Service-oriented Business Model Framework
A Service-dominant Logic based Approach for Business Modeling in the Digital Era

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Keywords: Business Model, Digital Transformation, Digital Technology, Digitalization, Service-Dominant Logic.

Abstract: The business model (BM) concept has been described as an intermediating tool for managing the transition from technology's potential value into market outcomes. Unfortunately, current business modeling methodologies do not meet specific needs of modeling value (co-)creation in digitally transforming ecosystems (DTE). Based on desktop research and empirical findings this paper proposes a Service-oriented Business Modeling (SoBM) framework to advance the development of market solutions in these environments. Adopting a service-dominant logic's (S-D logic) perspective a service-centric, network-oriented, and transcending solution proposal is presented. It has been designed to identify and leverage digital technology's potential value and to improve the conceptualization of value creation and capturing in a digitally connected physical world.

1 INTRODUCTION

Business practitioners and scholars have described the intense and progressive transformation of organizations, industries, and the overall economy through digital technology implementation in products, services, and BMs. This calls for constantly questioning, newly defining and transforming BMs to ensure sustainable business success. Hereby, the convergence of digital and physical value networks as well as an increased importance of service business can be seen as key challenges for digital business strategy and the design of contemporary BMs (Kane, 2016; Lucas et al., 2013; Zolnowski, 2015).

Among the many reasons, the change in the role of information strategy as an integral part of a digital business strategy (Bharadwaj et al., 2013) forces information systems research (ISR) to give guidance, and concrete recommendations for business modeling in DTEs (Berman, 2012; Bharadwaj et al., 2013; Iansiti and Lakhani, 2014; Veit et al., 2014). This is particularly important as it has been observed that not only products and services, but even more BMs have to promote the generative characteristics of digital artifacts that make use of them. Hence, there is a necessity to develop a transcending and flexible approach to provide a supportive environment for developing viable market solutions in a digitally connected physical world (Kallinikos et al., 2013; Lusch and Nambisan, 2015; Pfeiffer and Jarke, 2016; Turber et al., 2014; Yoo, 2010; Yoo, 2013).

By elaboration of digital technology's characteristics as well as its influences on economic exchange this paper presents a set of requirements for developing market solutions in DTEs. Following these requirements and by taking a S-D logic perspective a new business modeling approach is presented. Enriched by Service-oriented Architecture's (SOA) well-proven modeling principles the framework provides a flexible, networked, and agile modeling process for constantly changing and evolving DTEs.

This paper is structured as follows. First, the research methodology is briefly introduced. Second, a literature overview on the related work is given. Third, based on the related work the requirements on business modeling in DTEs are elaborated. Fourth, we present the SoBM framework as an appropriate solution proposal for the identified context of application. Finally, the findings are discussed based on case study results and a conclusion including limitations and future work is given.

Pfeiffer, A., Krempels, K-H. and Jarke, M.
Service-oriented Business Model Framework - A Service-dominant Logic based Approach for Business Modeling in the Digital Era.
DOI: 10.5220/0006255103610372
In *Proceedings of the 19th International Conference on Enterprise Information Systems (ICEIS 2017) - Volume 3*, pages 361-372
ISBN: 978-989-758-249-3

2 METHODOLOGY

Our research pursues a design science research methodology (Hevner et al., 2004; Peffers et al., 2007). It is in line with existing discussions in design science (Niederman and March 2012) and business model research (Veit et al., 2014) by advancing knowledge about BMs in DTEs.

The development of our SoBM approach has been an iterative process involving construction and evaluation phases. A series of case studies (Pfeiffer and Jarke, 2016; Pfeiffer, 2016) was a fundamental part of the research to gain insights into the research problem and evaluate the developed artifact. This artifact has been discussed and refined in diverse expert workshops and international conferences (e.g., Pfeiffer, 2016), which finally led to the present version of the SoBM framework.

3 RELATED WORK

The artifact "SoBM framework" is built upon relevant extant work, which was founded in three domains: ISR, BM research, and marketing research. ISR delivers insights into digital technology's nature, its layered modular architecture (LMA) and digital technology's influence on value creation processes. BM research provides knowledge on the relevant building blocks of BMs and a common state of the art in business modeling. Marketing literature contributes by providing S-D logic as an underlying philosophy for the interpretation economic exchange in DTEs.

3.1 Digitization and Digital Transformation

In nearly every industry sector, customer expectations, operational needs and technological evolution force business leaders to rethink business strategy with regard to the role of digital technologies. In many cases, digital technology has shown to be central in making new BM technically feasible and economically viable (Berman, 2012; Bharadwaj et al., 2013; Yoo et al., 2010; Yoo et al., 2013). To take advantage of digital technology's application in the business context, it is essential to firstly understand what digital technology is and secondly how it can be transformed into economic output.

