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Developing a Design Methodology for Control Procedures in E-Commerce: A Value Chains Perspective

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ABSTRACT

In systems development process, E-business modelling as a type of conceptual modelling is based on value chains concepts. The main goal of e-business modelling is to reach agreement among stakeholders regarding the question "who is offering what of value to whom and expects what of value in return". For e-business modelling, there are some methodologies focused on the descriptive part. The e³ value methodology, that it should be extended into a realistic and actual one, is a graphical approach to design an e-commerce value chain. The e³ value methodology supposes trustworthy behaviours of business partners. So, we would like to lead the e³ value methodology, into a realistic environment including opportunistic and fraudulent behaviours of partners. For this meaning, we can use "requirements analysis" and "conceptual modelling" techniques resulting a design methodology for control procedures in e-commerce from the value constellations perspective.

1. INTRODUCTION

The Internet as one of the e-commerce tools, of our viewpoint, is a powerful channel that presents new opportunities for touching customers, enriching products and services with information, squeezing out costs through process automation, and redesigning internal business processes through enhanced communication and knowledge sharing. In most firms e-business processes are changing the nature of the buyer-seller relationship, the role of information technology (IT), and the design of organizational structures and roles. As firms attempt to capitalize on their existing capabilities through the Internet, they necessarily disrupt their embedded processes. This process of leveraging strengths and disrupting habits underlies the migration to e-business resulting in a migration from market place to market space (Ross, et al., 2001).

The e-Business Model approach we propose in this paper shall help a firm to structure its organization in a way to become more efficient, more flexible and responsive to customer demand, to forecast possible future scenarios and therefore to stay competitive in the Internet area. E-business modeling has similar goals to enterprise modeling in general. Modeling helps firms develop business visions and strategies, redesign and align business operations, share knowledge about the business and its vision and ensure the acceptance of business decisions through committing stakeholders to the decisions made.

Business model is nothing else than the architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers in order to generate profitable and sustainable revenue streams. (Dubosson et al., 2001)

2. GENERAL APPROACHES

In electronic commerce, systems development is based on two fundamental types of models: business models and process models. A business model is concerned with value exchanges among business partners, while a process model focuses on operational and procedural aspects of business communication. Thus, a business model defines the what in an e-commerce system, while a process model defines the how. Business process design can be facilitated and improved by a method for systematically moving from a business model to a process model. Such a method would provide support for traceability, evaluation of design alternatives, and seamless transition from analysis to realization. The purpose of a business model is to describe the fundamental business aspects of the e-commerce system to be built. A business model describes which actors are involved, what the actors offer each other, and what activities they perform when producing and consuming offerings. The central concept in a business model is that of value, and the model describes how value is exchanged between actors (Jazaweera, 2002). Based on business model approach, an important issue in e-commerce systems is the development of design methodologies for value chains in organizational networks. In particular in electronic commerce these value chains tend to become very complex in virtual network organizations where bundling of various services are essential for profitability. For example, combining free internet access provided by an internet service provider with paid content by a separate content provider. The main problem is to analyze which value is exchanged between the separate companies in a virtual network organization and to introduce inter-organizational control procedures that guarantee that all the companies get the value they are entitled to.

3 RELATED BACKGROUNDS

Most design methodologies related to e-commerce are process-based and not value-based. There are a few value chain design methodologies, which provide concepts for describing value constellations. For example, the AIAI Enterprise conceptual framework (Uschold, 1998) or the Resource Event Agent (REA) (Geerts, 1999) conceptual framework, which stems from accounting. However, these frameworks only focus on the descriptive part, and do not support the value chain design. They lack for instance a graphical notation to represent value chains, and they provide no support for elicitation of e-commerce value propositions. Let alone quantitative profitability analysis tools. The e³ value methodology (Gordijn 2001, Gordijn 2002) is an approach to design an e-commerce value chain, and to model this formally in a graphical way, so that to is possible (1) to create a common understanding of the value proposition, and (2) to provide a quantitative profitability analysis of the proposed value chain. The methodology is supported by various software design and analysis tools.

