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## An e-Business Model Ontology for Modeling e-Business

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### Abstract

After explaining why business executives and academics should consider thinking about a rigorous approach to e-business models, we introduce a new e-Business Model Ontology. Using the concept of business models can help companies understand, communicate and share, change, measure, simulate and learn more about the different aspects of e-business in their firm. The generic e-Business Model Ontology (a rigorous definition of the e-business issues and their interdependencies in a company's business model), which we outline in this paper is the foundation for the development of various useful tools for e-business management and IS Requirements Engineering. The e-Business Model Ontology is based on an extensive literature review and describes the logic of a "business system" for creating value in the Internet era. It is composed of four main pillars, which are Product Innovation, Infrastructure Management, Customer Relationship and Financial Aspects. These elements are then further decomposed.

### 1. Introduction

After the burst of the .com stock market bubble in 2000/2001 the term "e-business model" might provoke yawning. Wrongly, as we show in this paper. Admittedly, consultants, executives, academics and journalists have abusively used the term and rarely given an explanation of what they really meant by talking about e-business models. This has undermined and discredited the concept. But in our opinion it merits a closer inspection by academics and executives. We think that rigorously defined e-business models can help companies implement their e-business strategies and additionally allow them to assess, measure, change and sometimes even play around with and simulate their business.

In this paper we construct and outline an ontology (rigorous framework) for e-business models based on an extensive literature review. In our opinion the understanding and use of e-business

models is essential in an increasingly dynamic and uncertain business environment for the following reasons:

1. The process of modeling social systems or an ontology – such as an e-business model – helps identifying and *understanding* the relevant elements in a specific domain and the relationships between them (Ushold et al., 1995; Morecroft, 1994).
2. The use of formalized e-business models helps managers easily *communicate and share* their understanding of an e-business among other stakeholders (Fensel, 2001).
3. Mapping and using e-business models as a foundation for discussion facilitates *change*. Business model designers can easily modify certain elements of an existing e-business model (Petrovic et al., 2001).
4. A formalized e-business model can help identifying the relevant *measures* to follow in an e-business, similarly to the Balanced Scorecard Approach (Norton et al., 1992).
5. e-Business models can help managers *simulate* e-businesses *and learn* about them. This is a way of doing risk free experiments, without endangering an organization (Sternman, 2000).

So what really is a business model anyway? As explained by Petrovic, Kittl and Teksten (Petrovic et al., 2001), a business model is not a description of a complex social system itself with all its actors, relations and processes. Instead it describes the logic of a “business system” for creating value, that lies behind the actual processes. Therefore we understand a business model as the conceptual and architectural implementation of a business strategy and as the foundation for the implementation of business processes (figure 1).

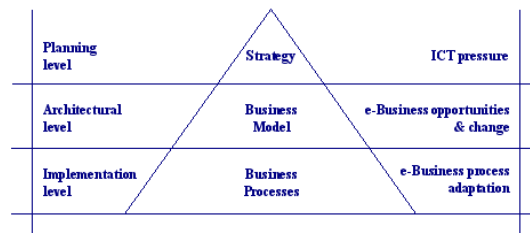


Figure 1: Business Logic Triangle

In the next section of the paper we propose an ebusiness model ontology that highlights the relevant e-business issues and elements firms have to think of, in order to operate successfully in the Internet era. An ontology is nothing else than a rigorously defined framework that provides a shared and common understanding of a domain that can be communicated between people and heterogeneous and widely spread application systems (Fensel, 2001). This formal approach is necessary in order to achieve the business model advantages described above. In our understanding a business model is nothing else than the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams. The e-business model ontology we propose in this section is founded on four main pillars, which are product innovation, customer relationship, infrastructure management and financial aspects. These main elements are then further decomposed.

In the third section we give an overview of related work. As shown by Linder (Linder et al., 2001), most people speak about business models when they really only mean parts of a business model. We think that the existing business model literature essentially attacks one, two or rarely all of the following three elements, which make up a Business model: Revenue and product aspects, business actor and network aspects and finally, marketing specific aspects. This extensive literature review has helped us build the ontology outlined in the second section.

