ABSTRACT

From a strategic enterprise perspective, the success of e-services depends on their ability to work as a medium for the exchange of business values. Thus, there is a need to be able to describe and analyze business collaborations in a structured way, in order to identify the needs and appropriate offerings of the participating actors. To model business collaborations, value-based business models are increasingly used. However, a question remains - how to systematically create value-based business models in order to identify the offerings of the involved actors, while spanning the whole life-cycle of a business collaboration? In this study we propose a method for designing more exploratory business models with a focus to how: (a). consumers classify values, and (b). the values are elicited in different phases of business collaboration life-cycle. A case study from the Swedish health care sector is used to ground and apply the presented method.

Keywords


1. INTRODUCTION

In enterprise engineering, business models play an important role. They are used to identify and classify business requirements in the terms of actors, the resources exchanges between them, and the activities performed by the actors to produce these resources.

There are different methods available for creating business models. Among them, the value modeling focuses on describing values offerings of enterprises. From the value viewpoint, in a business collaboration, enterprises (i.e. actors) engage in activities for producing objects of value and exchange them further with the other business actors. In this modeling method, the major tasks concern identification of objects of value, the activities that create these objects and further transfer them among the involved actors.

In the outlined context, however, there is still lack of systematic approaches for creating more exploratory business models in regard to how: (a). consumers evaluate offered values, and (b). how the values are derived in different phases of business collaborations:

Consumers characterize a value based on various factors, such as the cost, the fitness to their needs, the time and effort they have to use to obtain the value, and so forth. Furthermore, the value may be defined from different perspectives. One perspective for someone is to assess a value by simply evaluating its fitness to achievement of his/her goals. Another perspective is based on the consumption experience.

a. From the collaboration life-cycle perspective, a business passes through several phases. ISO Open-EDI initiative [1] defines a business transaction as consisting of five phases: planning, identification, negotiation, actualization and post-actualization. These phases encompass the activities to identify objects of value, establish relationship between the actors, transfer objects between them, as well as the activities related to post-sale services.

b. From the value perspective, each of these activities may produce certain value to the consumer. Thereby, a problem is how to include the activities of all those phases in an enterprise business model? From the business-to-IT alignment perspective, any method to create more explorative and strategically aligned business models should consider the activities from the planning up to post-actualization services.

Following the outlined, we think a better approach for obtaining more complete enterprise business models is to analyze the consumer values and thereby identify the objects of value that are to be exchanged across the whole business collaboration life cycle. The final objective is obtainment of an explorative business model, which can be used as a prosperous basis for identifying the e-services of the involved enterprises. To achieve that is the research objective of this paper.

The method that we propose has a practical relevance for business modeler and for system analysts. The former can use the method in explorative business analysis discussions. The latter can use it for exploring the enterprise models in more depth to be able to identify e-services from them and design systems accordingly. The theoretical relevance of this paper is in its contribution to the enterprise and business modeling theory, in particular by combining a consumer-value analysis and a collaboration life-cycle view.

The paper is structured as follows. In section 2, we give an overview of related research. In Section 3, we discuss and classify consumer values. The case study, the method, and the method application are presented in Section 4. Finally, we summarize our contribution and discussed subjects of future work in Section 5.
2. RELATED WORK

In this section, we first give an overview on the related research that concern value-oriented business models; after we briefly describe the Open-EDI business transaction framework.

2.1 Value Models

There exist a number of efforts for business modeling in the research community, such as the business ontologies [2], [3], and [4]. Studies [2], [3], [5], [6] and [7] focus particularly on the notion of the resource and its value perspective.

As mentioned in Introduction, in value modeling the focus is on identifying the objects of value to the actors involved in the model. For the purpose of this paper, we will make use of a comprehensive and well-established business model ontology, the e3 value [4]. This ontology is widely used for business modeling in the e-commerce context.

The e3 value ontology aims at identifying the exchanges of objects of value between actors in a business collaboration. Major concepts in the e3 value ontology are actors, value objects, value ports, value interfaces, value activities and value transfers (see Figure 1). An actor is an economically independent entity. It is often, but not necessarily, a legal entity, such as an enterprise or end-consumer, or even a software agent. A value object (also called resource) is something that is of economic value for at least one actor, such as a car, Internet access, or a stream of music. A value port is used by an actor to provide or receive resources to or from other actors. A value port has a direction: in (e.g., receive goods) or out (e.g., make a payment), indicating whether a resource flows into, or out of the actor. A value interface consists of in and out ports that belong to the same actor. Value interfaces are used to model economic reciprocity; for instance, a reader gets an article from a publisher in return for a payment. A value transfer (also called value exchange) is a pair of value ports of opposite directions belonging to different actors. It represents one or more potential trades of resources between these value ports. A value activity is an operation that can be carried out in an economically profitable way for at least one actor.