Digital technologies are defined as "combinations of information, computing, communication, and connectivity technologies" (Bharadwaj et al., 2013, p. 471). Within our approach, they cover both digital and digitized artifacts. Digital artifacts are continuants combined with structure, an agentive function imposed by human communities and a nonphysical mode of being (Faulkner and Runde, 2013). They result from digitization in the narrow sense, i.e., „the encoding of analog information into digital format" (Yoo et al., 2010, p. 725). Digitized or sometimes also referred as digitalized artifacts, however, are structured and organized arrangements of nonmaterial (digital) and material objects (Yoo et al., 2010). They are the outcome of digitization in the broader sense, i.e., the embedding of digital artifacts into material technological objects.

Kallinikos et al. (2013) introduced editability, interactivity, re-programmability/ openness and distributiveness as key attributes of digital artifacts. Yoo et al. (2010) point out, that the incorporation of digital artifacts causes physical objects to adopt these digital characteristics. Thus, also digitized artifacts are programmable and the design of new functionality can be integrated at any time, even after the physical production. Further, economics of scale during production become less relevant as the marginal costs of reproduction and distribution of digital artifacts are next to nothing (Henfridsson et al., 2014). Overall, digitized artifacts are perceived as having an ambivalent ontology (Kallinikos et al., 2013), being intentionally incomplete, and perpetually in the making (Zittrain, 2008).

Digitization enables resource dematerialization in form of resource unbundling and liquification. The latter concept entails the separation of information from its physical carriers. Resource unbundling implies the dissolvement of boundaries which are holding together activities in time, place and actors. Resource dematerialization enhances economic exchange by increasing resource density within value creation providing benefit to the actors and improving the viability of the ecosystem (Lusch and Nambisan, 2015; Normann, 2001). These improvements are facilitated through optimization in resource integration (i.e., digital technology's role as enabler) or through the creation of new sources of value (i.e., digital technology's role as initiator) (Lusch and Nambisan, 2015).

Yoo et al. (2010) pointed out that with digitization a new "layered modular architecture" (LMA) of digital technology emerged. This LMA consists of four loosely connected but interdependent layers: device, network, service, and content. Through its "*de-couplability*" a LMA facilitates a free and individual design between the different layer levels. "*The components represent [a] bundled set of specialized knowledge and skills appearing in the form of tangible or intangible components that easily interface with heterogeneous product forms and types*" (Lusch and Nambisan, 2015, p. 164 f.). Hereby, the service layer of a specific digital technology (i.e., a combined set of components) provides functionality for actors to create, manipulate, store, and consume information independent of the upper or lower layers. Thus, it unites "physical" and "intangible" functionality and represents the freely combinable value provision elements of a specific digital technology (Pfeiffer and Jarke, 2016; Yoo et al., 2010). As many digital artifacts are application agnostic, they allow multiple actors (incl. non-human actors) to interact, share, and contribute across the four layers independent of the embedding material objects or actual ownership (Storbacka et al., 2012; Yoo et al., 2010). This can be seen as one key enabler for generativity and digitally invoked transformation processes–an unforeseen and unprecedented field of possible "innovative" services provided by and with digital technology (Pfeiffer and Jarke, 2016; Tilson et al. 2010; Yoo et al., 2010). Based on the combinatorial evolution of existing technological artifacts (Arthur, 2009) the potential of digitization-based innovation is transcending product/service and industry borders. This increases by the widespread use of digital technology applying the LMA and ecosystems embedding it into supportive environments. These have been characterized by a modular and granular architecture (Kallinikos et al. 2013; Lusch and Nambisan, 2015; Yoo et al. 2010).

However, digitization and digital technology only provide chances to optimize and enhance value creation and capturing. These chances must be transferred into the context of ecosystems to capture improvements in actor's resource density. This process is called *digitalization* or synonymously *digital transformation*. Tilson et al. (2010) define digitalization as "*a sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural*" (Tilson et al., 2010, p. 2).

Accordingly, it is not only necessary to understand digital technology's nature and its potentials for value creation. The perception of a sociotechnical process requires to analyse the application of technology as resources in specific contexts. This application is characterized by interdependencies between resources (e.g., technology, knowledge, institutions) and various actors creating value through the integration of digital technology. Thereby, the establishment of shared institutions and common social practices becomes central to the development of new market solutions. This perspective focuses attention on "what" an actor actually realizes through digital technology and how digital technology changes his capabilities to create value for himself or another actor. Even more, the recognition of digital technology's initiator role within value creation leads to the question how to conceptualize its dual role in business modeling (Chesbrough, 2007; Lusch and Nambisan, 2015; Storbacka et al., 2012; Yoo, 2010). Following this logic means to question established views on economic exchange, institutions and ecosystems' architecture to cope with and proactively utilize changes in scale, scope, speed and sources of value through digitization (Bharadwaj et al., 2013; Storbacka et al., 2012; Turber et al., 2014; Zolnowski, 2015).

3.2 Service-dominant Logic

S-D logic was introduced by Lusch and Vargo in 2004. It derived from debates in marketing theory concerning the applicability of a goods-oriented interpretation of economic exchange against the background, among other things, of the increasing prevalence of digital technology's "*intangible*" value creation contribution (i.e., service as a process).

