

Modelling Business Transactions from the Value and Collaboration Perspective

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Abstract. Business collaborations between actors encompass different business objectives, such as making product awareness, buying or selling specific products or goods, providing post-sale services, and so forth. Thereby, a clear identification of required business transactions is vital for modeling complex business collaboration, as well as for their further implementation with IT systems. Although value-oriented approaches are used to model businesses, a question remains about how to systematically identify business transactions and the values exchanged by these transactions. In this paper we propose a method for creating more exploratory business models using a defined class of business transaction as a basis for identifying the exchanged values spanning entire collaboration life-cycles.

Keywords: business model, value model, economic value, internal value, business transaction.

1 Introduction

Business models play an important role in information systems development. These models are used for identifying and classifying business requirements in the terms of actors, resources exchanged between them, and the activities performed by the actors to produce these resources.

There are different methods to create business models. Among them, the value modeling focuses on describing values constellations between various business actors. From the value viewpoint, in a business, actors engage in activities for creating values (i.e. resources) and exchanging them further with the other business actors. The major task in value modeling concerns identification of the objects with value, and their transfer among the involved actors.

However, in this context, there is still lack of systematic approaches for creating more exploratory business models in regard to how: (a). value exchanges, more precisely - transactions, are identified and classified with respect to different objectives of business collaborations (b). values are derived for different phases of business collaborations.

Business collaborations occur with aims of achieving different business objectives. In some situations, actors collaborate with each other with the aim of increasing the

knowledge about goods, services, and product preferences, or even as a means of establishing certain business commitments for the future. Business actors could also collaborate with each other with the aim of exchanging objects of value such as goods, services, etc. Thereby, from the collaboration perspective, there seems to be different purposes of business collaborations, such as establishing commitments for future, or fulfillment of those commitments,, their maintenance, etc.

In addition, from the life-cycle perspective, a business typically spans a number of phases. ISO Open-EDI initiative [7] considers a business as consisting of five phases (activities): *planning*, *identification*, *negotiation*, *actualization* and *post-actualization*. From the value perspective, each of these activities may produce certain values to consumer.

In this study, we analyze different types of business collaborations and thereby we identify the values that are to be exchanged in planning, identification, negotiation, actualization and post-actualization phases of these collaborations. The final objective is the obtainment of a value- explorative business model, which, thereby, can be used as a comprehensive basis for identifying the services of a future information system.

The paper is structured as follows. In Section 2, we give an overview of related research. The classes of different business collaborations and transactions are defined Section 3. In Section 4, we present a method for identification of values in the proposed classes of collaborations and transactions. Finally, we summarize our contribution and discuss subjects of future work in Section 5.

2 Related Work

In this section, we give an overview on the main related research concerning value-oriented business modeling, categories of economic values (resources) and at the end, we briefly describe the Open-EDI business life-cycle framework.

2.1 Value Models

There exist a number of efforts for business modeling in the research community, such as the business ontologies [8], [9], and [2]. Studies [9], [2], [10], [5] and [6] 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 a business model. For the purpose of this paper, we will make use of comprehensive and well-established business model ontology, i.e. the e3-value [2]; this ontology is widely used for business modeling in the e-commerce context.

The e^3 value ontology in [1] and [2] aims at identifying the exchanges of values between actors in a business scenario. Major concepts in the e^3 value are *actors*, *value objects*, *value ports*, *value interfaces*, *value activities* and *value transfers* (see Figure 1). An actor is an economically independent entity. An actor 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, e.g., a car, Internet access, or a stream of music. A value port is

used by an actor to provide or receive value objects 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 value object 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. 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.

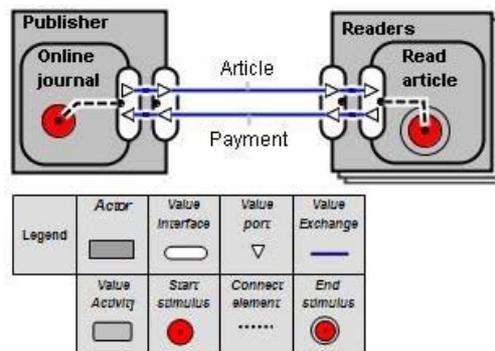


Fig. 1. Main concepts of the e^3 business ontology

2.2 Resource Categories

Consumers value resources based on their fitness to achieve the goals of buying them [5]. For example, a resident of certain area may value registration at the health care center in the area because it would provide him an opportunity to get medical treatment from them.

