A Service Science Perspective on Business Modeling

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Abstract. Service Science proposes a new worldview on economic exchange. This paper aims at the creation of service system interaction models according to this new worldview using the Resource-Event-Agent (REA) and e3-value business model ontologies. The paper also specifies six design criteria to evaluate the ability of these business model ontologies to create service system interaction models. The paper concludes with the future steps that have to be taken to further perform the analysis.

Keywords: Service Science, Service-Dominant Logic, Service Systems Theory, business model, service system interaction model, REA, e3-value

1 Introduction

Service Science is an interdisciplinary approach to the study, design, implementation, and innovation of service systems, that was developed in 2004 by IBM. This emerging research area still needs further development to reach a consensus on the key concepts and frameworks. In this context, an important challenge is the development of models that can be used for service systems, since this concept is the basic abstraction of Service Science [1]. The models can facilitate the understanding and further research of these systems.

An important type of service systems are enterprises. However, there is a lack of integration between business modeling, which is concerned with developing models for enterprises, and the Service Science perspective. This paper aims at investigating to what extent existing business modeling languages are able to model service systems in an economic exchange, according to the principles of Service Science. This is the main research question that will be addressed.

The remainder of this paper is structured as follows: section 2 gives a short overview of the existing service literature. This knowledge is used in section 3, where we propose six design criteria to evaluate service system interaction models. Section 4 shows the generic service system interaction models developed by means of REA and e3-value. The last paragraph describes the future work that is needed to complete this research.

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2 Background

This background section is limited to Service Science and two related theories. We discuss some ideas that will be used further on in this paper. Our choice of theories was mainly guided by previous Service Science research. In a joint white paper of IBM and Cambridge University's Institute for Manufacturing, Service-Dominant Logic is indicated as a possible theoretical basis for Service Science [2]. Furthermore, other proponents of Service Science propose the Service Systems Theory as an interesting theory to draw from [3].

First, Service Science can be described as the study of service provision in economic exchange, for which service systems are used as the key concept [1]. Maglio et al. define a service system as "a dynamic value co-creation configuration of resources, including people, organizations, shared information (language, laws, measures, and methods), and technology, all connected internally and externally to other service systems by value propositions" [1]. Different categories of resources can be identified: physical with rights (people), physical without rights (technology), non-physical with (organization) and non-physical without rights (information) [1]. Each category can be an operand or operant resource [4]. Service interactions enable service systems to co-create value [1]. A visual representation of the service system interactions is given in figure 1. These interactions are based on value propositions, which "help establish mutually agreement on expectations about realizable value co-creation potential" [4]. However, formulating value propositions is not sufficient if they are not realized effectively. The different outcomes of an interaction are described by the Interact-Service-Propose-Agree-Realize (ISPAR) model, which identifies 10 possible outcomes [1].

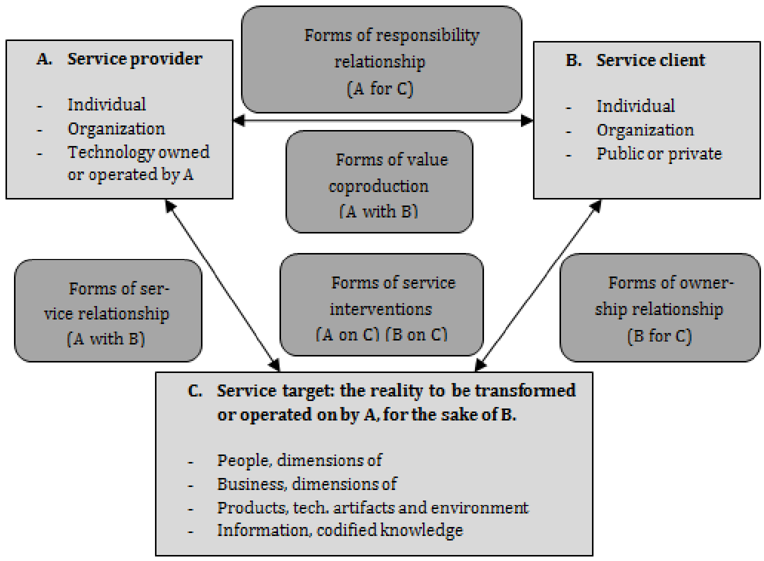

Fig. 1. The definition of services in terms of relationships and actions among service provider, service client, and service target [5].

