

Modeling e-Business Customization with e³value Modeling

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Abstract - E-commerce ideas demand validation regarding their economic effectiveness on businesses. For identifying relevant business values, some value modeling techniques are currently available in the research arena, and the e³value framework is an easy-to-use option. This framework has a notation to express different values in e-business scenarios. For most of customers, customization of requirements is usually necessary for standard products and services. In this paper, we discuss the need of e-Business customization, and design it using the e³value framework. We present then an approach of e-Business customization, followed by case-based evaluation.

Index terms--Customization; e-Business; e³value Framework; Value Modeling.

I. INTRODUCTION

With the advent of Internet, e-Business is flourishing. Understanding innovative e-Business ideas is indispensable to develop sustainable e-Business models [1]. Several ontological modeling techniques [2] [3] [4] [5] are currently proposed to develop e-Business models. The e³value modeling framework, proposed by Gordijn and Wirenga [6] describes e-Business models as value networks. This approach defines businesses as composed by actors assigned to value activities by competence, which in turn produce objects of economic value communicated to the external world through value ports, grouped in logical containers names value interfaces, further composed into value offerings, and traded as value exchanges [1].

Behind each e-Business innovative idea, there is a relevant customer's need (i.e. a wish or a desire). Customers' needs are more complex now, demanding much more than traditional approaches for predefining value offerings. In order, to maintain the customers' loyalty in fast-paced business domains, it becomes essential to satisfy their needs by providing products and services with value that abounds their expectations. Moreover, demands of a group of customers may be completely different from another'. To keep different groups as clients with a same value proposition for goods or services, businesses can offer options for each target market segment to design their own products and service, in compliance with private value expectations. Such an ability of allowing e-Business' clients or market segments to partially design required goods and services based on private value expectations is referred here as

“customization”. It is a property intrinsic to the business, considered essential to its success. Recent publications on innovative business models indicate that free customers are essential for the businesses, and customization provides to companies a way to get such free customers [7] [8]. For example, Gupta and Mela suggest a customer's valuation model that produces the true value of the free customers [7]. In the area of e-Business research, customization is an emerging trend. Customization also creates value for the customer as well as for the company. To be able to estimate the value produced by customization, we need to model business situations in which customization happens. For value modeling, the e³value has advantages of perceived usefulness (due to its embedded facility of profitability analysis mechanism), ease of use (i.e. it includes a graphical and intuitive modeling notation) and user acceptance (i.e. has been successfully applied in modeling business sustainability for real-world e-Business scenarios, e.g. Dutch Telecom, Intellectual Property Rights, and Renewable Energy Trading). However, the e³value framework does not include explicit guidelines for e-Business modeling customization. In the following sections, we identify points for customizing e-Businesses with the e³value framework. We use Wieringa's approach of problem analysis and solution design [9].

As our problem lies under the category “what stakeholders know about the world and what they would like to know”, we then can consider our problem as a *knowledge problem* [9]. Thus, modeling the customization problem can be restated as what customization is, how it effects value modeling, how it could leads us to wrong decisions, and what effects of our inability to model customization will be. We attempt to answer these questions by using two case studies. We also discuss some of the main issues related to customization of value modeling itself, and further suggest guidelines to overcome these issues.

The rest of this paper is organized as follows. Section 2 depicts basic concepts of the e³value framework along with a demonstrative case of e-Business customization. In section 3, we suggest guidelines to model customization by using the standard e³value notation proposed originally by Gordijn and Akkermans, adding new constructs whenever necessary. In section 4 we demonstrate the

application of the suggested customization guidelines on the business case introduced in section 2. Finally, concluded our approach with some relevant related work and give room to future research.

II. THE e^3 VALUE METHODOLOGY

e^3 value is an ontology-based methodology especially designed for modeling value based requirement engineering problems. The main focus of e^3 value model is to identify who is creating which value for whom. The methodology is based on the economic reciprocity [2].

Considering each instance of value, a number of value based rules and notations have been defined. An exchange can be between businesses or can be between a customer and a business. An e^3 value model considers components like customers, end consumers and other businesses which are of economic value and divide them into the categories based on their economic properties. Moreover business network from value perspective are also highlighted. e^3 value notations include an economically independent entity known as actor(s); it can be either buyer, seller or anyone. A value object can be a service, product or an experience which will be of economic value for at least one actor involved. Value ports are there to show the actor's interaction with the environment. The value in which actor offers to or request from the environment is called as value offering. Value interface groups the value offerings. Value exchange is used to connect two value ports. Number of actors jointly makes a market segment [1] [2]. Thus, forming a value model. The following Fig. shows us the details of e^3 value ontology with notations.