S-D logic addresses the generative nature of digital technology and offers a perspective on economic exchange transcending the boundaries of products, services and actor networks. Hereby, it provides an adequate perspective for analyzing and conceptualizing economic exchange in DTEs (e.g., Lusch and Nambisan, 2015; Storbacka et al., 2012; Vargo and Lusch, 2016; Zolnowski, 2015). Five axioms are fundamental basis of the concept (see Table 1).

Table 1: Service-dominant logic's five axioms, Vargo and Lusch, 2016.

Axiom 1:	**Service is the fundamental basis of exchange**
Axiom 2:	**Value is co-created by multiple actors, always including the beneficiary**
Axiom 3:	**All social and economic actors are resource integrators**
Axiom 4:	**Value is always uniquely and phenomenologically determined by the beneficiary**
Axiom 5:	**Value cocreation is coordinated through actor-generated institutions and institutional arrangements**

In S-D logic terminology service is fundamental basis of exchange and is defined as "*the application of specialized competences (operant resources–*

knowledge and skills), through deeds, processes and performances for the benefit of another entity or the entity itself" (Lusch and Vargo, 2014, p. 43). Value is always determined by the beneficiary (e.g., the customer) and co-created through actors by integrating (internal or external) resources through the exchange of service. Thus, value is seen as dynamic, experiential and contextual, rather than as a unit of output or embedded in a good or service (Vargo and Lusch, 2016). This shifts attention from goods–as inert, tangible passive operand resources–to skills and knowledge–as intangible operant resources applied through service provision.

Operant resources are acting on other resources to produce effects and are of a dynamic and difficult to transfer nature. Thereby, they are a central source of strategic benefit. "*The most fundamental operant resource is knowledge and the technology it fosters. Technology is the practical application of knowledge.*" (Lusch and Nambisan, 2015, p. 159). Explicitly highlighting the dual role of digital technology as an operand (enabling) and operant (initiating) resource characterized by institutional components improves the analysis and explanation of the necessities and opportunities through digital transformation (Lusch and Nambisan, 2015).

Service ecosystems as units of analysis are defined as "*a relatively self-contained, self-adjusting system of resource integrating actors connected by shared institutional arrangements and mutual value creation through service exchange*" (Lusch and Vargo, 2014, p. 161). This highlights the coordinating function of institutions and institutional arrangements (Lusch and Nambisan, 2015), as well as their role in being resources integrated by the involved actors. Using "oscillating foci" a service ecosystem can be analyzed at various levels of aggregation. Individual and dyadic structures and activities are studied at the micro level (e.g., internal, B2B or B2C), midrange structures and activities (e.g., industry, markets) at the meso level, and wide-ranging societal structures and activities at the macro level (Vargo and Lusch, 2016).

Providing relevant elements and relations for understanding economic exchange processes in DTE S-D logic can be taken as an explanatory approach and basis for the development of business activities in networked markets (Lusch and Nambisan, 2015; Storbacka et al., 2012; Turber et al., 2014; Zolnowski, 2015).

3.3 Business Model Concepts and Business Model Frameworks

The pace and impact of digitalization has recently initiated a renaissance of the BM concept, a theoretical model describing the components and fundamental mechanisms of value creation and capturing in organization. There exists a large variety of BM concepts and frameworks. This derives, inter alia, from the fact that the BM concept origins from diverse disciplines such as ISR, strategy, business management, economics (Fielt, 2014; Pozzi et al., 2016).

Within the substantial research on BMs in ISR and BM research in S-D logic, scholars have recently reviewed the literature (Fielt, 2014; Frow et al., 2014; Pozzi et al., 2016; Storbacka et al., 2012; Turber et al., 2014; Zolnowski, 2015). Unfortunately, these reviews reveal that neither a commonly accepted definition of BMs nor regarding their conceptual components exists. The concept boundaries of applications differ according to the context and conditions defined in the approaches (Fielt, 2014). Nevertheless, scholars identified commonalities in definitions and regarding basic elements of BM as they seem to oscillate around value proposition, value architecture, value network and value finance (Fielt, 2014; Frow et al., 2014; Pozzi et al., 2016; Storbacka et al., 2012; Zott et al., 2011). Therefore, we base our further work on the Zott et al.'s (2011) conclusions regarding the BM concept: "*(1) there is widespread acknowledgement—implicit and explicit—business model is a new unit of analysis that is distinct from the product, firm, industry, or network; it is centered on a focal firm, but its boundaries are wider than those of the firm; (2) business models emphasize a system-level, holistic approach to explaining how firms "do business"; (3) the activities of a focal firm and its partners play an important role in the various conceptualizations of business models that have been proposed; and (4) business models seek to explain both value creation and value capture"* (Zott et al., 2011, p. 1020).