Second, the Service-Dominant Logic (S-DL) was developed in service marketing research in response to the traditional Goods-Dominant Logic (G-DL) view on the economy. To structure the logic, Vargo and Lusch introduce ten fundamental premises, which are continuously reviewed and adapted. The authors describe services as "the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself" [6]. Service provision is considered as the core of economic exchange, while goods are means for indirect service provision as they are embedded with skills and knowledge [7]. The competences and capabilities that are needed to realize a service are described as operant resources, i.e., resources that are able to "create value by acting upon operand or even other operant resources" [8]. Hence operand resources only can be valuable if "an operation or act is performed on them to produce an effect" [6]. S-DL extends the role of the client as he is always a co-creator of value [9]. Other than in the G-DL view, production is only an intermediary step in the service process as the role of the client is crucial for the value that is created. Indeed, value is not determined on the moment of acquisition, but during the whole life cycle of the consumption of a service, i.e., the value-in-use [6]. This value is often opposed to the value-in-exchange, the monetary value of acquiring a service, which relates to the production costs that are made in the past [7].

Third, the Service Systems Theory was developed by Alter to "understand, analyze, implement and improve service systems by the IT department in organizations" [10]. The theory was structured using 20 basic concepts which were integrated with his former models of the work system framework, the service value chain framework and the work system life cycle model. Within this theory, a service is defined as an "act performed for someone else, including the provision of resources that someone else will use" [11]. This definition links service systems to work systems, which are "systems in which human participants or machines perform work using information, technology, and other resources to produce products and services for internal or external clients" [12]. These concepts provide a more general foundation for understanding service systems. Within the service value chain framework, different responsibilities are identified for the service client and provider during the provision and consumption of the service [12]. As a result, the whole theory goes beyond the value proposition as it takes into account more detailed steps regarding the actual realization of the service.

3 Design Criteria

Based on the existing service literature [1-12], we propose 6 design criteria that should be used to evaluate the ability of modeling languages to model service system interactions according to a Service Science perspective. These criteria will be further elaborated in the next paragraphs.

3.1 Dichotomy between service provider and service client.

Maglio et al. propose the service provider and the service client as the core parties of an exchange between service systems. Each party can be represented by an individual or an organization [5].

3.2 Service concept

The service concept is based on the vision of Maglio, who considers a service as a transformation of reality [5]. This vision can be extended by using the definition of a service system, which identifies information (language, laws, measures and methods) and technology, besides from people and organizations, as resources in a service system [1]. As a result we propose a vision in which a service (e.g. a restaurant meal) is represented as a transformation by means of technology (e.g. the cooker) and information (e.g. the recipes) for the benefit of other people or organizations (e.g. the clients).

3.3 Operant versus operand resources

The difference between operant and operand resources is not captured in the definition of a service system in Service Science. However, the claim is often made that Service Science is based on the principles of the S-DL [2]. To really achieve this fit with S-DL, business models should clearly reflect this difference while shaping service system interactions.

3.4 Separation between value proposition and service realization

The value proposition is crucial as it is the connection between service systems. Its most important aim is to match the expectations of the different parties in a service context [4]. However, this concept is not sufficient to have a complete view of service provision. Both Alter and Service Science researchers take into account the whole process of service provisioning, which is illustrated by frameworks such as the ISPAR model and the service value chain framework. Within the service provisioning process we believe the difference between the value proposition and the realization of the service is a crucial element in service system interaction models.

3.5 Value co-creation

Value co-creation is a central concept in the literature reviewed. It can be seen as the ultimate goal of the service provision between the client and the service provider. However, the concept of value is still too narrowly defined within Service Science. Both Alter and S-DL refer to value-in-use, which is often opposed to value-in-exchange. The term value-in-use is typically used within the G-DL literature [6]. Hence, to achieve a truly Service Science-oriented approach, it is crucial to capture the value-in-use in business models.

3.6 Cash flows and information as feedback mechanisms

This criterion originates from S-DL. Lusch and Vargo consider cash flows as an important feedback of the value propositions of an enterprise [7]. Indeed, a cash flow is more than just a payment. This view clearly differentiates models from the traditional G-DL. In our opinion it is useful to extend this feedback to both cash flows and information. In many cases companies urge clients to also provide (oral or written) information about the quality of the actual service realization. This way the enterprise gets direct feedback from its clients.

4 Service System interaction models

4.1 REA ontology

Due to space limitations, the definitions of the basic REA concepts will not be explicitly listed. We refer the reader to the work of McCarthy for the original definitions [13].