The e³ value ontology is organized in three sub viewpoints, each discussing related requirement types (Gordijn, 2002):

- The global actor viewpoint shows:
  1. the actors involved;
  2. the objects of economic value created, exchanged, and consumed by these actors;
  3. objects of value, which actors expect in return for an object of value delivered, or the mechanism of economic reciprocity;
  4. objects which are offered or requested in combination;
  5. phenomena that cause exchanges of objects between actors.
- The detailed actor viewpoint(s) shows:
  6. partnerships between actors, which show that actors request or offer objects of value jointly;
  7. constellations of actors, which need not to be seen on the global actor viewpoint, e.g. to avoid unnecessary complexity;
  8. plus: requirement expressions as on the global actor viewpoint, but then only for actors expressed on the detailed viewpoint.
- The value activity viewpoint(s) shows:
  9. the value-creating or adding activities and their assignment to actors.

The main purpose of the *global actor* viewpoint is to explain the overall value model to all stakeholders, including CxO type of stakeholders, involved. It hides complexity, which can be shown on detailed actor viewpoints. The reason to introduce a *detailed actor* viewpoint can be twofold: (1) representation of constellations: a decomposition of a part of the global actor viewpoint to reduce complexity, and, (2) representation of partnerships: actors who decide to offer and/or request products or services as one virtual actor to/from other actors. The *value activity viewpoint(s)* shows what actors do to create profit or to increase value for themselves. Its main motivation is to separate discussions of who is participating in the e-commerce idea from who is doing what.

3.1 The global actor viewpoint

The explanation of our ontology is structured by presenting a description for each concept, properties of the concept, relations with other concepts, and the way of visualization in a value model. A concept and relation is illustrated by definitions. Figure 1 presents the ontology graphically using UML class diagrams.

Actor: An actor is perceived by his/her environment as an economically independent (and often also legal) entity. Enterprises and end-consumers are examples of actors. A profit and loss responsible business unit, which can be seen as economically independent is an actor, although such a unit needs not to be a legal entity.

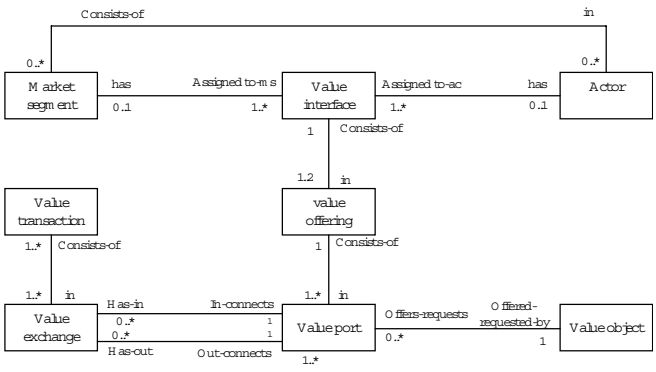
Properties. An actor has a name, e.g. a company name, or a name that represents the role such an actor plays.

Visualization. An actor is depicted by a rectangle, with his/her enterprise or role name.

Value Object: Actors exchange value objects. A value object is a service, a product, or even an experience, which is of economic value for at least one of the actors involved in a value model.

Properties. A value object has a name. While choosing a name, one should keep in mind that it expresses the object from an economic value point of view.

Figure 1: Concepts and relations of the e3-value ontology (global actor viewpoint).



Visualization. A value object is presented by showing the name of the object nearby a value exchange (to be discussed below), representing a potential trade of such an object, or by showing the name nearby value ports offering or requesting objects.

Value Port: An actor uses a value port to provide or request value objects to or from his/her environment, consisting of other actors. Thus, a value port is used to interconnect actors so that they are able to exchange value objects. Such a value object flowing into or out an actor denotes a change of ownership, or a change in rights.

Properties. A value port has a direction, which can have the values in (shortly called an in-port) or out (called an out-port) indicating whether a value object flows into or out an actor (seen from that actor).

Relations. A value port offers or requests one value object. This cardinality constraint again emphasizes that we are not so much interested in value object instances, but rather in the prototype for such instances. A value object can be requested by or offered by zero or more value ports.

Visualization. The value port is depicted by a small black filled circle. Value in-ports have an incoming arrow. The name of the value object offered/requested by the port can be depicted.

Value Offering: A value offering models what an actor offers to (an out-going offering) or requests from (an in-going offering) his/her environment, and closely relates to the value interface concept. A value interface models an offering of an actor to his/her environment, and the offering such an actor requests in return from his/her environment. An offering is a set of equally directed value ports exchanging value objects, and implies that all ports in that offering should exchange value objects, or none at all.

Relation. A value offering consists of one or more equally directed value ports. A value port is in exactly one offering.