Further, frameworks or representations of BMs are widely used tools for analyzing and developing current or future business ventures. They are substantiating or operationalizing the BM concept: "*a useable business model framework captures the ways in which key decision variables are integrated, including the need for unique combinations that are internally consistent.*" Moreover, a BM framework is "*more than the sum of its parts, the model captures the essence of how the business system will* *be focused*” (Morris et al., 2005, p. 47). According to Morris et al. (2005) a framework needs to be simple, logical, measurable, comprehensive, and operationally meaningful. According to results of recently conducted reviews most BM concepts lack relational and process-oriented attributes that are characteristic for service logic and supporting the understanding of digital technology’s opportunities for BMs (Fielt, 2014; Frow et al., 2014; Pozzi et al., 2016; Storbacka et al., 2012; Zolnowski, 2015). Overall, many of the well-known business modeling approaches tend to focus on strategic aspects of BMs. “*They provide “an exploded view”, showing the “parts of an engine”*” (Westerlund et al., 2014, p. 9), presenting monolith and static views while focusing on the architecture of value creation and capturing rather than a relational- and process-oriented perspective. With this approach, they fail to explain the dynamics between BM components and the surrounding ecosystems (Fielt, 2014). In this line, existing approaches do not sufficiently support a transcending view on value creation in networked relational and interdependent partnership (Turber et al., 2014; Zolnowski, 2015). Building on S-D logic and service science, first attempts to create such models emerged adapting existing BM approaches (e.g., Ojasalo and Ojasalo, 2015; Turber et al., 2014; Viljakainen et al., 2013; Zolnowski, 2015).

The results reflect general challenges in mapping networked relations to focal company’s business thinking and in identifying new opportunities for co-creation to increase resource density based on digital technology’s LMA (see Viljakainen et al., 2013; Frow et al., 2014). Further, existing approach seem to fail in coping with the complexity emerging from the interactive, fluid and borderless attributes of digital resources. They seem to focus on physical or digital materiality (good-like characteristics) rather than on digital technology’s potential to enhance, extend, and redefine value co-creation in value networks.

4 REQUIREMENTS FOR BUSINESS MODELING IN DIGITALLY TRANSFORMING ECOSYSTEMS

As pointed out in the previous sections, digitization and digital transformation force companies to question established views on economic exchange, proactively use the chances of digital transformation and built viable market solutions.

We elaborated that the formation of market solutions in digital transformation has to take “*digital nature*” (i.e. editability, interactivity, openness and distributiveness) and its LMA (i.e. networked, loosely coupled, service-centric) into account. Especially, a development environment characterized by modularity and granularity has been considered as supportive to create and capture value from digitization.

The BM concept appears to provide an appropriate unit of analysis for shaping business activities while S-D logic presents an explanatory perspective on economic exchange in DTEs. Further, the discussion has shown that the concept used to describe and manage value creation and capturing must be adapted to an interactive and networked perspective that transcends product/service boundaries and focuses on value co-creation.

Building on these findings we propose following requirements for business modeling in DTEs substantiated in two categories (see Figure 1):

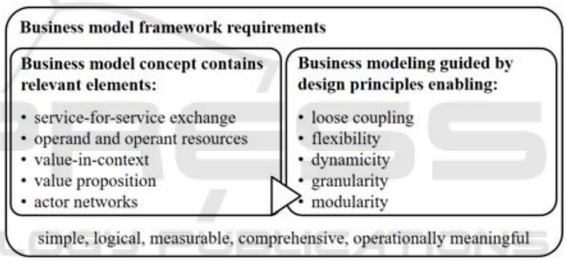

Figure 1: Requirements for business modeling in digitally transforming ecosystems–own diagram based on Lusch and Nambisan, 2015; Morris et al., 2005; Vargo and Lusch, 2016.

Business Model Elements: Following our findings, a comprehensive BM concept builds on S-D logic ecosystem elements and their relations. Specifically, we see the value context and operant resources (e.g., institutions and digital technology) relevant for developing viable solutions in DTEs. They cover relevant ecosystem's aspects transcending focal actor’s sphere to partners and foremost beneficiaries’ value perception (value-in-context) in value co-creating activities (see also Zolnowski, 2015). The value-in-context is seen as direct related to interrelating value propositions as they are “*phenomenologically determined based on existing resources, accessibility to other integratable resources, and circumstances*” (Vargo and Akka, 2009, p. 39).

Design Principles: Following common perception of digital technology’s nature, BM principles should guide the course of modeling in the way that the architecture is characterized by a layered structure reducing complexity in networked and interrelated system. Further, they should allow loose coupling and a flexible adjustment of BM elements. As a modular and granular architecture is seen as supportive, we see these concepts as fundamental design principles for the development of BM. Especially, modularity ensures mix-and-match of BM elements in different variations based on the provided granularity of the system (see also Lusch and Vargo, 2015; Storbacka et al., 2012).

Business Model Framework Characteristics: Following Morris et al.'s proposal a business model framework should be designed to be simple, logical, measurable, comprehensive, and operationally meaningful.

5 SERVICE-ORIENTED BUSINESS MODEL FRAMEWORK

The results of recently performed literature reviews and applications in practice (exemplified in section 3 and 6) show, that existing BM frameworks are not sufficiently addressing the specific needs of digital-oriented business modeling (see Section 4). Therefore, we started the development of a solution proposal based on the deducted requirements applying S-D logic. Latter provides a feasible understanding of economic exchange in a digitally connected physical world. With its transcending, service-centric and network-oriented perspective it deems to provide a solid basis for developing new value creation activities in value networks. Further, it enabled us to easily transfer well-proven paradigms of ISR to improve business modeling in DTEs. The following sections will provide a brief overview of SoBM framework highlighting some S-D logic specifics and presenting it as a comprehensive and flexible BM framework.