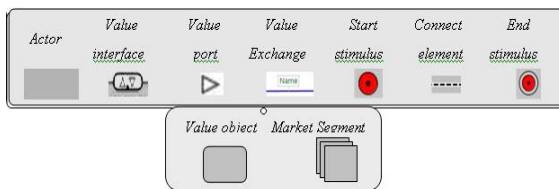


Fig. 1: Notations

III. THE CASE STUDIES

We have considered two cases which are taken from the case study library of the Harvard Business School: one is Netflix, a premium online video rental and video-on-demand company and other is MedNet, an online website specialized in health care information.

A. Netflix

With the busy schedule of life, in home entertainment are increasingly popular. And the major sources of in home entertainment are movies. Usually movies are being rented from the rental stores and customer always worry

about to return the movie in time to save themselves from late fee. This is the major source of discomfort and a motivation for Netflix [10] to establish their business. The aim of the Netflix business is to provide the movies to the customers and act as the intermediary between the movies and the customers and charge customers the usage fee. Customers have to subscribe on the Netflix with a standard fee per month then they can personalize a rental queue. Netflix send three DVD's through US postal service (USPS) along with postage-paid return mailers from USPS for each DVD. Customer can watch DVD according to their convenience. As soon as they return one DVD they will get the new from the queue. For maintaining the stock Netflix buy the DVD from best buyers Netflix offers services of customization, fulfillment and customer services.

The business model of Netflix is to earn revenue by communicating with many partners such as movie providers, DVD providers, postal services and customers as shown in value model see Fig. 2. With the help of shipping centers Netflix produce value for the customer in the form of providing the DVD for unlimited time period. In parallel Netflix produce value for the postal service in the form lot of business and in return Netflix uses the services of USPS [10].

B. MedNet

Health issue is one of the most concerned topics today. MedNet is an online, healthcare media service that provides easy-to-read, interactive, in-depth scientific medical information that is user-friendly for consumers [11]. The company's goals are: (a) to provide scientific based medical information to a non-professional consumer audience, (b) to provide the information for free and (c) to generate profits from advertising sales. MedNet also communicating with many partners, such as the faculty of a prominent medical school, news agencies, active community of visitors that used social media tools, community chat and virtual reality. The main idea of the business model is rely in the sales on its advertising, especially for pharmaceutical companies.

MedNet become the center part connecting consumer that will look for health info and the advertisers that selling their products through the website. The most important actor in MedNet business model is the content provider and additional material provider. They produce medical information that is one of the value object transferred to the targeted consumers. MedNet play intermediary role for both the consumers and advertisers. MedNet's value is exchanged with health care providers and advertisers to produce value for the customers as shown in Fig. 3.

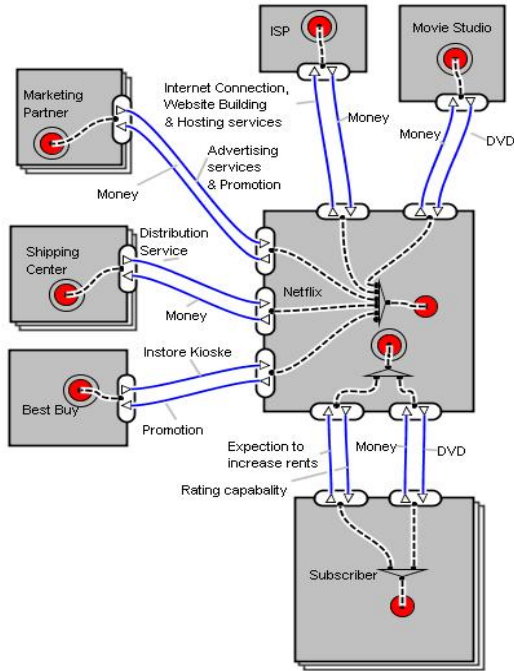


Fig. 2 Netflix Value Model

IV. MODELING CUSTOMIZATION

Customers as an asset can be kept in the business, only if they feel that the business is working according to their needs. So to design and develop a product according to the specific needs of a single customer or/and a group of customers is termed as the **customization**.