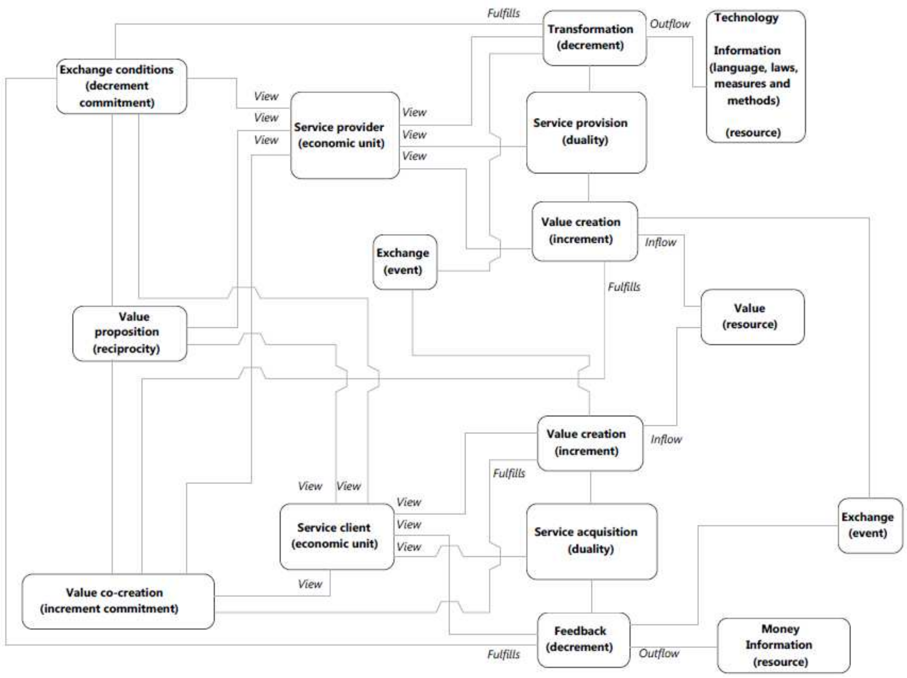

Fig. 2. Service system interaction model developed by the REA ontology

Figure 2 shows the generic service system interaction model developed by using REA. The structure of this model is based on the doctoral research of Laurier [14]. He applied the REA ontology on intra- and inter- enterprise value chains to create an information system that enables system interoperability and information sharing.

In the model two economic units are identified: the service client and the service provider. These core entities are connected to a duality, which can be described as service acquisition for the client and service provision for the provider. Each duality is related to an increment and decrement event. For the service provision we identify respectively the value creation and the transformation by means of technology and information. The value creation and the feedback by information or money are the dual events in the service acquisition of the service client. The exchange events in the model each connect one increment and one decrement event of the side of the service client and the service provider.

On the left side of the model, more attention is paid to the proposed value proposition between service systems. This concept is adopted as a reciprocity, which consists of the value co-creation and the exchange conditions as increment and decrement commitment.

4.2 e3-value

The definitions of the core elements of e3-value can be found in the research paper of Gordijn and Akkermans [15].

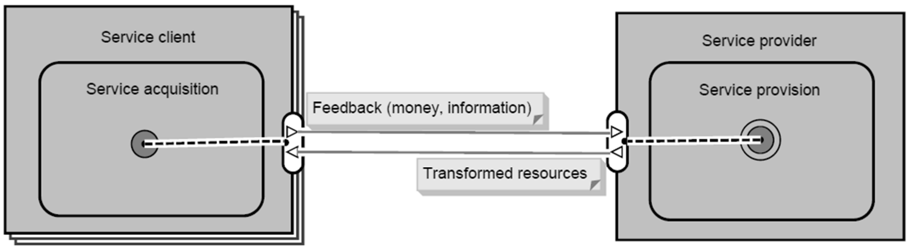

Fig. 3. Service system interaction model developed by e3-value

The service provider can be considered as a composite actor. This composite actor is deliberately not specified any further as we want to preserve the generality of this service system interaction model. The service client is represented as a market segment as all clients of a certain service provider will exchange the same value object during the service, which corresponds with the definition of this concept. The client and the provider are also actors in the model, who are able to create value and/or profit by performing a value activity. The activity of the client can be described as service acquisition, while the service provider will perform a service provision activity (a transformation by means of technology and information for the benefit of the service client). These activities will result in an exchange of value objects. The service provider will offer its transformed resources (which is a combination of operand and/or operant resources) in return for feedback of the service client via money or information.

The model is extended with a scenario path according to the use case maps technique. A service exchange starts (in most of the cases) with the need of a client. This need is the start stimulus in the model. The scenario path ends at the stop stimulus as the service provider has performed his service. Responsibility elements are not included in this model.

5 Future work

The future steps that are needed to complete the research are twofold. As a first step, the generic service system interaction models need to be concretized by means of a number of examples. The examples should be chosen in such a way that they are representative for a whole category of similar services. Hence it is important to find the right criteria to achieve this categorization, such as the physical exchange of goods or the physical contact between the service provider and client during the service provision. These criteria are just a first attempt to a more formal categorization of services. The last research effort is the actual assessment of the different modelling languages, based on the design criteria that we specified before. Provisionally a four point ordinal scale was used to do this assessment, in which we identified four different cases: (1) the aspect is fully reflected in the model, (2) the aspect is partially reflected in the model, but some adaptation of the ontology's elements is needed, (3) the aspect is not yet included in the model, though it is possible through an adaptation of the definition of certain elements, (4) the aspect can only be covered by the ontology if its elements are fundamentally changed. The most difficult aspect here is to find a more formal assessment tool for the models. This tool must provide the evidence that is needed to validate our temporal results and which enables a replication of our research by means of other examples.

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