In the last section we show that it makes sense to follow three levels of research issues in e business models in order to achieve the development of a set of tools for management or IS Requirements Engineering. First, the ontology level to define the relevant concepts for e-business models and the relationships among them. Second, the identification of the essential measures to evaluate e-business models. And finally, the dynamic equations level, which allows simulation in order to learn about and understand the consequences of change in e-business models. Further, we outline a range of research projects that can be placed in one of the three mentioned categories.

## 2. The e-Business Model Ontology

The goal of this sections is to define an approach that brings e-business model literature one step further, by providing a more rigorous building-block-like methodology that defines the essential concepts in e-business models and shows the relationships between them. Our e-business model ontology has in some ways been inspired by the different enterprise ontology projects described in academic literature (Toronto Virtual Enterprise, Enterprise Ontology, Core Enterprise Ontology) (Bertolazzi et al., 2001). An ontology essentially gives a common understanding of a specific domain by defining its elements and the relationships between these elements. We think this rigorous and formalized business model approach is necessary in order to achieve the five main advantages described above (see first section).

As explained above, our e-business model ontology is founded on four main pillars (figure 2). (1) The **products and services** a firm offers, representing a substantial value to the customer, and for which he is willing to pay. (2) The **infrastructure and the network of partners** that are necessary in order to create value and to maintain a good customer relationship. (3) The **relationship capital** the firm creates and maintains with the customer, in order to satisfy him and to generate sustainable revenues. And last, but not least, (4) **the financial aspects**, which are transversal and can be found throughout the three former components, such as cost and revenue structures.

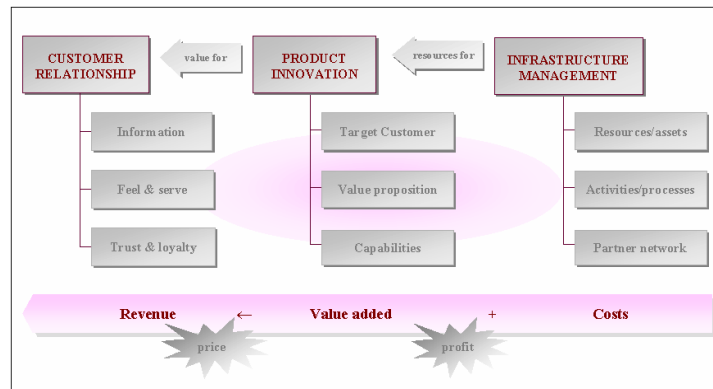


Figure 2: e-business model framework

### Product Innovation

This first pillar of the framework covers all product-related aspects. The main elements are the **value proposition** a firm wants to offer to specific **target customer segments** and the **capabilities** a firm has to be able to assure in order to deliver this value. We illustrate this with the example of LeShop.ch, a Swiss Online retailer that sells groceries to private customers (figure 3).

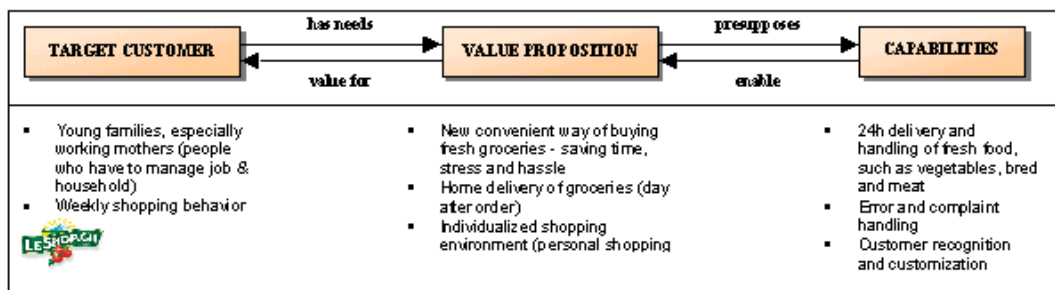


Figure 3: Product Innovation

**Value proposition.** This element refers to the value the firm offers to a specific target customer segment. ICT has created many new opportunities for value creation on the one hand and more efficient value creation on the other hand. We believe this opens up three trajectories of differentiation from competitors. The first one is (a) innovation through new, complementary or

customized offerings. ICT allows firms to include strong and new information components into their offerings or in some cases even completely digitize their products. Through mass customization (Piller et al., 2000) for example, firms can propose value tailored to the profile of every single customer. The shoe company Customatix<sup>1</sup>, to mention one example, lets their customers design their own personal footwear. The second trajectory of differentiation is (b) providing a lower price than the competition. Cost savings achieved through optimized infrastructure management or direct selling over the Internet (Benjamin et al., 1995), can be passed on to customers in form of lower price tags. The third trajectory of differentiation is (c) a premium customer service level and customer relationship excellence. ICT allows firms to propose a whole new range of (often free) services that augment the value of the core offering. The company Live Manuals<sup>2</sup> for example, lets firms that sell consumer electronics offer their clients interactive and multimedia product manuals. Other services that can be provided through ICT, include product updates, training or support.