In e-business, customization has been introduced and is used by many online companies, well known examples are Facebook and Linked-in. Customization demand high cost and time therefore organizations offer a set of standard featured and provide a facility to change few of them. As customization produces the economic value for businesses and customers, modeling the customization is a challenge that we will discuss by using e^3 value modeling ontology, in the following subsections.

A. Modeling Customization with e^3 value

The popularity of the customization feature introduces the problem of modeling this feature with respect to the value it creates. e^3 value modeling provides us a way to model the economic aspect of the business.

For modeling each aspect, we have different notations [1]. As we started modeling Netflix and MedNet cases following questions arriesed, To answer these questions we went through the details discussed in [1] [2] and came-up with following arguments.

1. *Is there any fixed number of value exchanges in the customization?*

Customization is the process of modifying the products or services to fulfill the requirements of an individual customer or a group of customers. Needs of each customer are different so steps for customization will vary from customer to customer which leads to varying number of value exchanges. Hence the total number of value exchanges will be different for each customer.

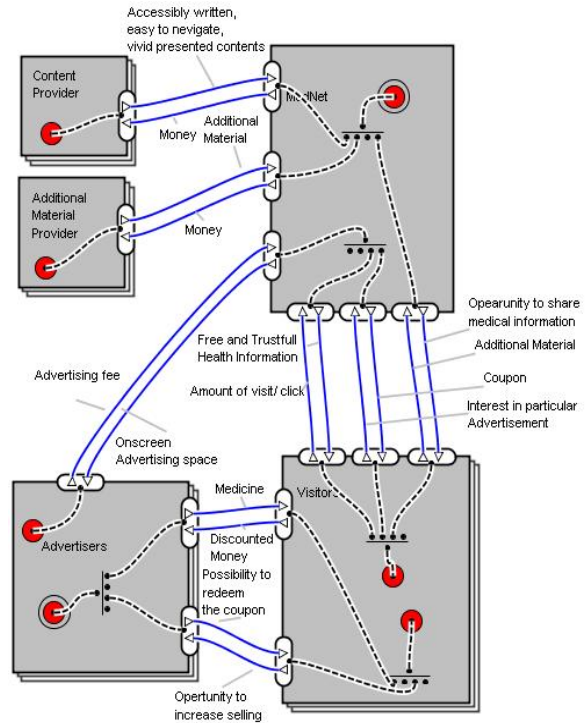


Fig. 3 MedNet Value Model

2. *How many value ports will be there?*

As value ports provide a way to interact with environment and there is a traditional way of giving and taking for value exchange. Each value interface has two value ports, but due to customization needs we will have a number of values. Based on customer needs we need a flexible way to model all the value exchanges in a single interface. The number of ports involved in the customization will vary from case to case thus will be modeled in a single value interface to precisely show customization process.

3. *Who will start or end the scenario?*

Traditionally, value modeling scenarios are being started by one actor and ended by another. Start stimulus and end stimulus notations are in use to represent the start and end of a scenario. But in the case of customization we are not able to identify who will start the scenario; at one instant customer can be a starter of a scenario, while at another instant he (or

she) is the terminator. In case of customization any actor can start or end the scenario, so we need to identify a notation by which we can represent the start and end stimulus at a time either by using existing notations or by introducing a new notation. Consideration of existing notation leads us to the following question.

4. *Is there any need of AND or OR operator for modeling customization?*

The customization property requires the actor to start or/and end the scenario, so we need an AND operator along both start and end stimulus notations. Connecting the start and end stimulus notation with an AND operator serves the purpose. So any actor can start or end a scenario. But for modeling customization we don't need OR notation. Because start and end stimulus notations along with an AND operator's notation, helps us to model customization.

5. *Is there any need to define new notation for modeling customization in e^3 value modeling.*

All those problems discussed in the previous sections can be solved with a little modification in the use of existing notations. For example, modeling the value exchange and value interface with a number of values of exchanges ports leads us to use the existing notation. Another example is the problem of modeling a start and end of a scenario is being solved observed that AND operator along with Start and End notations can model this situation fully. So we don't need to introduce new notations for e^3 value modeling.

6. *Is there any need to modify the existing tool designed to draw e^3 value models?*

By answering all the questions we can analyze that the existing notations can fulfill our need to model a complex scenario of customization. Existing tool with compatible packages for different OS¹ have the capability to observe the recommendation made by us for modeling customization.