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Additionally, in the Open-EDI effort, goods, rights, or services are the subjects of economic values. However, goods may consider both physical and informational objects, as discussed in [8].

In value-oriented business modeling, actualization phase is often considered when determining the value exchanges in a business constellation. Thereby, from the e3 value modeling perspective, the activities performed in the five Open-EDI phases, may be defined as followings (see also Figure 1): in the planning and identification phases, actors and value objects are identified respectively; in the negotiation phase the commitments to particular value exchanges are established; in the actualization phase the agreed value exchanges are carried out, and in the post-actualization phase possible complaints are entertained.

Figure 1 depicts a base business model of the eye-care health case (the model is an excerpt of a larger case defined in the REMS, a Swedish research project [11]) that we use as the case study. It illustrates the basic value exchanges between a primary eye-care provider, patients, and an eye-care specialist center. The primary eye-care provider is responsible for giving a basic treatment with a diagnosis to the patient. If the diagnosis requires that the patient need an advanced treatment, the primary care physician will refer the patient to an eye care specialist at a hospital clinic.

2.2 Open-EDI Phases of a Business Collaboration Transaction

The Open-EDI standard effort [1], classifies a collaboration-oriented business transaction spanning five distinct phases, which are briefly described below:

Planning: In this phase, the customer and the provider are engaged in activities to identify the actions needed for selling or purchasing goods and services. As an example, a distributor sends catalogues to potential customers.

Identification: This phase involves the activities needed to exchange information among providers and potential customers regarding selling or purchasing goods and services. For example, a provider sends a quotation to a customer.

Negotiation: In this phase, contracts are proposed and completed. Detailed specifications of goods and services, quantity, price, terms, and conditions are determined in this phase. If required, the parties involved may make bids and put forward counter offers. For example, a customer sends offer to a provider and the provider sends the counter offer to the customer.

Actualization: This phase includes all the activities necessary for exchanging goods and services between involved actors after agreements during negotiations. For example, the provider sends advance shipping notice when goods are prepared for shipping.

Post-Actualization: This phase contains all the activities and associated exchanges of information between involved actors after the goods and services are provided. For example, the customer may send a warranty invocation to the provider.

In the remaining sections of the paper, we use the term business transaction (or, simple, transaction) meaning the Open-EDI transaction.
3. CONSUMER VALUE
Consumers rate objects of value based on their fitness to achieve the goals of buying them. Some concrete examples are books, cars, movies, hair cuts, and medical treatments. However, values can also be of a more psychological and social nature, such as beauty, pleasure, health state, honor, and feeling of safety. This is also discussed in [9]. Furthermore in [10], a user experience is also recognized having a value. To distinguish between these different kinds of values, we identify two categories: economic values and internal values.

An economic value is an object that can be transferred. More precisely, an economic value is a resource that can be under the control of an actor, in the meaning that the actor may have legal rights on the resource. Economic values have utilitarian value to consumers. Therefore, they can also fit to the extrinsic value category in the Holbrook’s classification of the consumer values [5].

An internal value could be a certain property attached to an actor, such as beauty, health state, honor, or it could be a property of some facilitating service, such as delivery. An example for this could be the convenience attached to the home-delivery of a product. They cannot be directly transferred between actors. It is not meaningful to talk about legal rights on these values, neither it is possible to transfer any of these resources from one actor to another. Additionally, internal values can be classified as ends in themselves, or as the instruments for other purposes. For instance, someone might desire more knowledge without any intention to use it in a particular way. Someone else might desire knowledge in order to make money through lecturing or other knowledge services, i.e. she/he uses knowledge as an instrument for producing some other resource. The first categorization of internal values fits into the intrinsic value category of the Holbrook’s classification [5].

From the e3 value modeling perspective, economic values are same to value objects. Internal values are not supported, however; they are used as a basis for identifying additional value objects in a given e3 value model that may fulfill the requirements for internal values.