We combine the three trajectories outlined above with the approach of Kambil, Ginsberg and Bloch (Kambil et al., 1997), which further decompose the concept of value proposition into its sub-elements. They identify three main components. First, the cost element, which is decomposed into price, effort and risk. Second, the role of the customer, which can be buyer, user, co-creator or transferer of value. Third, the performance of the value proposition.

**Target customer.** A firm generally creates value for a specific customer segment. The definition of the market scope (Hamel, 2000; Afuah et al., 2001) captures the essence of where the firm does and does not compete – which customers, which geographical areas, and what product segments. A firm can market either to businesses and/or individuals, commonly referred to as business-to-business (B2B) and business-to-consumer (B2C). What actually changes compared to classical marketing is the notion of distance and the notion of time. Through ICT firms expand their reach because geographical notions become less relevant and because Website or open 24/7. This is as much of an opportunity as also a threat because barriers to market entry are lower and competition increases (Porter, 2001).

**Capabilities.** To deliver the value proposition to different customers, a firm must ensure that it possesses the range of capabilities that underpin the proposed value. Several authors describe how value and competencies or capabilities are interconnected (Bagchi et al., 2000; Wallin, 2000). Capabilities can be understood as repeatable patterns of action in the use of assets to create, produce, and/or offer products and services to a market (Wallin, 2000). For example, a retailer that sells perishable food over the Internet has to be able to assure rapid home delivery, a computer chip designer has to be able to constantly innovate and a news-site has to be able to offer up-to-date information.

The value proposition of LeShop.ch is to offer people (especially women) who have to manage job, family and household a convenient way of buying fresh food. On their website LeShop.ch offers every client a personalized shopping environment with personal account and shopping lists. In order to offer this value proposition the company has to assure certain capabilities, such as rapid delivery of fresh groceries like vegetables or bread, but also frozen food.

## Infrastructure Management

This second pillar of the framework, the infrastructure management element, describes the value system configuration (Gordijn et al., 2000) that is necessary to deliver the value proposition. This comprises the **activity configuration** of the firm, in other words the activities to create and deliver value, and, the relationship between them, the in-house **resources and assets** and the firm's **partner network**. We illustrate this with ColorMailer, a Swiss business in the photography industry (Bauer & al., 2001).

<sup>1</sup> <http://www.customatix.com> [Accessed on December 10<sup>th</sup>, 2001]

<sup>2</sup> <http://www.livemanuals.com> [Accessed on December 10<sup>th</sup>, 2001]

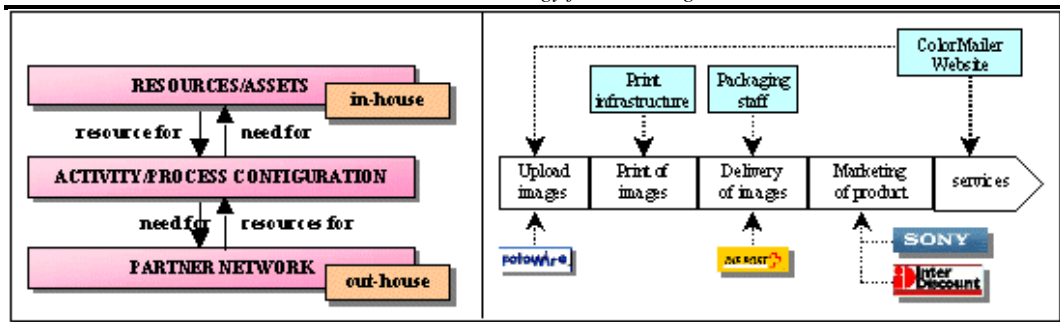


Figure 4: Infrastructure Management

**Activity configuration.** The main purpose of a company is the creation of value that customers are willing to pay for. This value is the outcome of a configuration of inside and outside activities and processes. To define the value creation process in a business model, we use the *value chain framework* (Porter et al., 1985) and its extension, such as defined by Stabell and Fjeldstad (Stabell et al., 1998). They extend the idea of the value chain with the *value shop* and the *value network*. Former describes the value creation process of service providers, whereas latter describes brokering and intermediary activities. It is in this component of the e-business framework that we will find such activities as Supply Chain Management (SCM), Efficient Customer Response (ECR), or e-procurement.