B. Evaluation of Customization Features in Netflix

In this section, we will evaluate the customization feature on Netflix case. For each subscriber, Netflix provide a customized store by using its proprietary CineMatch technology. They offer them movie recommendations which, in turn, will create their subscriber's library. The more the subscriber will consume the Netflix movies, the more his/her library will be personalized. In terms of value modeling Netflix provide the value in the form of recommendations and management of the subscriber's

personal library. In return, the subscriber offers more and more business to Netflix [10]. Fig. 4 shows a partial diagram of whole case study of Netflix with problem of customization modeling domain. The problem is subscribers can customize the way in which they experience their own store. In return they provide their loyalty to the Netflix. As shown in the figure, the recommendations, reminders and personalized lists all of these are separate value objects. However, it is not decidable from the diagram who is going to start the scenario and who will end that. So we will apply the answers of the questions discussed in the section 4.1 on the Fig. 4. In this diagram a single interface has many ports which are expressing each value and we have the start and end stimulus notation which are separated by the AND operator.

In Fig. 5 we can see if a subscriber starts the scenario then he/she can either personalize the list or select a movie. In return Netflix offer to the subscriber customize store experience and some recommendation and then Netflix can end that scenario. So we have flexibility in value offerings which is the demand of the customization modeling.

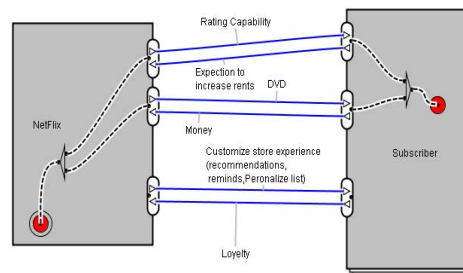


Fig. 4: Problem in Modeling Customization

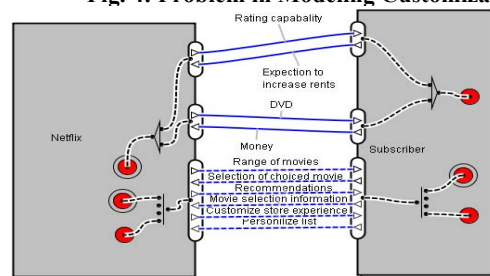


Fig. 5 : e^3 value modeling for Customization

C. Evaluation of Customization Features in MedNet

In this section, we will evaluate the proposed approach to the case of MedNet.

Whenever a visitor visits the MedNet he can ask about a particular disease and then may ask for the medicine or can only finish his search without going towards the medicine. On the next visit whenever visitor provides his particulars he will get the recommendations about the diseases and medicines and new information about it.

¹ <http://www.e3value.com/tools> accessed on August 25, 2015 at 12:35 Hours

MedNet maintain the history of the customer and then it acts as a personal physician who knows all about your health. By using e^3 value modeling, we can model this situation shown in the Fig. 6, which is the partial diagram of the MedNet case studies with problem representation. Again the question arises regarding who will start the scenario. Either the MedNet can start the scenario by asking from the visitor “Are you sick? Do you have any problem?”, and then say “I have this suggestion for you”. Or a visitor starts the scenario by visiting the MedNet and asking “I have this problem, provide me information about that and suggest some medicine”.

As shown in the Fig. 6, we are not able to decide who is going to start the scenario. Observation has shown that both situations are possible. Thus we have modeled customization by using the recommendation discussed in Section IV and is shown in Fig. 7.

D. Discussion and Threads to Validity

We have two entirely different cases, yet both have the same problem of customization modeling. In this section we compare the two models (a) by using a previously published categorization scheme [12]. (b) by using the set of questions discussed in Section 4.

The scheme in [12] helps classifying business models according to the way the collaborating partners use innovative ideas and the governance forms they choose. We chose this schema because it indicates the different ways in which the customization is happening in online businesses. The Netflix case emphasizes the collaboration among the companies so it can be classified as Elite circle [12] in which Netflix themselves select a group of participants while in case of MedNet we can categorize it as innovative mall [12]. As shown earlier, that different case can be modeled in the same way. So a single standard of modeling the customization suits to all type of models. Gary P.Pisano, Roberto Vergabti [12] produce generic criteria for classification of the models and the two models in our case studies are entirely different with respect to this generic criterion. The comparison is based on customization modeling criteria shows us that these are totally similar cases, and modeling customization in these models is similar. So, we can say that for modeling customization by using e^3 value modeling, we have a single standard that can model all type of business. Furthermore, we have designed the customization approach by considering the set of question discussed in section 4. Validity of each question on both case studies are discussed in Table 1.