Value Interface: Actors have one or more value interfaces. In its simplest form, a value interface consists of one offering, but in many cases, a value interface groups' one in-going and one out-going value offering. It shows then the mechanism of economic reciprocity. Economic reciprocity refers to rational acting actors.

We suppose that actors are only willing to offer objects to someone else, if they receive adequate compensation (i.e. other value object(s) in an in-going offering) in return. So, with the value interface, we can model that an actor is willing to offer something of value to his/her environment but requests something in return, whereas a value offering models that objects can only requested or delivered in combination.

Relations. A value interface is assigned to zero or one actor and consists of one or two value offerings, in the latter case being an out-going offering and an in-going offering. Each actor has its own value interface. Multiple value interfaces can be assigned to an actor and a value offering belongs to exactly one value interface.

Visualization. The value interface is visualized by a rounded box at the edge of an actor. Value ports are drawn in the interior of the rounded box. Note that a value offering is not visualized explicitly. However, value offerings can be easily seen by grouping all out-going value ports in a value interface (the out-going offering), or by grouping all in-going value ports in a value interfaces (the in-going offering).

Value Exchange: A value exchange is used to connect two value ports with each other. It represents one or more potential trades of value object instances between value ports. As such, it is a prototype for actual trades between actors. It shows which actors are willing to exchange value object instances with each other. So, it does not model actual exchanges of value object instances, which we call value exchange instances.

Relations. The value ports involved in a value exchange are represented by the has in and has out relations, which relate to exactly one in-port and exactly one out-port. A value port may connect to zero or more value exchanges.

Visualization. A value exchange is shown as line between value ports. The name of the value object which is exchanged is presented nearby the value exchange.

Value transaction: A value interface prescribes the value exchanges that should occur, seen from the perspective of an actor the value interface is connected to, because all ports in a value interface should

exchange objects or none at all. Sometimes, it is convenient to have a concept that aggregates all value exchanges, which define the value exchange instances that must occur as consequence of how value exchanges are connected, via value interfaces to actors. We call this concept a value transaction. In its simplest form, a transaction is between two actors. However, a transaction can also be between more than two actors. We call such a transaction a multi-party transaction.

Relation. A value transaction consists of one or more value exchanges. Note that the exchanges in a transaction should be consistent with the way these exchanges are connected to value interfaces. A value interface requires that if a value object is exchanged via a port, also exchanges must occur via all its other ports. These exchanges must be also part of the transaction.

Visualization. A value offering is shown by a line intersecting the value exchanges it contains. The intersection points are shown by small filled circles.

Market segment: In marketing literature, a market segment is defined as a concept that breaks a market (consisting of actors) into segments that share common properties. We employ the notion of market segment to show that a number of actors assign economic value to objects equally. This construct is often used to model that there is a large group of end-consumers who value objects equally. We realize that in practice no actor will value objects exactly the same, but supposing an equal valuation for some actor groups is a simplification needed to arrive at comprehensible value models.

Properties. A market segment is given a name, in must cases in plural form, such as customers, surfers, or alike. A market segment has a count, which indicates the number of actors in the segment (number, unbound, or unknown).

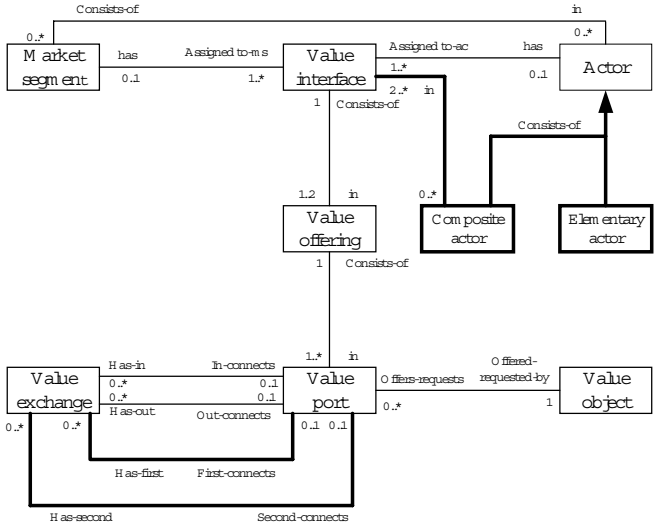
Relations. Because a market segment is a set of actors, a value interface can be assigned to zero or one market segment, just as an interface can be assigned to an actor. Objects exchanged via this value interface are valued equally by actors in the segment.