**Partner network.** The partner network outlines, which elements of the activity configuration are distributed among the partners of the firm. Management literature defines these strategic networks as “stable interorganizational ties which are strategically important to participating firms. They may take the form of strategic alliances, joint-ventures, long-term buyer-supplier partnerships, and other ties” (Gulati et al., 2000). Especially the shrinking transaction costs make it easier for firms to vertically disintegrate and to reorganize in partner networks. Firms can then focus on their core competencies in the value system configuration and rely on partner networks and outsourcing for other non-core competencies and activities. One of the several examples of the impact of ICT on the modification of the activity distribution can be found in the food retailing business. Because of shrinking coordination and transaction costs retailers have introduced the so-called Vendor Managed Inventory (VMI). In this concept buyers completely transfer supply management to suppliers, which directly control the stock of the buyer and refurnish automatically, when necessary. Among other advantages, this substantially reduces inventory costs. In e-business literature there are several terms arising for these new forms of strategic networks in the value creation process, some call them b-webs (Tapscott et al., 2000), or fluid and flexible organizations (Selz, 1999), others call them value networks (Brandenburger et al., 1996).

**Resources and assets.** In order to create value, a firm needs resources (Wernefelt, 1984). Grant (Grant, 1995) distinguishes tangible, intangible, and human assets. Tangible resources include plants, equipment and cash reserves. Intangible resources include patents, copyrights, reputation, brands and trade secrets. Human resources are the people a firm needs in order to create value with tangible and intangible resources.

ColorMailer (figure 4) prints digital images of private customers on various physical items, such as T-shirts, gifts and photo-paper, which are then directly delivered to their homes. The value configuration is roughly divided into image upload, print, delivery, marketing and after-sales services. These activities are fulfilled through owned in-house resources and out-house partners, like the Swiss postal service, Sony Europe and the electronics retailer InterDiscount.

## Customer Relationship

Through the use of ICT firms can redefine the notion of customer relationship. First, they can get a feel for and understand the customer by outlining an *information strategy*. Second, firms can exploit new ways to deliver value and expand reach by covering new and multiple *channels*. Third, companies must understand that *trust and loyalty* has become one of the most important

elements in a business world that is increasingly virtual and has less face-to-face contact. We illustrate this in figure 5 through the bricks & mortar bookseller Barnes & Noble.