Some concrete examples of resources are books, cars, movies, haircuts, and medical treatments. These are more often called *economic resources* as they can be transferred between different actors. More precisely, an economic resource 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. As a fundament for analyzing economic resources, we utilize the following categories:

- *Goods*, which are physical objects, like cars, refrigerators, and cell phones.
- *Information*, which is data in a certain context, like blueprints, referrals, and customer databases.
- *Services*, which are economic resources that encapsulate other resources, and are used to increase the value of some other resource. Examples of services are haircuts and eye-treatments.

- *Rights*, which describe the activities that the resource-holder can perform. For example, buying a book does not transfer the buyer to reprint it and sell. For that the buyer may need to obtain the economic resource “copy right”.
- *Money and vouchers*, which are media for exchange. A voucher is a certificate that can be exchanged for another specific economic resource, e.g. a good or a service. Money can be viewed as the most general form of voucher without any restriction on economic resources and actors.

2.3 Open-EDI

The Open-EDI standard effort [7], as mentioned in Introduction, classifies a business collaboration into 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 data 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, prices, 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 as agreed during negotiations. For example, the provider sends advance shipping notice when goods 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 sends a warranty invocation to provider.

From the e3 value perspective, the activities performed in the outlined 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 performed.

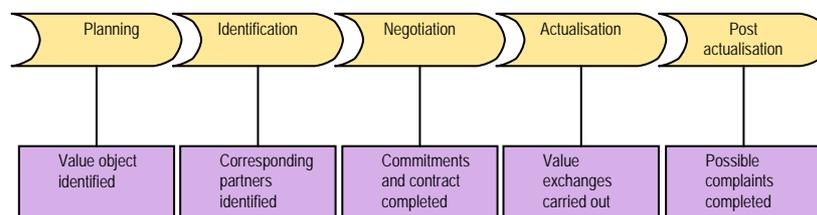


Fig. 2. ISO Open-EDI phases of a business collaboration, defined from the e3 value perspective

3 Classifying Business Transactions

Business collaborations occur in different ways. In some cases, customers need to register some information prior to actual transfer of the acquired resources. For example, a person may need to register himself in a health care unit before getting a medical treatment from it. This ordering of activities happen due to various reasons, such as: a. risks associated with the resource transfer, b. the need for the assessment and allocation of human and other resources required to handle customer demands, and so forth. In some other cases however, buyers do not necessarily need to provide some personal and product related information to establish commitments before the actual transfer of resources. For instance, to purchase a book from an online book shop, a customer may only need to provide his credit card information as a means of making the payment. In such cases, there won't be any transaction aiming to establish commitments prior to the actual resource transfer. Following the described, we identify the two major transaction types:

Future Commitment Oriented

In these transactions, actors collaborate with the aim of exchanging information such as personal details (e.g. do an authorization), product preferences, etc. The main concern here is to attract customers and expectantly establish specific commitments for future transactions for selling actual products or goods. The goals of these transactions may be two fold. A provider may engage with a customer *with a goal of providing a specific product over a certain time period*. He could also *have a goal of identifying customer preferences*, i.e. advertising his products to make the customers aware of them. In the latter case, the transaction would not be aiming at selling some specific product or service within a particular time frame, but only to make an awareness of the available resources. Considering these two goals, we distinguish *product dependent* and *product independent* transactions.

Immediate Commitment Oriented

In these transactions, collaborating parties start with providing resources, i.e. goods, services, and also prepare and complete the resource delivery. As we have explained above, certain businesses require having an authorization transaction established between the resource provider and the customer before a potential resource transfer occur, In such cases, we call the transaction concerning the transfer of resources as dependent on an authorization. An example would be that a patient seeking the medical treatment at a local health care unit may need first to perform an authorization from the latter by means of obtaining an acceptance registration in it. However, obtaining an authorization is not a must in every business. For example, to buy some goods from an online web shop, a customer may only need to provide her credit card information as a means of making the payment. In such cases, the actual transfer of goods is authorization independent.