Visualization. A market segment is shown as three stacked actors. A value interface of a market segment is presented on one of the edges of the topmost actor. An explicitly modelled actor who is also part of a market segment is mentioned in the name of the market segment.

3.2 The detailed actor viewpoint

The purpose of a *detailed actor viewpoint* is twofold. First, a detailed actor viewpoint can be used to *detail* an actor identified on the global actor viewpoint into more actors. We call such an actor a *value constellation*. A value constellation can be used to isolate parts of the value model to a limited number of actors, who can decide on that specific part without consulting other actors participating in the e-commerce idea too much. A value constellation is also a way to reduce complexity on the global actor viewpoint, such that all actors can understand this viewpoint. A second reason to introduce a detailed viewpoint is the representation of partnerships between actors. As such, a number of actors may decide to present themselves, as a virtual enterprise actor, to their environment. These actors then decide on one common value interface.

Figure 2: Concepts and relations of the e³-value ontology extended for the detailed actor viewpoint.



Composite actor and elementary actor: For both modelling purposes, we specialize the actor concept into a composite actor, and an elementary actor (see figure 2).

A composite actor group's value interfaces of other actors. Also, a composite actor has its own value interfaces to its environment. This composite actor's value interfaces allow us to (1) abstract away from the composite's internals, or (2) to show a common value interface from actors who decide to present themselves as a virtual enterprise.

An elementary actor does not contain value interfaces of other actors. Such an actor is the lowest decomposition level that can be reached from an actor perspective. Note we group value interfaces and not actors into a composite actor. The reason for this is that in case of partnerships, an actor may decide to offer objects jointly with objects of other actors, but also may decide to offer other objects on its own.

Consequently, it is not the actor that is grouped, but what s/he is offering for a specific case. The same holds for introducing a composite actor in case of value constellations. Such an actor can group a number of value interfaces of the actors it contains, while interfaces of these actors may also appear somewhere else in the value model.

Relations. A composite actor is an actor. An elementary actor is also an actor. This means that all properties and relations identified for actors will also hold for composite and elementary actors. A composite actor consists of minimal two value interfaces of other actors. We need at least two interfaces to be able to group meaningfully.

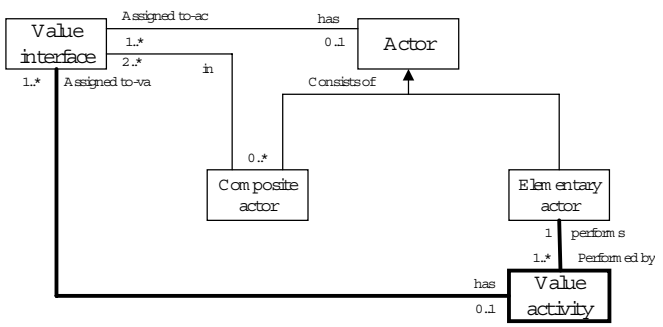
Visualization. A composite actor is visualized by drawing a rectangle around the actors whose value interfaces are grouped. Inside this rectangle, the value interfaces of the actors must be shown grouped by the composite actor.

Value exchange revisited: We have introduced the value exchange concept earlier to relate ports of actors exchanging objects. These connected ports have *opposite* directions. The value exchange construct is also used to relate value ports of a composite actor to value ports of actors being part of the composite. In this case, connected ports have *equal* directions. An object offered via an out-port of a composite actor still has to be offered via an out-port of one of the actors in the composite. Also an object requested via a composite actor's in-port must be requested by an in-port of one of the actors it contains.

Properties. To represent the various applications of value exchanges, we distinguish four types. A type 1 exchange relates ports of actors trading objects, while a type 2 exchange relates ports of a composite actor with ports of the actors it contains.

Relations. To stress that a type 2 value exchange, which connects ports with equal directions is different from a type 1 value interface which connects ports with opposite directions, other associations are shown in the ontology. A value exchange *has a first* value port of the composite actor, and *has a second* value port of one the actors contained by the composite actor.

Figure 3: Concepts and relations of the e3-value ontology extended for the value activity viewpoint.



3.3 The value activity viewpoint

The main purpose of the *value activity* viewpoint is to illustrate the assignment of value activities to actors. This assignment is a key consideration in strategic e-commerce decision making.