4. METHOD AND METHOD APPLICATION
In this section, we present our method for obtaining an explorative business model subsequently illustrating the method on the given case study.

4.1 Method, Step 1: Identifying Business Transactions in Eye-Care Case
In the first step, the business modeler identifies the business transactions by analyzing and refining the value exchanges of all the involved actors, as elicited in the base business model. The business modeler performs the tasks by pursuing the two guidelines:

Guideline 1: Analyze every pair of value interfaces (i.e. “economic reciprocity”, see Section 2.1.) in the base e3 value model, to identify business transactions.

The given guideline concerns the exchange of value objects between actors. These exchanges may include potential alternatives for the transfer of a same object. As an example, in the given health case, the patient may get from the primary-care provider either a full treatment, or an initial treatment followed by a referral to an eye-care specialist.

Utilizing the Guideline 1, we elicit the following transactions for the case presented in Section 4.1.

- FullTreatment: for providing a full treatment by the primary care provider to the patient.
- InitialTreatment: for providing an initial treatment by the primary care provider to the patient.
- ReferralManagement: for managing the patient’s referral to the specialist clinic for giving a right for advanced treatment.
- AdvanceTreatment: for providing of an advance treatment by the specialist.

Guideline 2: For each transaction elicited using Guideline 1, consider addition of transactions concerning establishments of commitments between that mandatory precede actual value object offerings.

The purpose of the transactions defined here is to establish commitments for a future transaction that concerns transfer of a certain value object. That is, these transactions concern one-time activities pertaining to establishment of the right to future transactions where the right is exercised number of times over some period of time. Examples of such transactions could be user profile creations at amazon.com, residents’ registration at health care centers, and so forth. Transactions concerning the establishment of commitments can either be done by the actors who provide the main resources, or they can be carried out by the actors not visible in the basic business model. For example, the resident registration can either be done by the primary care itself, or it can be carried out by some other actor. In this example, we identify Registration Office as being responsible for registering both patients and the specialist care centers, and make this information available to the primary care centers.

Here, commitments are established by means of exchanging information between actors regarding some value object type. They could be later fulfilled by different transactions or they may never be fulfilled meaning for example, a resident never take treatments from his registered health care center. Considering the given guideline, we identify following transactions related to the Health Care business case from Figure 1.

- PatientRegistration: for registration of the patient to a primary care center, offered by Registration-Office actor.
- SpecialistClinicReg: for the specialist care registration to obtain rights for patients for advance treatments, offered by Registration.Office actor.

4.2 Method, Step 2: Identifying Consumer Values
In this step, the business modeler examines the transactions identified in the above step to identify additional value objects and value transfers according to following guidelines:

Guideline 3: For each transaction identified using Guidelines 1 and 2:
a. Identify economic values (i.e. value objects) that are to be exchanged in the planning, identification, negotiation, actualization and post actualization phases of a given transaction.

b. Identify internal values that are to be exchanged in the planning, identification, negotiation, actualization and post actualization phases of a given transaction. Thereby elicit the value objects that will realize the wanted internal values.

Thus, in the first outlined task, the modeler should analyze every transaction across the whole collaboration life-cycle (i.e. from planning to post actualization) to identify additional value objects. This is needed as the given transactions are identified for the actualization phase only. In the second task, we examine the elicited value objects, and identify zero or more economic values. For the identification, we utilize the following tentative list of internal values as proposed in [12]:

- fastness
- convenience
- responsiveness
- safety
- customizability
- reliability

In what follows we analyze the use of the outlined internal values in different phases of business collaborations:

- In the planning phase, an actor typically provides informative-type value objects, such as catalogues. For a consumer, time and effort in obtaining this information are two important factors. Therefore, in a planning phase, medium of information delivery such as electronic or printed, quality of information such as relevance, up-to-date, correctness are the vital aspects which give a consumer a pleasant experience. As such, we identify convenience and reliability as the internal values related to the planning phase collaborations between actors.

- Similar to the planning phase, the identification phase also regards the exchange of information among actors. This is basically to establish a literal link between actors. Thus, for the provider, what is most important in this phase is the reliability of the information that he gets from the consumer. Therefore, in this phase, we examine the identified value objects against the internal value reliability to investigate the correctness of the information, in order to examine if there are additional value objects that may support the desired internal value. This could lead to derivation of new value objects, for example, the verification of consumer accreditation correctness, provided by a third actor.