Considering the two categories of business transactions identified above and their sub-classifications, in the following, we distinguish four basic transaction types for business collaborations:

1. Future commitment oriented, product independent.

2. Future commitment oriented, product dependent
3. Immediate commitment oriented, authorization dependent
4. Immediate commitment oriented, authorization independent

In what follows we discuss possible dependencies among the outlined transactions, to get an understanding of possible orderings of their execution.

The first two transaction types do not involve the actual transfer of the resources. The first transaction (1), focuses on exchanging personal and product related information. Here, the involved actors do not identify the concrete products or services to be exchanged. As such, this transaction cannot be a pre-requisite for other transaction types in the list. In the second transaction (2), actors exchange not only personal and product related information but also agree on the products or services to be later exchanged. As such, it must precede an immediate commitment oriented – authorization dependent transaction type (3). Since the resource types had been already identified in a future commitment oriented transaction, here actors set the focus on agreeing on facilitating services such as delivery, or allocation of human and other resources. Regarding the fourth transaction type in the list, the actors agree both on the resources to be exchanged and completing the delivery, and therefore this transaction type is not dependent on any other one.

In the following section, we identify different types of resources transferred in each of the defined transaction types along the five phases of Open-EDI: planning, identification, negotiation, actualization and post-actualization. We outline the proposals in the form of e³ value model templates.

3.1 Future Commitment-oriented, Product-independent Transactions

This type of transaction focuses on a prospective buyer registration independent of any resource transfers. The primary aim is to make the buyer aware of products of a company. This type of transaction involves the transfer of the economic resources aiming at increasing knowledge of actors. For example, personalized recommendations offered by amazon.com to its registered users aims to make them aware of the items of their preferences.

The resources transferred between the actors in this transaction are mainly restricted to information resources. However, it is also possible that a provider sends some other complementary resources as a means of advertising his products.

In Section 2.3 we have given a brief overview of the Open-EDI proposal for different phases in business transactions, and its relation with the e³ value model. Thereby, in the following, we outline different categories of resources exchanged in different Open-EDI phases of a business collaboration conforming to the *Future commitment-oriented, product-independent* transaction type.

Planning: In planning phase, the provider offers the information regarding the registration service to the requestor.

Identification: The requestor submits information requested by the provider.

Negotiation: The provider accepts the requestor as a registered user

Actualization: The provider offers product related information to the registered user.

The e3 value model in Figure 3 depicts this transaction.

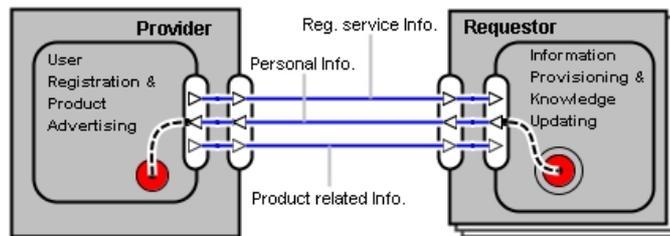


Fig. 3 Template 1: e³ value model for future commitment-oriented, product-independent transaction.

Although the given business template is modeled as collaboration between two actors, in practice the provider may use an intermediate for provisioning of the discussed resources. However, since the focus in this transaction type is to model the interaction between the requestor (of registration service) and the provider, we do not include a third actor.

3.2 Future Commitment-oriented, Product-dependent Transactions

In some businesses, the customer registration becomes a prerequisite for the actual transfer of economic resources. For example, a resident needs to be registered at a primary health care center before he or she gets a medical treatment. This registration could happen well before someone gets a medical treatment. Thereby, these are two separate transactions aiming to achieve different objectives where the first aims to achieve the registration of patients and the second treating the patients.