Value Activity: An important issue in value model design is the *assignment* of value activities to actors. Therefore, we are interested in the collection of operational activities which can be assigned as a whole to actors. Such a collection we call a value activity. Actors perform value activities, and to do so, a value activity must yield profit or should increase economic value for the performing actor. Consequently, we only distinguish value activities if at least one actor, but hopefully more, believes that s/he can execute the activity profitable. Value activities can be decomposed into smaller activities, but the same requirement stays: the activity should yield profit. This also gives a decomposition stop rule.

Relations. A value activity has one or more value interfaces, just like actors and market segments. A value interface belongs to exactly zero or one value activity. A value activity is performed by precisely one elementary actor. Finally, multiple value activities can be performed by an actor.

Visualization. A value activity is graphically presented by a rounded box, which is drawn inside the actor who performs the activity.

Value exchange revisited: We also use the value exchange to connect ports of value activities with ports of the actor performing these activities. These are called type 3 value exchanges. Such ports must have the same direction. Also, ports of value activities, which are performed by the same actor, can be connected by using type 4 value exchanges. These exchanges represent 'internal' trades of an actor. Such exchanges connect ports with an opposite direction.

4 PROBLEM DEFINITION

However, the e^3 value methodology of introduced by Gordijn assumes perfectly trustworthy non-opportunistic business partners, which is an over-idealized assumption for actual commercial transactions. In this research we would like to extend the e^3 value methodology with a theory about trust building and control mechanisms to detect or prevent fraudulent or opportunistic behavior in value exchanges, particularly in electronic commerce transactions between organizations. Trust and control in commerce and especially in electronic commerce, is a topic which is currently a very active research field (Geyskens et al., 1998; Jarvenpaa and Tractinsky, 1999; Keen, 1999; McKnight et al., 1998). The trust and control extension of the e^3 value methodology will be based on earlier research by (Tan & Thoen, 1998, 2000; Bons et al., 2001) and accounting research on inter-organizational trust building (Dekker, 2002; Groot and Merchant, 2000).

Gordijn and Tan (2003) concluded that: two interesting observations were made about control procedures. First, trust-increasing procedures themselves can be seen as viable commercial value-added services with a corresponding value model. We called such value models secondary, because they facilitate the exchange of values in another, primary, value model.

Relating a secondary value model to enhance trust to a primary value model goes via the value exchanges of this primary model; these are the exchanges which need to be secured by trust-services. Second, a theory is needed about trust procedures and how to design them for specific value models. Just as the design methodology requires principles for the design of the primary value models, it also requires control specific principles for the design of the secondary trust services value models. Here we made a first attempt to develop such a theory for the design of the secondary trust services value models (Gordijn and Tan, 2003).

Also measures will be investigated to prevent fraudulent behavior by changing the value constellation and the way actors exchange objects of value. For example, in some cases trust issues can be solved by creating conflicts of interest between actors and thus by changing the value constellation (Gordijn, 1999). So, now we can quote our basic question as follows:

What are the principles, characteristics, features, and basics of a design methodology based on value chains concepts so that it can control potential opportunistic and fraudulent behavior in value exchange?

5 THEORETICAL FOUNDATIONS

In an e-commerce systems development process, the initial phase includes the development of a business model. The fundamental objective of the business model development phase is two folded: The business idea being designed will be satisfactory to all involved parties and the technical feasibility of the realization of the business idea on the available IT platform will be determined.

The central concept of a business model in any trading set up is value. We assume that value can be created and it can be exchanged as economic resources among business partners. Among the objectives of a business model, answers to the following questions are essential.

1. What types of involved Business Partners are there?
2. What types of Economic Resources exchanges are there?
3. Which Business Partner offers what Economic Resource type to whom and in return for what Economic Resource type?

The main foundation of the business model is the concept of value. It has been analyzed extensively in the economics and marketing literature for centuries.

In search for the solid theoretical foundations, we had led to the Porter's work; a significant work entitled Porter's competitive advantage series (Porter, 1998).

He builds the concept of value chain through which value is successively added to products to win a targeted customer. The value chain divides a company's activities into the technologically and economically distinct business activities which ultimately create value for the company. The physical creation of the product, its marketing and delivery to buyer, and its support and servicing after sale are some primitive value activities.

The challenge for any (electronic) commerce application is to do profitable business where the price for goods/services sold is higher than the production cost.

