concretize capabilities for implementation (TOGAF, 2018). In this approach, new digital capabilities combine and integrate business-related and technological components and services. Central concept is the business service which is composed of technical components, entities and services. In this way, SDA brings previously motivated IT infrastructure capabilities into action thereby building on existing IT resources and systems ("systems of record") (Proper and Lankhorst, Weiß et al., 2018).

4.4 SDA Canvas

To successfully execute a strategy, it is advisable to provide guidance for implementation. This research aims to provide that guidance with the SDA Canvas (Figure 3). In the remainder, we summarize research results yielding from a current research study and project (Schlegel 2018). The SDA canvas proposes eleven capability clusters that aim to assist companies in identifying and developing specific capabilities for their digital transformation (Schlegel 2018).

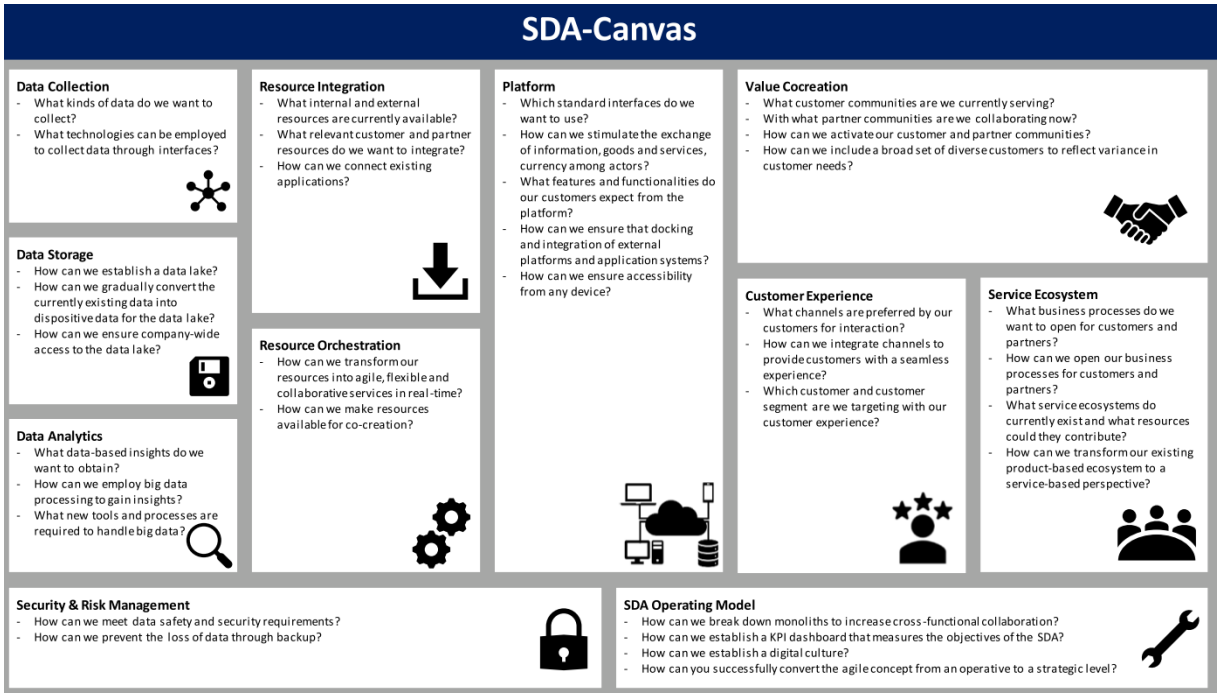

Figure 3: SDA Canvas (Draft version) (Schlegel 2018)