5.1 Business Modeling from a Service Dominant Logic Perspective – Definition and Concept Map

We identified BM design as a key unit of analysis for the improvement and shaping of value co-creation. Taking a S-D logic perspective, business modeling is part of a structured institutional work in micro and meso level service ecosystems. Successful business modeling is leading to institutionalized market solutions for new or existing problems of actors. Thus, business modeling should be understood as co-creational activity undertaken by actors to increase resource density and to optimize viability of a service ecosystem (Vargo and Lusch, 2016). Applying S-D logic we define:

A business model describes a meso level service ecosystem from a focal actor's perspective to explain the value logic of an organization in terms of how it creates and captures value (i.e. the mutual value co-creation). It can be represented by an interrelated set of elements that address service ecosystem's actors, value propositions, services, resources (e.g., technology, knowledge, institutional logics), and value dimensions (i.e. value-in-context).

Based on this definition we propose a meta-model for business models grounded in S-D logic as depicted in the following concept map (see Figure 2):

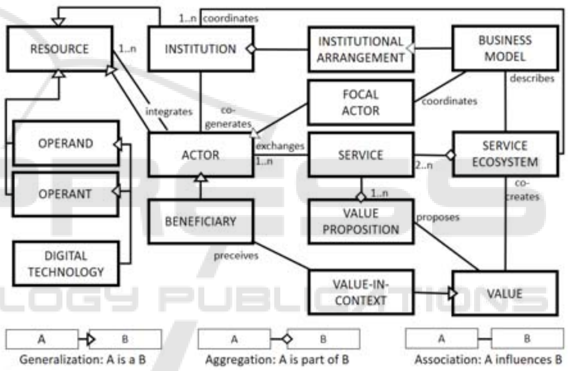

Figure 2: Meta-model Service-oriented Business Model Concept Map–own diagram.

The relational model depicts the main elements and relations within the BM concept addressing them from a S-D logic perspective (see Section 3.2). In line with commonly accepted BM concepts SoBM takes a system-level, holistic approach from a focal actor's perspective to describe and develop value creation and capturing activities of a firm (Zott et al., 2011). Within our framework, actor's roles in business modeling as well as in service-for-service exchange are multiple. They change depending on the nature of service exchange and the type of resource integration achieved, e.g., actors can take role as ideators, designer and intermediary (Lusch and Nambisan 2015). Thus, the term "actor" is used as a generic construct for all resource integrators. The "focal actor" takes the role of initiating and coordinating business modeling. He aims to improve resource density for both intra-actor and inter-actor (e.g., network partners, stakeholder, customers) through (co-)development of the BM. Nevertheless, actor's roles are oscillating between service provider and beneficiaries depending on position in service-for-service exchange. (Storbacka et al., 2012). Following an actor-to-actor perspective the network-oriented approach extends the boundaries of a BM and business modeling to the (co-)design of value co-creation in service ecosystems. Hereby, the analysis of the interrelated BM elements of all actors strives for a holistic understanding of service ecosystem's viability.

SoBM is a service-centric and value-in-context oriented BM approach. Services are reciprocally exchanged by actors to co-create value through integration of operand and operant resources (e.g., digital technology). As value creation is a reciprocal service-for-service exchange value-in-context is always perceived by the particular beneficiary. In general, this value can be measured in different ways by the recipients and concern multiple dimensions (e.g., financial, social). Within the SoBM concept, actors encapsulate operand and operant resources through service and provide potential benefit for themselves and/or others.

Thus, actor's service provision is equipped with value proposition attributes resulting from resource integration activities. It is important to note, that resources in our SoBM concept–in line with S-D logic–offer value through application in service and not through specific technology per se. This reflects the role of LMA's "service layer" as central value provisioning element (see Section 3.1). This service-centric conceptualization enables a BM development focused on the identification of "what" beneficiaries (i.e., all type of actors) can do with digital technology and how digital technology changes beneficiaries' capabilities to co-create value (Vargo et al., 2008).

Value propositions are defined as invitations to participate in value co-creation (Lusch and Vargo, 2014) and seen as a "*dynamic and adjusting mechanism for negotiating how resources are shared within a service ecosystem*" (Frow et al., 2014, p. 340). Value creation is coordinated through actor generated shared institutions initiated by the acceptance of matching value propositions. The development of value propositions is part of business modeling (i.e. institutional work). As the service ecosystem is dynamic in creating and re-creating needs this development is seen as a continuous process (Vargo and Lusch, 2016).

5.2 Procedure Model

The SoBM development approach is structured as follows (see Figure 3). It is based on the conviction that BMs in DTEs in particular build on improvements of resource density through resource dematerialization. Therefore, an analysis of the service ecosystem and (digital) technology-based opportunities is the starting point of the SoBM procedure model.