In the following, we identify possible resources exchanges at different Open-EDI phases for the transaction type in discussion:

Planning: The provider offers information regarding the economic resource committed to offer later.

Identification: The requestor offers information needed for registration

Negotiation: The provider grants right to the resource to the requestor

Actualization: The provider offers resource-related information to the registered customers.

In Figure 4, we depict the described transaction using an e3 value model.

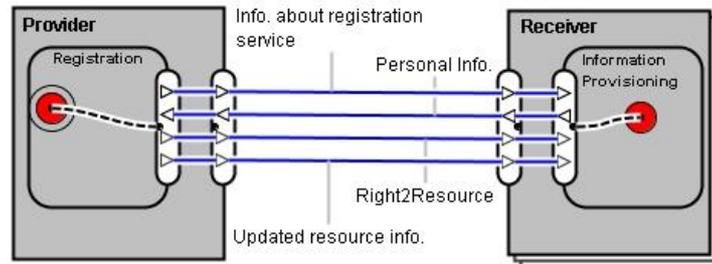


Fig. 4 Template 2: e^3 value model for future commitment-oriented, product-dependent transaction type.

The template in above figure models the commitment establishment stage and commitment fulfillment stage within different value transactions. This is basically to make the template flexible to handle a situation where a registered user may not consume his right to resource obtained at the commitment establishment stage. For example, a registered resident may never take medical treatment and in such case the template should be able to handle it.

3.3 Immediate Commitment-oriented, Authorization-dependent Transactions

We have explained in Section 3 that immediate commitment-oriented, authorization dependent transaction requires that the future commitment-oriented, product dependent transaction carried out first (i.e. template 2). In the following we go through planning, identification, negotiation, actualization and post actualization phases and identify different types of resources transferred in each phase.

Planning Not performed in this transaction since the resource types are already identified in the Future Commitment Oriented – product dependent transaction.

Identification: The registered customers submit the registration information to the provider. The provider may offer in return some additional information related for instance, to the third actors associated with the transaction.

Negotiation: Since the right for the resource has been established earlier (i.e. using transaction template 1), here the provider and the customer engage in collaborations regarding the establishment of rights for the facilitating services such as time allocation, delivery of the resource, etc.

Actualization: customer gets the custody of the resource. Provider gets the compensation from the customer, for example, payment.

Post-actualization: Post-sale services may be performed by the provider according to a possible commitment established in the preceding transaction (template 1).

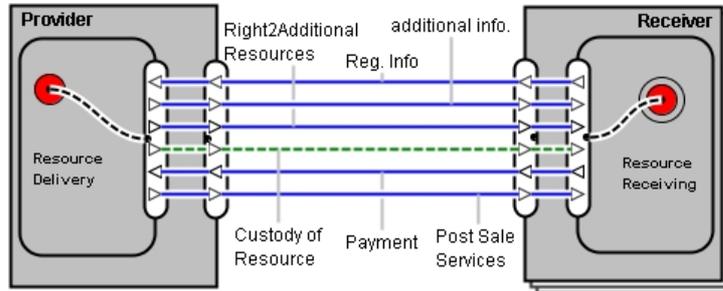


Fig. 5 Template 3: e^3 value model for immediate commitment-oriented, authorization-dependent transaction type.

3.4 Immediate Commitment-oriented, Authorization-independent Transactions

In some businesses, the customer registration is not a required activity for the transfer of economic resources. For example, when someone buys a book from a conventional book shop, the buyer doesn't necessarily register himself. Even in Web-based transactions, buyers may only need to provide information to register his payment obligations such as credit card details.

In the following, we examine the five Open_EDI transaction phases, to identify the types of resources transferred at each phase.

Planning: The provider offers information regarding the resource in concern.

Identification: The provider sends the additional information requested by the buyer.

Negotiation: The provider offers the right to the resource to the buyer. The buyer offers the right to payment (obligation to make payment) to the provider.

Actualization: The buyer gets the custody of the resource.

Post-actualization: The provider offers warranty related services.

The figure below models this business template in an extended e^3 value model.