- In the negotiation phase, actors exchange different rights on the value objects. Customizability, safety and reliability are identified as internal values in this phase. The customizability addresses the issue of being able to agree on different forms of a value object such as game CDs and their delivery, such as home delivery, etc. In the context of agreements, the latter two internal values mainly concern the issues related to risks, an aspect that we do not consider in this paper.

- In the actualization phase, actors carry out the custody transfers of the value objects agreed in the negotiation phase. We identify safety and reliability as internal values here. The former concerns whether the custody transfers are according to the agreements in the negotiation phase.

- In the post-actualization phase we identify responsiveness as the major internal value. In this phase a consumer should be able to obtain the post-sale services that he needs in order to be able to effectively consume the value objects that he bought. For example, a provider should be willing to provide additional services such as replacements, or repairs for the sold objects.

Below, we explore few transactions identified in method-step 1 (i.e. Section 4.2) along all the five collaboration phases, to identify the value objects as proposed in Guideline 3 in this section. For each set of transactions identified there, we first search for additional value object across the collaboration phases (Guideline 3a). Then we identify internal values along these phases and derive more value objects (Guideline 3b). Due to the space restrictions, we only explore FullTreatment and PatientRegistration transactions as identified in Section 4.2. A complete set of transactions and discussion on identifying economic and internal values is available in the technical report “Exploring Business Collaborations along Open-EDI Business Transaction Phases” [13].

In the table below, we report the results when applying Guideline 3a for FullTreatment and PatientRegistration transactions.

<table>
<thead>
<tr>
<th>FullTreatment</th>
<th>PatientRegistration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitment for the treatment has been already established in the PatientRegistration transaction and hence no value objects identified in here.</td>
<td>The Registration Office offers Services catalogue Value object: ServicesCatalogue</td>
</tr>
<tr>
<td>Patients provide Accreditation information to the primary care Value object: Accreditation Information</td>
<td>Patients provide personal information to register them to primary care center Value object: PersonalInformation</td>
</tr>
<tr>
<td>Primary care offers Right2timeSlot to the patients Value objects: Right2TimeSlot, Right2Payment</td>
<td>Patients get Right2Services. Value object: Right2Services</td>
</tr>
<tr>
<td>Primary care offers Full treatment to the patients Value object: FullTreatment</td>
<td>Registration Office sends Information updates to the registered patients Value object: InformationUpdates</td>
</tr>
</tbody>
</table>
Post actualisation

<table>
<thead>
<tr>
<th>Post actualisation</th>
<th>Primary care offers Timeslot to post health examination. Primary care offers Post-health exam. to the patients. Value objects: TimeSlot2PostHealth Examination, PostHealthExam.</th>
</tr>
</thead>
<tbody>
<tr>
<td>No value objects could be identified in the post actualization phase of this transaction.</td>
<td></td>
</tr>
</tbody>
</table>

For the transactions FullTreatment and PatientRegistration, we have identified number of new economic values (i.e. value objects) in the table above. These are valued for their usage as a utility to achieve some goal of any of the actors involved in the transaction. For example, the ServicesCatalogue has a useful value to the Patient since it provides him an opportunity to get information about the health care services offered by primary care centers and to well understand whether or not she should register herself at a particular primary care center.

Next we re-examine each of the elicited value objects, to identify internal values, along all the 5 phases .

In the planning phase of PatientRegistration, the Patient may find it is convenient if the Primary Care offers services catalogues in different formats such as e-catalogues and printed catalogues. Hence, we derive a new value objects: eCatalogue and PrintedCatalogue as different choices that replaces previously identified value object: ServiceCatalogue. For the transaction FullTreatment, no value objects are identified in the planning phase.

In the Identification phase of the transaction FullTreatment, the accreditation of the patient should be checked against the original registration data. Therefore, considering the reliability of information provided by the patient, we derive a value object, PatientRegistrationInformation to be received by the Primary Care. This new value object exchange between the Primary Care and the Registration Office leads to an identification of a new transaction for provisioning patient registration data from latter to the former. We call this new transaction, RegistrationInformationProvisioning.

Considering the customizability in the negotiation phase, we derive new value objects: Right2CancelAppointment regarding the transaction, FullTreatment and Right2UpdatePersonalInfo regarding the transaction PatientRegistration other than ones already derived in the table.