This is done, according to Porter, by performing value adding activities at lower cost or performing them in a way that leads to differentiation from similar products so that customers will be ready to pay a premium price. Achieving this leads to competitive advantage.

The success of a product or service introduced to a competitive market is the basis of the survival of a company. This can be determined by relationships of the popular market triangle proposed by Ohmae (Ohmae, 1982). It is possible to achieve competitive advantage in terms of successful marketing when one's offer is targeted to goal system of consumers (customer orientation) and is held by consumers to be better than competing offers.

Consumer value is central for every successful marketing strategy in a market economy. An interesting and significant collection of contributions in the direction of consumer value can be found in Holbrook's works (Holbrook, 1999). There, Holbrook defines consumer value as "an interactive relativistic preference experience". The evaluation of some *object* by some *subject* is called consumer value. In a typical case, a subject could be the consumer or customer while the object could be a product or a service offered by Manufacturing/service Company respectively.

The term "interactive", in Holbrook's definition of consumer value, means that consumer value entails an interaction between some subject and some object. This interaction has led to two schools: subjectivists and objectivists side of interaction.

The subjectivist argues that consumer value depends entirely on the nature of subjective experience, i.e. "man is the measure of all things". This is the basis for customer orientation where a product is assumed to have value only if it pleases some customer or put simply, the customer is the ultimate arbiter of consumer value.

The objectivist argues that value reside in the object itself as one of its properties. These arguments have led to product orientation assuming that value is put into the offering by virtue of a certain

resource, skill or manufacturing efficiencies. The classical economists including Karl Marx has contributed to the labor theory of value that specifies the value of an object as the amount of work invested in producing it.

The term "relativistic", in Holbrook's definition of consumer value, means that consumer value is comparative, personal, and situational. Comparative is the value of one object compared to another when evaluated by the same individual. Here Holbrook has highlighted intra-personal comparisons rather than inter-personal comparisons. Personal means that the value of one object varies from individual to individual according to subjective preferences. Situational means that the value of one object depends on the context in which the evaluative judgment is reached. Finally, neither he states that the possession of the purchased product, nor the selection of the brand is the value but the consumption experience. This is the central point to treat all markets as service marketing when creating consumer value.

6 METHODOLOGIES AND TECHNIQUES OF RESAERCH

As that it is previously mentioned, the main objective of this research is to develop more a design methodology. Hence, we will generally apply the information systems design research methodologies. The IS design research methodology involves aspects such as "requirements analysis" and "conceptual modeling".

Requirements analysis intends to elicit the actual information system needs and problems of the user. An important aspect of analyzing user requirement is to choose an appropriate to provide the desired information. Approaches vary in the amount and depth of information that can be obtained, and also in the level of intrusiveness to the user. Common approaches utilized by researchers include:

1. focus groups,
2. structured interviews,
3. observational analysis,
4. questionnaires.

The requirements analysis technique should be in harmony with the type, size, and scope of the project; the number, location, and technical expertise of the users; and the anticipated level of involvement of the users in the data collection and analysis processes. The technique should ensure that the functionality, performance expectations, and constraints of the project are accurately identified from the system owner/users' perspective. The technique should facilitate the analysis of requirements for their potential impact on existing operations and business practices, future maintenance activities, and the ability to support the system owner's long-range information resource management plans.

It is advantageous to select a technique that can be repeated for similar projects. This allows the project team and the system owner/users to become familiar and comfortable with the technique.

E-Business modeling and process modeling are both forms of conceptual modeling, both are necessary for good e-business design, but they differ in several significant ways. First of all, the purpose of Conceptual Modeling is to help us disregard irrelevant structures by building relationships between idealized concepts that focus on what is essential. Efficient concepts disregard almost everything in a way that is noticed as little as possible. "The power of thinking is knowing what not to think about".

And also, the main goal of e-business modeling is to reach agreement among stakeholders regarding the question "*who* is offering *what of value* to *whom* and expects *what of value* in return". In contrast, an important goal of process modeling is to reach a common understanding about *how* activities should be carried out (e.g. in which order). These are two different modeling goals, asking for different modeling methods with different constructs. Modeling strategic intent of e-business differs from modeling operational fulfillment. As a result, the contents of an e-business model and a process model also differ in a number of ways (Gordijn and et al., 2002).