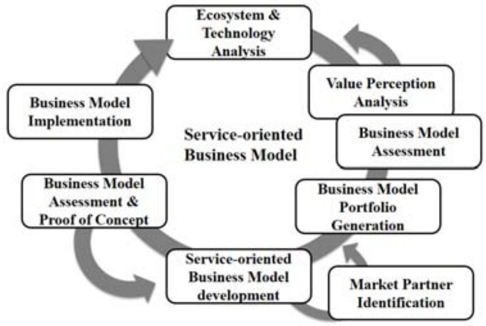

Figure 3: Procedure Model of the Service-oriented Business Model Framework–own diagram.

Within the ecosystem analysis distinct ecosystem elements and their interdependences are elaborated. Essential result of this step is a layered ecosystem model (see Figure 4) and a (digital) technology analysis (based on the LMA). The ecosystem analysis depicts on the first layer the relevant operand resources (e.g., physical objects, machines, rules, norms, other institutions), on the second layer the distinct operant resources (e.g., human or non-human capabilities), on the third an abstract description of the exchanged services and on the fourth layer an actor model. Central subject of investigation is the ecosystem's service portfolio in the service layer. Services are identified by combining lower level layers' elements (e.g., based on LMA of digital technology). A service represents the application of operant resources combining physical objects and/or data (i.e. operand resources) and/or other operant resources. The integration of the specific digital technology service portfolio, derived from an in-depth LMA analysis of digital technology involved, provides an important basis for further BM generation.

To keep conformance with the elaborate DTE requirements (see Section 4) the definition of service within the analysis follows a distinct set of SOA design principles: standardization, modularity, loose coupling, abstraction, reusability, discoverability and composability (Erl, 2007).

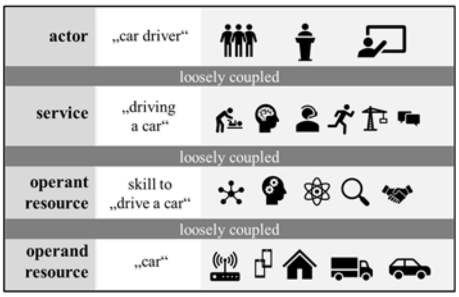

Figure 4: Ecosystem analysis–own diagram.

Based on the ecosystem analysis a company's BM assessment is iteratively conducted to identify possible market positions and value propositions (i.e., focal actor's ability to apply useful knowledge in service exchange). The company BM assessment is grounded on an existing structured BM (SoBM) and the ecosystem analysis. A "*value perception analysis*" (VPA) helps in identifying value-in-context as a starting point for determining service-based value propositions. As value-in-context exists on a continuum of actor's needs and accessible resources (e.g., capability to acquire external value propositions) the VPA acknowledges actor's needs and its operant and operand resource base. The method builds on these ecosystem elements to analyze concrete customer's value-in-context. Hereby, service value propositions represent value co-creation options. These encapsulate customer's required external operant resource access through acquisition of partner's services and are building blocks for focal value propositions.

In the next stage, the derived portfolio of the BMs is assessed by its probabilities and profits. A preliminary assessment based on first assumptions regarding the categories required investments (time, technology, human resources) and the innovatory potential as well as the expected profits of the BM is conducted. Here, BMs with positive profit estimations, high innovatory potential and low investments dominate those with negative or lower profits, low innovatory potential and high investments (like Scheer, 2016).

Afterwards, high-ranked BMs undergo the SoBM development cycle (see Figure 6) involving identified relevant market partners (i.e., value co-creators like customers, suppliers). In specific this process step highlights the actual (co-)development of the SoBM by discussing and evolving matching reciprocal value propositions and shared institutions. One key outcome of this process is the BM-specific service repository related to the focal firm's service system in conjunction with external customer and partner services. A second important outcome is the relevant information to perform a "financial" cost-benefit analysis (e.g., Brent, 2007). This is grounded on SoBM's cost-benefit architecture which can be derived from the service repository. Herein, the specific service-based cost and revenue models are captured. This supports a cost-benefit oriented SoBM scenario analysis based on service out- or in-sourcing as well as on service-specific digitization degrees. The on-demand availability of all information substantiates BM decision making within the BM assessment stage significantly.

Having an elaborated SoBM based on service repository and a set of identified business partners, a second BM assessment stage can be conducted. Herein, a proof of concept helps to assess the business model's prospects. With a positive decision, the BM can be transferred into the operational stage. Taking a new or redesigned business into operations is a starting point for a continuous BM improvement process.

5.3 Development Cycle and the Service-Oriented Business Model

Core of our BM framework is the SoBM. Essential element is a three-layered modular architecture. As pictured in figure 5 it is formed by a set of interconnected business, service and resource layers for all relevant actors contributing to the execution of the meso level service ecosystem covered by the BM description. It takes shape within the SoBM development stages being completed and optimized through an iterative co-development process.

First the layered BMs for one or more beneficiaries (i.e. customers) are defined, second the focal firm and third the value network partners (i.e. suppliers) are added.