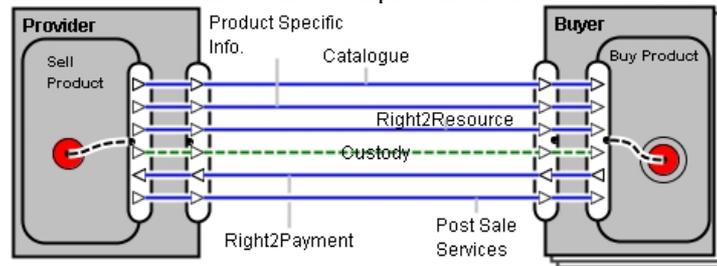


Fig. 6 Template 4: e^3 value model for immediate commitment-oriented, authorization-independent transaction type.

In the above figure, we model only the core value transfers for the product oriented-registration independent transaction template. In general, there may be additional value transfers depending on possible additional economic resources offered by the provider.

4 Method and Method Application

In this section we, introduce the case study that we use as a running example. Then we derive business model components using the templates defined in Section 3. Finally, we develop a complete business model using the derived components as building blocks.

4.1 Case Study

Figure 7 depicts a simple business model of the eye-health care case (the model is an excerpt of a larger case defined in the REMS, an eye-care project [4]). The model shows the basic value exchanges occurring among a primary eye-care provider, patients and a eye-care specialist center. The primary eye-care is responsible for providing a basic treatment to the patient (an initial, or a full). If the patient needs an advance treatment, the patient will be, after a given initial treatment, further referred to the eye-care specialist.

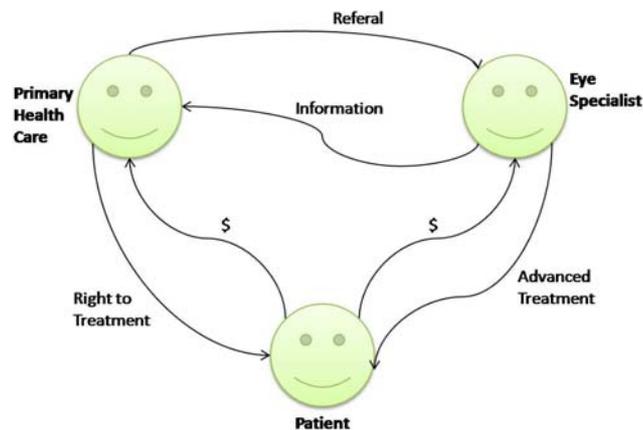


Fig. 7 Eye-care case: actors and basic value exchanges among them

4.2 Identifying Transactions and Developing the Business Model

In this section, we identify the transactions in the previously described business model, in accordance to the classification explained in Section 3. Then we further explore them to identify relationship between them based on registration dependency and product dependency.

Guideline 1: Identify the transactions and establish dependencies between them, in accordance to the classification and explanations given in Section 3.

Based on the business scenario presented in the Section 4.1, we derive following transactions.

After considering possible future commitment-oriented transactions between the primary care and the patient, we introduce transaction *PatientRegistration* (template 2). We also identify a similar transaction, *SpecialistClinicReg.* for establishing future commitments between the primary care and the specialist (template 2)..

For the provisioning of full treatment by the primary care to patients, we introduce one transaction *FullTreatment* (template 3). For the provisioning of initial treatments by the former to the latter, we introduce transaction *InitialTreatment* (template 3). For referring the patient to the specialist clinic, by the primary care, we introduce transaction *ReferralManagement* (template 3). For the provisioning of the advance treatment by the specialist, transaction *AdvanceTreatment* (template 4) is introduced.

Having identified the transactions, we next move to identify dependencies between them and in parallel control the correctness of the dependency constellation. There are two transactions of type future commitment-oriented, i.e. *PatientRegistration* and *SpecialistClinicReg.* Both transactions are product dependent (template 2), i.e. treatment and referral dependent respectively. Thereby, *FullTreatment*, *InitialTreatment* becomes dependent on *PatientRegistration* transaction, while *ReferralManagement* depends on both the *SpecialistClinicReg* and *PatientRegistration* transactions.