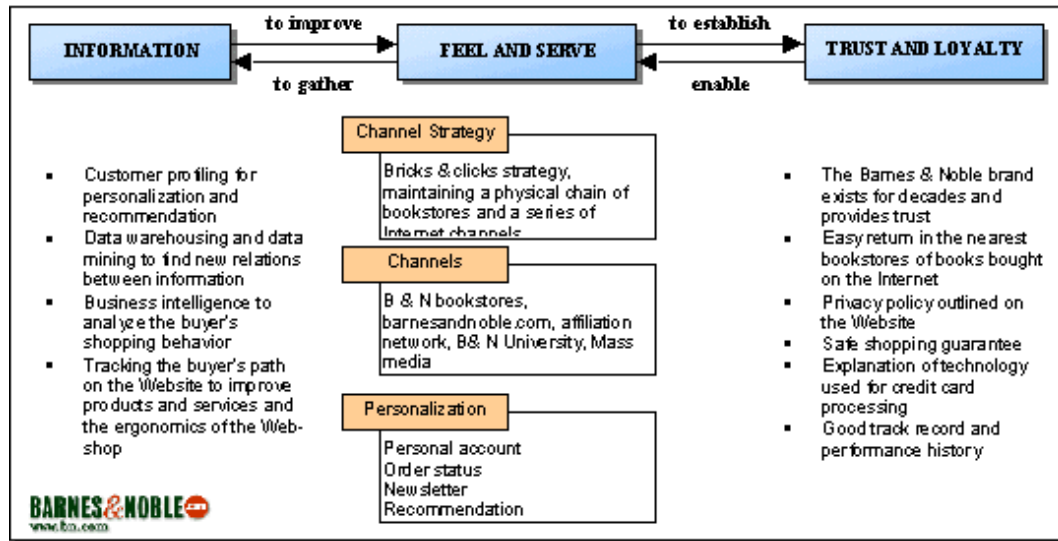


Figure 5: Customer Relationship

**Information strategy.** The objective of the information strategy is threefold. First, the defining of the strategy of gathering customer information and second the outlines of how to use this information in order to excel in customer relationship (e.g. through personalization and profiling). The third goal refers to the exploitation of customer information in order to discover new and profitable business opportunities and to ameliorate customer satisfaction. Data warehousing, data mining and business intelligence are important technologies that allow managers to gain insight on their customers buying behavior. These insights can be used to create what Hamel (Hamel, 2000) calls the positive feedback effect. A firm with a large base of users, and a way of rapidly extracting feedback and information from those users, may be able to improve its products and services faster than its competitors. In this virtuous circle products and innovation can be improved, which in return attracts new customers. Information strategy should contribute to a personalized relationship with the firm's customer. Customer profiles allow rule-based one-to-one personalization or collaborative filtering, which give the customer the feeling of having been taken seriously as an individual.

**Feel & Serve (distribution channels).** This element refers to the way a firm "goes to market" and how it actually "reaches" its customers (Hamel, 2000). This means a company must define its channel strategy and outline through which channels - either indirect or direct channels, operated by the firm or provided by a third party (e.g. agent, intermediary) - it wants to deliver the company's value proposition. The purpose of a channel strategy is to make the right quantities of the right product or service available at the right place, at the right time to the right people. (Pitt, 1999). ICT, and particularly the Internet, has a great potential to complement rather than to cannibalize a business's channels (Porter, 2001). Direct selling over the Web could improve margins, whereas selling through new Internet mediation services (cybermediaries) (Sarkar et al., 1995) could mean new market opportunities. Of course the expansion of the range of channels also increases the potential of conflicts between channels (Anderson et al., 1998) and demands strong management. Because ICT can fundamentally change the way firms interact with customers, we think it is important to closely analyze and understand channel interaction. To do this we use a grid (following Dolan, 2000) that draws the channel functions of the customer buying cycle (CBC) on the one axes and the range of channels on the other axes. We illustrate this in a simplified example of the bookseller Barnes and Nobles (figure 6) who has a wide range of virtual and physical channels. On the x-axis of the grid we draw the channel phases of the CBC, which are Awareness, Evaluation, Transaction and After Sales and on the y-axis we provide a list of the different channels of Barnes and Nobles. Finally it is also important to mention that ICT opens up new opportunities to personalize and individualize the different phases in the CBC, which will deeply influence the customer's experience in doing business with the firm.

CHANNEL	Awareness	Evaluation	Purchase	After sales
<b>Barnes and Noble Stores (Retail)</b>	Promotion of authors and books	Reading corners, coffee shops, sales people	Cash registry (credit card or cash)	Return of books
<b>Barnesandnoble.com (Website)</b>	banners	Search function, customer review, critics, excerpt	Virtual shopping cart & checkout (credit card)	Order status, transaction history, return
<b>Affiliation Network (Internet)</b>	Specialized affiliate Websites	Expert commentaries, recommendations		
<b>Barnes and Noble University (Website)</b>	Free online courses	Courses based on books of Barnes & Nobles		
<b>TV, Print, Movies (Mass media)</b>	Mass advertising			

**Figure 6: Channel grid (following Dolan, 2000)**

**Trust and loyalty.** It is essential to establish trust between business partners when the business environment becomes increasingly virtual and the implicated parties do not necessarily know each other anymore before conducting business. With the emergence of the Internet in business and commerce important research has been conducted on what trust actually is in cyberspace. There exists a certain number of mechanisms to build trust in e-business environments, such as, for example, virtual communities (Hagel et al., 1997), performance history, mediation services or insurance in case of harm, third party verification and authorization, and, a clear and explicit privacy policy (Friedman, 2000; Dimitrakos, 2001).