In the actualization phase, considering fast and reliability, we identify economic values: eDeliveryOfUpdateBulletin for the transaction PatientRegistration. In addition to already identified economic values for the FullTreatment transaction, we derive HomeVisitService4Elders as the other option of the value object FullTreatment. That is, they are not offered simultaneously.

Considering the intrinsic values in the post actualization phase for the transactions FullTreatment, and PatientRegistration, we could not derive new value objects other than the ones we have already identified.

In Figure 3, we summarize and depict the excerpt-business model including the complete set of value object exchanges for transactions FullTreatment and PatientRegistration, as elicited using our method. Thereby, the given business model includes the value object transfers that originate from the exploration of the collaboration phases, as well from the consideration of the consumer-related values.

![Figure 3. e\textsuperscript{3} value model for the PatientRegistration and FullTreatment transactions.](image)

4.3 Final Business Model for the Eye-Care Case

In this section, we integrate the business model fragments developed in section 4.3 and in [13] to create a complete business model for the Eye-Care sample case introduced in Section 3.1. A full description of the business model fragments is available in [13]. In the final e3 value business model in Figure 4 below, there are five actors, the Patients, the Primary Care and the Specialist Care Center, Registration Office and the Knowledge Services Center. Comparing to the base model given in Figure 1, the new actors have been identified as the provisioning sources for the value objects identified using our method.
In Figure 4, the Patients first register themselves at the Registration Office and this is modeled by transaction ①. The Registration Office records specialist care centers and this is shown in transaction ② in the model.

The provisioning of a full treatment by the Primary Care is modeled by the previously explored transaction FullTreatment and this transaction is marked as ③ in Figure 4. The transaction InitialTreatment between the Patients and the Primary Care is depicted with ④. The referring of Patients to the Specialist Care by the Primary Care is modeled by the transaction ReferralManagement and this is shown by ⑤.

Finally, the provisioning of the knowledge services to the Primary Care by the Knowledge Services Center and provisioning registration information to the former by the Registration Office is modeled by transaction ⑥ and ⑦ respectively. Identification of these two transactions was made considering the consumer value and the transactions treatment and referral management respectively. We do not go into details in this paper and the identification of these transactions are discussed in detail in [13].

To summarize, as emphasized in the beginning of the study, the practical relevance of an explorative business

The transaction AdvanceTreatment between the Patients and the Specialist Care is shown by transaction ⑧.
model as the one exemplified in Figure 4 is twofold: the business modeler can use the obtained business model, for in-depth analyze of its viability from both business and economic perspectives. The system analyst can use the model for getting a detailed understanding of enterprise collaboration models, in order to identify e-services. In every value interface, each reciprocal value transfer will give rise to an aggregated service that may, partially or fully, be designed as an e-service.

5. CONCLUSION
In this paper, we have proposed a method for exploration of value-based business models, from a business collaboration life-cycle perspective.

In our approach, value-oriented business models play a major role in the service identification, because they offer some important advantages compared to other types of enterprise models. They can illustrate a high-level description of a whole business in a single and easy-understandable view. The proposed method consists of two major steps. The first step comprises the identification of the business transactions in a given business model. The second step sets the focus on determining the resources to be exchanged, for all the transactions, where each transaction is considered as consisting of five phases: planning, identification, negotiation, actualization and post-actualization. Here, we have considered two categories of values for eliciting the required resource exchanges: a) economic, that is the values on which legal rights may be set, and b) internal, i.e. the values specifically desired by the actors as the complements to the economic ones, such as beauty, convenience, and so forth. We have used the e3 business modeling ontology to illustrate the transformation of the business model, from a basic one (Figure 1), to the final model obtained by applying our transformation method (Figure 4).

The proposed method can be used in two ways. First, it can be applied to suggest and identify systematic and innovative business models that extend the assortment of the exchanged resources, improving thus economic performance of a network of actors. The method, thereby, may assist business analysts in generating new ideas and help to ensure that all potential value offerings are elicited. Secondly, the methods promotes usage of value-based models as a starting point in developing business-aware IT solutions, by using the obtained business model as a basis for identification of e-services that are to be provisioned all through a collaboration life-cycle and customized according to consumer internal values.

There exist a number of directions for future research. The major research issue, as we see it, concerns integration with the technology, i.e. the use of the obtained business model, as a rich basis for identifying e-services that will “carry” the values contained in the model. En effort in this direction has been proposed in [14].

6. REFERENCES