Our aim is to provide a comprehensive overview of customization process by using e^3 value modeling approach. The main threat of validity lies on the variation in customization requirements. The threat is mitigated by considering multiple customization processes with similar outputs.

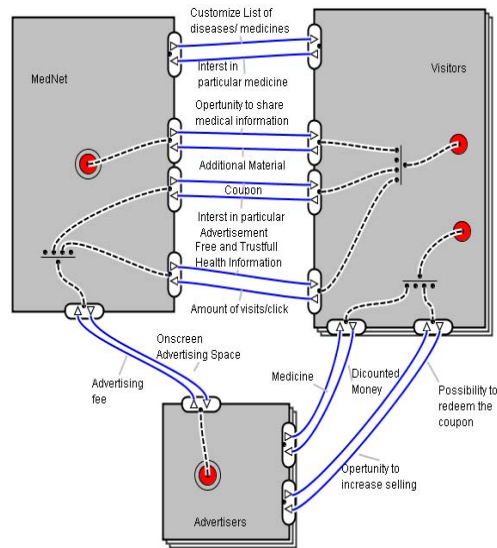


Fig. 6: Problem in Modeling Customization

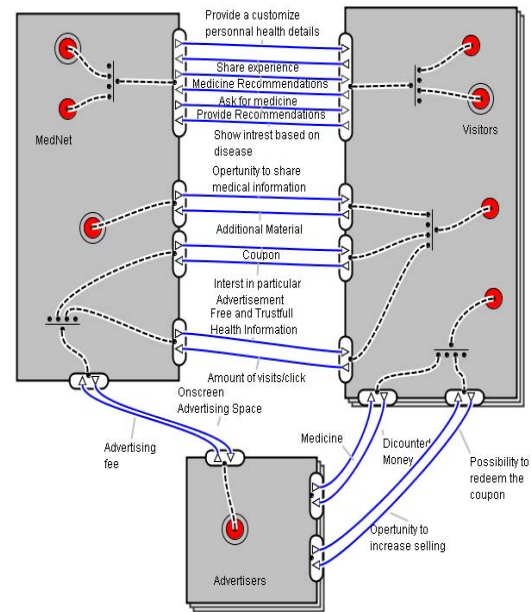


Fig. 7: e^3 value modeling for Customization

Another threats to validity is business in evaluation process, this threat is mitigated by periodic evaluation of the research work to the experts of the field.

V. CONCLUSION AND FUTURE WORK

For understanding the innovative e-business ideas [1] it is indispensable to develop a value model, several ontological modeling techniques can be found. e^3 value model is among one of those value modeling approach . It has notations to express different values in the e-business. With the increase in competition customization feature is used as tool to attract customers. As customization is creating value for the customer if we

cannot model the customization in value modeling then our model will not be complete which will ultimately leads us to wrong decisions.

Table 1: Questions validity on case studies.

Q#	MedNet	Netflix
1	Numbers of value exchanges are fixed in MedNet; however, the value exchange which the customer will follow is dependent on his/her choice.	Numbers of value exchanges are fixed in Netflix, But the order of value exchanges depends on the customer choice.
2	Value ports associated with a value interface vary from case to case, as in case of modeling customization in MedNet we have 6 value ports	In Netflix we also have 6 value ports for modeling customization. But there exist possibility of more/less value ports.
3	Anyone can start or end the scenario.	Anyone can start or end the scenario.
4	AND operator will be used to model customization along with start and end stimulus notations	AND operator will be used to model customization along with start and end stimulus notations
5	There is no need for new notations.	Existing notations satisfies all the demand of modeling so there is no need for new notation.

In this paper we have defined an approach to model the customization in the e³value model by using the AND operator with start and end stimulus notation. Also we have recommended some modification in the usage of value port and value interfaces. By modeling the customization with the help of our approach we have used existing notation and tool for modeling customization of e³value modeling.

There are several approaches related to value modeling e.g Tropos [2] [3], REA [4]. Tropos is a tool designed to facilitate the early phases of requirement engineering and it helps in goal modeling, the question is whether or not customization can be modeled as a goal. However, to the best of our knowledge REA is very much similar to e³value modeling [13] [14] but it also has not specified any criteria for modeling customization. As a future work we can propose to identify the methods to model the customization by using REA.

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