Customer loyalty can be understood as the outcome of the customer's trust and satisfaction. To establish loyalty and relationship capital (Tapscott et al., 2000) the firm has to create positive relationship dynamics (Hamel, 2000), where emotional (such as e-branding), as well as transactional elements in the interaction between firm and client play an important role. Even though well known, it is often forgotten that in most cases it is much cheaper to incite existing customers to do repeat business than to acquire new customers. In the early days of the Internet many e-businesses have concentrated on acquisition for growth and have neglected customer loyalty.

## Financial Aspect

The financial aspect, the last pillar of our framework is transversal as illustrated in figure 2, because all other pillars influence it. This element is composed of the revenue model of the firm and its cost structure. The formerly mentioned determine the firm's profit model and therefore its ability to survive in competition.

**Revenue model.** This element measures the ability of a firm to translate the value it offers its customers into money and therefore generate incoming revenue streams. A firm's revenue model can be composed of different revenue streams that all have different pricing models. An online media company for example, could sell its content in several different ways. It could collect subscription fees from its private customers and demand fixed prices for content (articles, films, and sound) from its business customers. The media company may also live from advertising and sponsoring that it could sell or auction to business customers. Another revenue stream could be commissions or transaction cuts from other businesses that conducted sales through the media company's Website. The new pricing mechanisms enabled by ICT should be used in order to maximize revenues. Particularly the Internet has had an important impact on pricing and has created a whole new range of pricing mechanisms (Klein et al., 2000). It has become easier to compare prices, which will probably conduct firms to abandon fixed pricing. The German start-up



Guenstiger.de<sup>3</sup> for example, allows customers to compare prices of products in a retail stores with the lowest prices in town by using a mobile phone.

**Cost structure.** This element measures all the costs the firm incurs in order to create, market and deliver value to its customers. It sets a price tag on all the resources, assets, activities and partner network relationships and exchanges that cost the company money. As the firm focuses on its core competencies and activities and relies on partner networks for other non-core competencies and activities there is an important potential for cost savings in the value creation process. The right use of ICT in customer relationship also opens up new opportunities for delivering premium customer services and therefore additional value at reasonable costs.

**Profit model.** This element is simply the outcome of the difference between revenue model and cost structure. Therefore it can be seen as the culminating point and as an expression of the entire e-business model ontology. Whereas Product Innovation and Customer Relationship shall maximize revenue, an effective Infrastructure Management shall minimize costs and therefore optimize the profit model.

### 3. Related Research

In this section we explore the existing business model literature considering three aspects, which are revenue- and product-specific, business actor- and network-specific and marketing-specific. Most authors that have written about business models cover one or two and sometimes all of the three aspects mentioned above. Sometimes their approaches are highly abstract and very rigorous and sometimes they are purely descriptive and of low conceptual contribution. The goal of this literature review is to understand what a business model could be and what elements it should be composed of.

**Revenue/product aspects.** The first three authors we discuss essentially classify business models, but do not give a more detailed description of what elements such a model is composed of. For Rappa (Rappa, 2001) a business model spells-out how a company makes money by specifying where it is positioned in the value chain. His taxonomy consists of nine generic forms of e-business models, which classify companies among the nature of their value proposition or their mode of generating revenues (e.g. advertising, subscription or utility model).

Tapscott, Ticoll and Lowy (Tapscott et al., 2000) provide an other typology of business models that they call b-webs. They identify five generic b-webs, which are called Agoras, Aggregations, Value chains, Alliances and Distribution Networks. These five models are classified according to their degree of value integration (from self-organizing to hierarchical) and their degree of control (low/high) of the value creation process.

**Business actor and network aspects.** The probably best known classification scheme and definition of electronic business models is the one of Timmers (Timmers, 1998). According to him, a business model is an architecture for the product, service and information flows, a description of the various business actors and of their roles, as well as a description of the potential benefits of these actors and finally a description of the sources of revenue. In addition he acknowledges the necessity of providing a marketing strategy, in order to accomplish a business mission. Timmers classifies the eleven generic e-business models he outlines, according to their degree of innovation and their functional integration.

A quite rigorous business model framework - which is very different from the classification approaches mentioned previously - is the one provided by Gordijn and Akkermans (Gordijn et al., 2001). Their methodology is based on a generic value-oriented ontology specifying what's in an e-business model. This approach allows the representation and understanding of value flows between the several actors of an ebusiness model. The main elements are value-oriented and actor-oriented.