Guideline 2: Identify economic resources in accordance to the identified transaction templates (see sections 3.1 to 3.4) from the previous step.

Table 1 below identifies the resources types along five Open-EDI phases for the transactions occurring between the primary care and the patient.

Table 1. Economic resources of *FullTreatment*, *InitialTreatment* and *PatientRegistration* transactions. In the table P, I, N, A and PA stand for Planning, Identification, Negotiation, Actualisation and Post actualization respectively.

	FullTreatment	InitialTreatment	PatientRegistration
P	-	-	PCC offers <i>Services catalogue</i>
I	Patients provide <i>Registration information</i> to the primary care	Patients provide <i>Registration information</i> to the primary care	Patients provide <i>Personal information</i> to the primary care
N	primary care offers <i>Right2timeslot</i> to the patients. patients offer <i>Right to payment</i> to the primary care	primary care offers <i>Right2timeslot</i> to the Patients. patients offer <i>Right to payment</i> to the primary care	primary care offers <i>Right2services</i> to the patients.
A	primary care offers Full treatment to the patients.	primary care offers Initial treatment to the patients.	primary care offers <i>Information updates</i> to the registered patients

PA	primary care offers <i>Timeslot to post health examination.</i> primary care offers <i>Post health check</i> to the patients.	primary care offers <i>Timeslot to post health examination.</i> primary care offers <i>Post health check</i> to the patients.	
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Regarding the PatientRegistration transaction (template 2), the primary care offers the Service catalogue resource, containing the information regarding its services. In the identification phase, the patient offers Personal information to the primary care. In the negotiation phase, the primary care offers Right2services to the patients. This means that the patient gets the right to get treatments whenever she/he needs medical services. The primary aim of this transaction is to register residents in the area of the primary care and to provide necessary information regarding the medical facilities and services. Therefore, in the actualization phase, the primary care provides Information updates (regarding medical services) to those who registered for it. Following the same guidelines, the resources for the other two transactions are identified, as shown in Table 1.

In the Table 2 below, following the same reasoning as for the first table, we explore the economic resources exchanged in transactions, ReferralManagement (template 3) and SpecialistClinicReg (template 2).

Table 2: economic values in the transactions, ReferralManagement and SpecialistReg. In the table P, I, N, A and PA stand for Planning, Identification, Negotiation, Actualisation and Post actualization respectively.

	<i>ReferralManagement</i>	<i>SpecialistReg.</i>
P	PCC offers Specialist clinic info to the Patients.	PCC offer Registration service to SC
I	PCC provides <i>Patient info</i> to the SC chosen. PCC provides <i>Specialist info</i> to the Patient.	SCs provide Registration info. to the PCC
N	In this transaction, we do not identify any additional resources transferred between the PCC and SCs. However, the PCC offers <i>Right2Advance</i> treatment which is an additional service offered to the Patients by the PCC.	SC offers <i>Right2GetService</i> to the PCC
A	The PCC sends the <i>Referral</i> which means transferring the custody of the Patients to SCs.	
PA	SCs offer <i>Disease info.</i> to the PCC.	

4.3 Developing Business Model for the Health Care Case

In this section, we take the economic resources identified along five Open-edi phases of transactions, FullTreatment, InitialTreatment and ReferralManagement in section 4.1 and 4.2 and create the complete business model for the health care case. In the e3 value business model in the figure 6 below, there are three actors, the Primary Care, the Patients and Special Clinics.

In the model, there are five basic transactions which are connected in different ways to represent how actors are collaborating with each other. For example, the transaction FullTreatment could be able to associate with the transaction ReferralManagement in such situations where the primary care gives the full treatments to the Patients but the Patients should be referred to specialist clinic when they are not cured. Such situations are represented by using the AND & OR gates and dependency links between these transactions.