The SDA Canvas was developed on the following methodology: Firstly, a review of existing literature on service-dominated architecture, related fields of research, and existing canvases, including the business model canvas, IT service canvas, and SDL canvas, was conducted. Secondly, the findings from the literature review were allocated to the four main elements of the SDA, namely the systems of engagement consisting of the three technical systems, system

of interaction, system of participation, system of operant resources, and the data lake. Thirdly, based on the allocated findings, cross-referencing clusters were developed. Fourthly, the preliminary clusters were refined in a set of iterations to minimize overlaps and to ensure that all relevant aspects are included (Schlegel 2018). Fifthly, guiding questions were developed and prioritized to provide the reader with guidance in implementing a SDA. Prioritized questions are marked in bold. Sixthly, the canvas clusters were arranged in a way to guide the reader through the overall SDA Canvas step by step, building on the insights of the previously canvas cluster (Schlegel 2018). Digital platforms establish the technical foundation, on which the business runs. SDA operating model constitutes the organizational foundation from a business perspective. It is outlined in the operating model capability cluster. Value co-creation covers the key elements of the SDL and SDA. This capability cluster redefines how companies create value jointly with partners. In addition, customer experience addresses the operationalization of elements from the value-co-creation cluster (Schlegel 2018). In the dimension service ecosystem, networks of collaborations are assessed, representing a key element for service transformation. Resource integration and resource orchestration constitute the foundation of services development. Data collection, data storage and data analytics include collecting, maintaining, and analysing data for improved decision making and services development. Security and risk management summarizes required measures for establishing data safety and security management (Schlegel 2018).

5 Discussion

As the SDA Canvas constitutes the first practical framework, embedded in theoretical foundations, it may require further iterations and adjustments to optimize it. It is recommended to further refine the SDA Canvas by conducting a set of use cases, with focal points on: Firstly, a pressure test if all relevant topics for SDA are fully covered by the capability clusters of the SDA Canvas. Secondly, if questions provide sufficient guidance for practitioners, and if the prioritization of questions is logical and reasonable. Thirdly, whether different canvases are required, for example in case that industry or company size renders the SDA Canvas poorly applicable to some companies. Fourthly, whether the canvas clusters and questions managed to balance the trade-off between depth of detail and conciseness (Schlegel 2018). Previously, we have suggested that digital strategies grounded on SDL are adequate to develop digital strategies (Schlegel 2018). We have described what digital strategies and their purpose are and have proposed SDA to overcome current challenges of service systems engineering. This architectural design conceptualizes major components by organizing them into a structure that describes system elements encapsulating SDL principles and related functionalities. Presented research aims to respond to what Sein et al. (2011) refer to as dual mission and needs in the context of Action Design Research (ADR): (1) make theoretical contributions and (2) solving current anticipated problems of practitioners (Sein et al. 2011). ADR foresees ongoing improvement and adaption of the original design idea through incorporating gained insights form organizational use, perspectives and participants (Sein et al. 2011). Thus, we recognize that SDA came into existence in a specific organizational context, which is of course a limitation concerning its broader applicability and future adoption for other interested parties in their given organizational contexts. Hence, in this paper we aim continuing to articulate and document our learning process. This includes continuous adaptation of the artifact (SDA) and the respective "[…] local practices of its use, and to make such analysis the basis for generalizing" (Sein et al. 2011).

6 Conclusion and outlook

The SDA is designed to connect the existing IT architecture with service-dominated solutions by introducing the systems of engagement, which reflect business needs and requirements based on digital business models, incorporating co-creation, interaction, and collaboration.

The systems of engagement are characterized by the following technical elements: Agile development processes and teams to include technological innovations into the company, introduction of data control points and analysis of customer behaviour, and processing of data, for example data generated by sensors in devices. To conclude, the SDA-Canvas, in combination with the SDL-approach, outlines a set of capability clusters and success factors that companies have to master in order to remain competitive in a digitized world (Schlegel 2018). Our next research objective is to clarify and broaden the knowledge base of the produced IT artifact concerning implemented mechanisms and expected effects. Next steps foresee to further expand the knowledge base and theoretical foundation to deal with resource integration and cocreation in the context of the SDA. In addition, we aim to clarify and investigate further requirements concerning SDA's evaluation. Evaluation happens iteratively at the end of each development step by an assessment through use cases or practitioner feedback. Following the DSR process as suggested by Sein et al. (2011) and Baskerville et al. (2018), we intend to commence our study of the utility and usefulness of the created IT artifact in the given concrete organizational context. SDA operationalizes and deploys respective capabilities through its purposed subsystems (Warg et al. 2016).

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