Beneficiary's layered BM development (see Figure 5-1) focuses on beneficiary' value-in-context derived through the VPA (see section 5.2). Thus, the relevant information can be depicted and further be analyzed from earlier process results. Hereby, the layered BM already covers all relevant services and resources integrated in service-for-service exchange.

Elaborated on specific layers they support the development of the meso level service ecosystem encapsulating relevant information of lower layers (e.g., resources) on higher level layers (e.g., services). This reduces complexity on higher levels and enables a mix-and-match of internal and external layer elements. This builds the basis for the further development within the focal (see Figure 5-2 a,b,c,d) and network business model layers (see Figure 5-3).

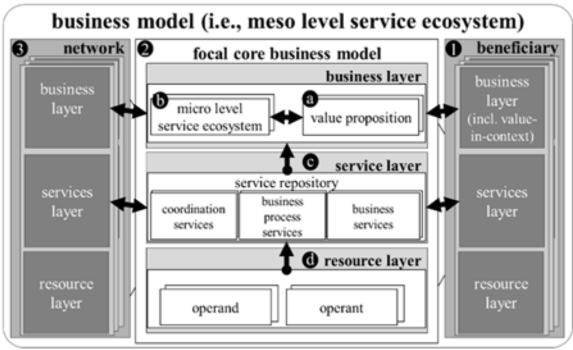

Figure 5: Service-oriented Business Model–own diagram.

Focal firm's layered BM is the core element of the SoBM. On the business layer, it defines the focal firm's value propositions as an answer to the identified beneficiaries' value-in-context covering the service offering. Furthermore, it includes the corresponding micro level service ecosystems needed to provide the value proposition. The sum of micro level service ecosystems is building focal actors value propositions including the service-for-service exchanges to execute the specific business model. Means and methods (i.e. value co-creation through resource integration) required to form the micro level service ecosystem are detailed on the service and resource layer.

The service layer is described by a focal service repository. This describes and organizes all relevant internal and external service definitions necessary to execute the formulated micro level service ecosystems within the focal business layer. The development of the repository follows the SOA design principles which have been proven to be well-suited to service-oriented business design and management. As an architectural style, SOA captures a distinct approach to the analysis, design, and implementation of service-oriented environments. Better business-IT alignment, increased service reusability, significant agility improvement, and adaptive information utilization in changing and complex ecosystems are benefits resulting from SOA (Arsanjani, A. 2004; Choi et al., 2013; Luthria and Rabhi, 2015). Furthermore, SOA's design principles of loose coupling and standardization foster digital technology capabilities: reusability, distributiveness and interoperability (Choi et al., 2013; Luthria et al., 2015).

Service is understood as a conjunction of economic, functional, emotional, social or technical activities provided by actors to mutual co-create value related to micro level service ecosystem. It is transcending the focal sphere by addressing the resource integration activities of the involved actors (e.g. focal, beneficiaries, network partners). Service is categorized as business process services–high-level abstract services–coordination services, and atomic business services.

Service definition in the SoBM implies the inclusion of distinct service descriptions. These explain "what" the service provides, but not "how" in detail it is provided. Thus, they point out, inter alia, which beneficiary's expectation, needs, and capabilities are meet by acquiring the specific service implying quality of service parameters (i.e., service value proposition). By applying financial values to the service repository–including internal as well as external service costs–the financial structure of value creation and capturing is caught in a structured and transparent way.

Further, service interfaces point out the preconditions that have to be fulfilled to obtain the service. Additionally, service definition contains indirect relations to organization's offers through micro level service ecosystems and direct relations to encapsulated operand and operant resources (Mele and Polese, 2011). Latter ones are described on the resource layer. In coherence with S-D logic, actors act upon operand resources "*to obtain support (i.e., they enable or facilitate)*". Physical operand resources are often natural resources e.g., machines, digital technology infrastructure, actors, norms, rules. Operant resources "*act on other resources to produce effects—that is, they act or operate on other things rather than being operated on*" (Lusch and Nambisan, 2015, p. 159). These are enabler and initiator resources having high impact especially on business success in DTEs. Operant resources are often intangible and dynamic like human skills, IT-applications, business relations, and (digitalized) information. Business modeling in SoBM puts emphasis on digital technology as an operant resource thus it unleashes generativity and generates new opportunities for resource integration, service exchange, or innovation in the service systems (Lusch and Nambisan, 2015).

On network partners' layered BMs focal firm's related value propositions, services and resources are represented. These are derived through identification of relevant network partners' skills, capabilities and contributions based on focal actor's needs. Partners' BM elements are directly mapped to relevant elements on the focal firm's business and services layers. By this, all necessary activities for fulfilling the value propositions are bundled within the interrelated service repository.

6 DISCUSSION

As part of a design science research project on business modeling in DTEs, this contribution is one step towards finding an answer to the question of how to facilitate the BM concept to guide managers in DTEs. Two case studies led to the results presented here, while ensuring that the artifact closely links theory and practice.