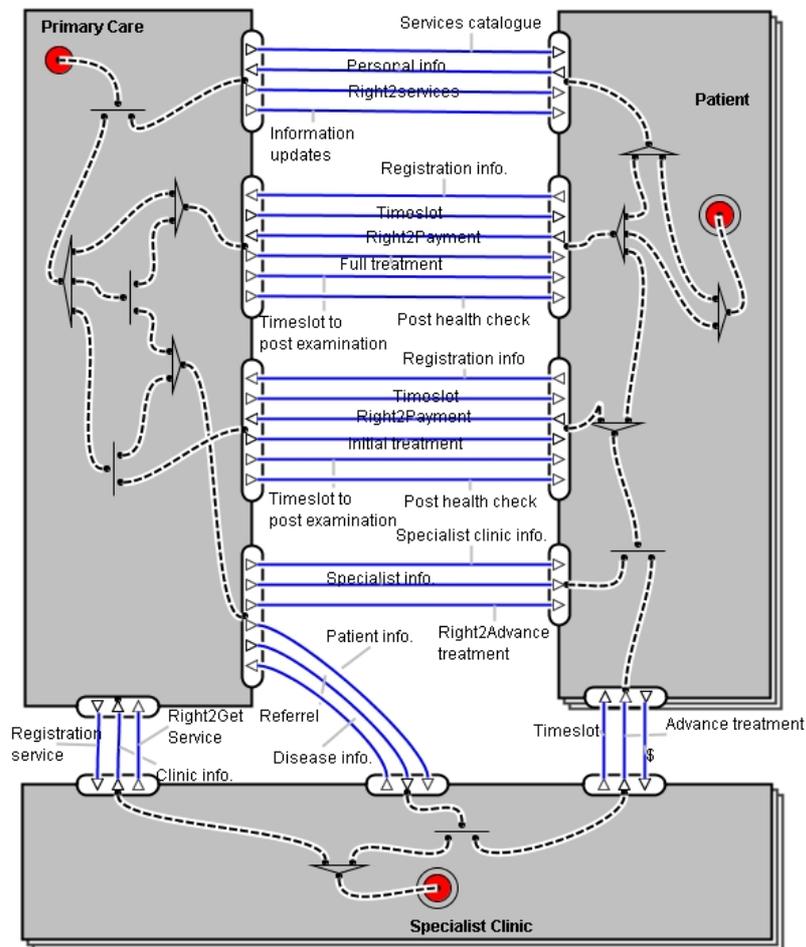


Figure 4: e3-value model for the MMOG Case

5 Conclusions and Future Work

In this paper, we have analyzed value-based business collaborations and thereby we have defined four possible types of value transactions. Using them, we have proposed a method for creating business models templates that span the five major phases in business collaboration as defined by Open-EDI initiative. . Our study is presented in two major parts.

The first part has been focused on identifying and classifying business collaborations, by identifying resource types exchanged along the five phases of the Open-EDI collaboration framework (i.e. planning, identification, negotiation, actualization and post-actualization).. We have identified two primary collaborations: Future Commitment Oriented and Immediate Commitment Oriented. For each of them, we have identified set of attributes based on the goals of collaborations. Considering the attributes and the collaboration types, we have defined the four basic transaction templates.

In the second part we have set the focus on creating a business model using and combining the basic transaction templates identified in the first part. We used the e³ value business model ontology that is accompanied with a graphical notation, to illustrate a final business model.

The proposed method can be used in two ways. First, it can be used to systematically suggest and identify transactions and create new and innovative business models that extend the assortment of the exchanged resources, improving thus economic performance of a network of actors in business collaborations. The method will thereby assist business analysts in generating new ideas and help to ensure that all potential value expansions are explored. Secondly, the methods promotes using a value-based model as a starting point in developing business-aware IT solutions, by, for instance, using the obtained business model as a basis for identification of e-services provisioned by the involved actors and customized according to actor-oriented internal values.

There exist a number of directions for future research. Regarding the validation, the method has been applied on a health care case, as described in the paper. However, this application essentially constitutes only a proof-of-concept for the feasibility of the method. More empirical work is needed on applying the method in order to show its full usefulness; for instance, from the economic perspective (such as utility, sustainability, see [3]). Another important issue concerns integration with the technology, i.e. the use of the obtained explored business model, as a rich basis for identifying e-services that will “carry” the values contained in the model

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