For conceptual modeling we use *the e^3 value graphical modeling techniques* and *formal specification* to define a mathematical syntax and semantics for the terminology and ontology that is used in the design methodology. In formal specification concepts are given mathematical precise definitions using set theory. For example, we will formally specify notions such as the knowledge asymmetry between the different actors in a value exchange to analyze the required level of controls that are sufficient for these actors. Depending on the type of knowledge asymmetries, different types of controls are needed. The combination of graphical and formal specification techniques is often done in IS research to guarantee that the graphical notation has an unambiguous interpretation. This unambiguous interpretation is required when the graphical model representation is used for the actual implementation of an information system. Both applicants have a long-standing experience in the IS design methodology.

We also plan to do case studies. The development of the e^3 value methodology was already supported over the last couple of years by various real-world case studies (e.g. for the publishing company PCM, the intellectual properties association SENA) where it was actually applied and evaluated for its effectiveness and incrementally improved. We plan to do more case studies specifically on the topic of control mechanisms in value exchanges. In these case studies interviews or other approaches for determining requirements will be conducted to evaluate the usefulness of this extended version of e^3 value for the support of business model development. Specially, requirement analysis will be used to evaluate to what extent e^3 value is a useful tool for (external) business analysts to help business experts from the company to develop and test new business models.

7 SOCIETAL RELEVANCE

Over the past few years many innovative e-commerce ideas have been proposed. Unfortunately, many of these initiatives have failed. During 1998-1999, the e-commerce hype reached its top. Recently, it became clear that many e-commerce ideas are not successful (Shama, 2001).

An important reason for this failure is the lack of a sound value proposition for customers, which is also profitable for the e-commerce company. This design methodology will support organizations to design better value-added services for electronic commerce. Specially, this design methodology supports complex bundling of online services by virtual network organizations.

8 DEFINITION OF CONCEPTS

There are some extended ontologies and standards about business model concepts that are developed from of various references. Some of them are more common and more well-known for academic researchers. We can accept one or composed of those and also can develop a new one for our meaning. Some of more well-known are entitled as following:

B2B (Business to Business) Standards:

ebXML, (Electronic Business using eXtensible Markup Language See: http://www.ebxml.org)

OAGIS (Open Applications Group Integration Specifications Inc. See: http://www.openapplications.org)

XBRL (eXtensible Business Reporting Language See: http://www.xbrl.org)

UN/EDIFACT (United Nations Directories for Electronic Data Interchange for Administration, Commerce and Transport See: http://www.unece.org/cefact/)

EANCOM (European Article Numbering Inc. See: http://www.ean-int.org)

ANSI (American National Standard Institute See: http://www.ansi.org)

EDIFICE (is the Standardized Electronic Commerce forum for companies with interests in Computing, Electronics and Telecommunication. See: http://www.edifice.org)

SWIFT (SWIFT is the industry-owned cooperative supplying secure messaging services and interface software to 7,000 financial institutions in 198 countries. SWIFT provides messaging services to banks, broker/dealers and investment managers, as well as to market

infrastructures in payments, treasury, securities and trade Sea http://www.swift.com)

CEN/ISSS (Information Society Standardization System See: http://www.cenorm.be/isss)

ESCA (Electronics Supply Chain Association See: http://www.electronicssupplychain.org)

EIDX (Electronics Industry Data Exchange Association See: http://www.eidx.org)

ICC (International Chamber of Commerce - Business practices, contractual and legal issues of EDI. See: http://www.iccwbo.org)

UN ICC (UN International Computing Center See: http://www.unicc.org)

UCC (Uniform Code Council See: http://www.uc-council.org)

9 CONCLUSIONS

An e-business model ontology centers around the core concept of value, and expresses how value is created, interpreted and exchanged within a multi-party stakeholder network. Our e-business model ontology is part of a wider methodology for e-business modeling, called e^3 value methodology, that is currently under development. It is based on a variety of industrial applications some researchers are involved in, and it is illustrated by discussing a free Internet access service as an example.

The trust perspective describes how value webs can be expanded with trustworthy control procedures to provide for each actor sufficient confidence in each other to enable trading.

The deliverable contribution of this work would be to develop a design methodology from the value chains perspective that can support a designer achieving development of a trustable and controlled e-commerce system.

This research has two clear scientific contributions: 1- extend the research on design methodologies for value chains in virtual network organizations, 2- extend the theory about trust building and control mechanisms for virtual network organizations in electronic commerce.

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