Following a problem-oriented approach, the first case study of a provider of electric vehicle services was based on an enhancement of the Business Model Canvas (BMC) (Osterwalder and Pigneur, 2010). It aimed to identify the relation between digitization and digitalization within the eMobility market setting. The case focused on an elaboration of general services and resources (physical, personnel and digital) relations as well as the related value proposition evolution over time. The study was designed to test the idea of digital technology enhanced service identification and the derivation of business services fulfilling "*unknown*" customer needs in business model development.

Within the demonstration and the following evaluation, key results were the identification of digital technology's service-based value provision through an in-depth LMA assessment. As shown in Pfeiffer and Jarke (2016) different types of business models in eMobility are accompanied with digital technology involvement and value capture options depend on the realization of a flexible, loosely coupled digital technology architecture. Further, practice has shown that BM framework–especially in fast changing DTEs–has to support continuous business model development. Finally, the idea of utilizing the SOA concept for enhancing business modeling was identified. This not least because the specific case of an encapsulation of resources through a service layer helped the participants engage in open thinking and derive service-based new value-in-context options.

Based on an updated design concept, the second case study was conducted with a provider of smart home technology and platform services. The new approach covered a procedure model, the layered and networked BM architecture. It utilized the SOA concept as a significant methodological improvement. The ecosystem and technology analysis firstly enabled discussions and an efficient solution finding process based on a shared worldview. Secondly, participants could identify new business-oriented technology solutions as well as position the focal firm in a complex ecosystem context. Thereby, the formulation of value propositions was enhanced and simplified. The case study demonstrated the applicability and efficacy of the SoBM as a novel BM framework for DTEs, while also providing a service-based cost and value-in-context related revenue calculation. Further the collaboration-based IT tool enabled–in accordance with the participants' specialization–a simultaneous editing and visualization of the BM development process.

The present paper complements these empirical findings from a theoretical perspective. It shows that the SoBM framework covers all relevant BM dimensions to be classified as a BM concept (Zott et al., 2011). By taking beneficiary's needs (value-in-context), focal service-based value propositions and resource base as well as network partnership contributions into account it additionally encompasses a network perspective on value creation and capturing.

The conceptual modeling approach can be utilized to describe existing and future business opportunities. It is coherent because value creation and capturing can be described on a holistic basis for the whole value network connected over all SoBM layers and being orchestrated within a comprehensive service repository. In addition, through the connection of value propositions and service repository elements, value creation and capturing within the BM is underpinned with clarifying content. Hereby, it covers a wide range of business aspects, connects them relationally and enables flexibility and reusability in business modeling. The framework is dynamic and flexible due to its modular and granular SOA-based architecture, relevant changes (i.e. new value needs, regulatory demands, shifts in partnerships) in BM architecture can be identified, analyzed and performed with minimal effort.

Besides this, existing internal or a partner's public service repositories can be used as a starting point for new business development based on existing BMs and business partnerships (Löhe and Legner, 2009). Moreover, SoBM enables the execution of BMs by providing an elaborated "*ready-to-use*" service repository with clear and measurable preconditions.

7 CONCLUSIONS

Digitalization is a sociotechnical phenomenon that has changed the way we interact with our environment within the last decades. This process is leading to a smart, data-driven, and connected economy promising huge benefits for companies that leverage digital technology potential value (Hanna, 2015).

The SoBM framework presents a business modeling approach to manage the transition from (digital) technology's potential value into market outcomes. Overall, it can be classified as fulfilling the proposed needs of BM representation in DTEs. Specially, it represents a modular and granular environment enabling loosely coupled and flexible networks of resource integrating actors.

For theory, SoBM applies a well-proven ISR concept of SOA in the field of business modeling. Thereby, it adds proven paradigms to BM research complying and positively reinforcing key characteristics of the LMA to unveil digital technology's generativity in BMs. The results are both theoretically founded and field-tested. Particularly important, this concept can add to the research on the digital nature's influence on BMs and business modeling in a digitally transforming world. Finally, the approach adds to S-D logic theory through development of a meta-model for business modeling and operationalizes S-D logic in two business modeling case studies.

For practitioners, the artifact serves as a tool for describing, analyzing and implementing BMs delivering a shared worldview for all participants. As a framework, it not only provides a representation of BMs but even more so presents a procedure and development model. Envisioning the ecosystem and technology value service perspective it provides a clear view on collaborative value creation logic. Furthermore, discussions within possible partnerships become easier–firstly, because a shared worldview can be elaborated; secondly because distinct service descriptions for all relevant aspects are presented; and thirdly, because these descriptions are modular and granular. Thereby, there is no need to give "*the whole picture*" in first discussions with potential partners or competitors.

The generalizability of the findings is limited by the fact that they are initially only based on case study research in the fields of eMobility and smart home. These are characterized by a specific market situation. Therefore, the capability to draw conclusions on business modeling in other application fields is limited. Extending the scope of assessed information on applicability, e.g., through expert interviews, and incorporating a higher number of cases will increase generalizability.

Additionally, an implementation based on and in addition to existing company's SOA would underline the versatile application of the SoBM framework.

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