Another framework for business models that is value-centered and takes in account the creation of value through several actors is given by Afuah and Tucci (Afuah et al., 2001). In this methodology

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<sup>3</sup> <http://www.guenstiger.de> [Accessed on December 10<sup>th</sup>, 2001]



one can find a list of business model components, from scope over pricing and revenue source to connected activities and capabilities. But it is less clear how the value is delivered to the customer; i.e. classical marketing problems such as channel design or conflict are not in the center of this approach.

A highly network-centered framework is given by Amit and Zott (Amit et al., 2001). They describe a business model as the architectural configuration of the components of transactions designed to exploit business opportunities. Their framework depicts the ways in which transactions are enabled by a network of firms, suppliers, complementors and customers.

#### **Marketing specific aspects**

A very interesting business model methodology has been developed by Hamel (Hamel, 2000). For him a business model is simply a business concept that has been put into practice. He identifies four main business model components that range from core strategy, strategic resources over value network to customer interface. These components are related to each other and are decomposed into different sub-elements. The main contribution of this methodology is a view of the overall picture of a firm.

The business model framework by Petrovic, Kittl and Teksten (Petrovic et al., 2001) suggest that a business model can be divided into seven sub-models, which are the Value Model, the Resource Model, the Production Model, the Customer Relations Model, the Revenue Model, the Capital Model and the Market Model. These sub-models and their interrelation shall describe the logic of a business system for creating value that lies behind the actual processes.

Weill and Vitale (Weill et al., 2001) give a systematic and practical analysis of eight so called atomic e-business models. Every one of these models is analyzed according to its strategic objectives and value proposition, its sources of revenue, its critical success factors and its core competencies. In addition the authors also outline the different model's channels, customer segments and IT-Infrastructure. Firms can combine atomic e-business models to create an e-business initiative.

A very interesting and rich framework is described by Rayport and Jaworski (Rayport et al., 2001). They divide an e-business model in four main pillars, which are the value cluster, the marketspace offering, the resource system and the financial model.

## **4. Research in Progress**

In this section we explain why it is interesting to split e-business model research in to three research levels, which are (1) the ontology level, (2) the measures level and (3) the dynamic equation level (figure 7). We pursue research projects among all three of these levels. Besides the e-Business Model Ontology provided in this paper, our goal is to develop a set of managerial tools (prototypes) that allow business people to react to an increasingly dynamic business environment.

		<b>Management function</b>	<b>IS application</b>
<b>Level 3</b>	<b>e-Business Model Equations</b>	Simulate models, play and learn by changing models, understand consequences of change	e-Business Model Simulator, e-Business Model Games
<b>Level 2</b>	<b>e-Business Model</b>	Pilote, follow, alert	e-Business Model Balanced Scorecard
<b>Level 1</b>	<b>e-Business Model Ontology</b>	Understanding model elements and relationships, communicate and share models, change models	e-Business Model Framework (eBMF), Language (eBML), Handbook (eBMH) and Design Tool

**Figure 7: Research in Progress**

**Ontology Level.** This first level of research is the foundation for the upper two levels and represents the core of our e-business model research. By defining the relevant e-business model

concepts and their relationships on the ontology level, one can better understand e-business models. A highly rigorous and formal ontological approach enables firms to share and communicate models among actors in different formats for different situations. For example business plans for financing and deciding, or visual charts for communicating and rapid understanding.

On this first level of research we are developing the ontology, an e-Business Model Language (eBML), Handbook (eBMH) and Design Tool (figure 7). eBML allows the formalization of e-business models with an XML-based markup language (Ben Lagha et al., 2001). This makes it possible to compare different business models and to generate different views of the model in function of different needs (such as descriptions, graphical representations, business plans, reports for financing, reports for eventual partners, acquisitions or mergers, etc.). eBMH is inspired by the process handbook of the MIT (Malone et al., 1998) and consists of a Web interface that shall allow users to navigate in the concepts of the e-business model ontology and understand them. It should also become a repository for numerous e-business case studies. The so-called e-business model design tool, shall help business model designers rapidly design, adapt, assess and critic e-business models. This tool essentially refers to the metaphor of the drawing table, where an architect assembles the different elements of a building.

**Measures Level.** Once defined, the ontology will help identify the relevant indicators to follow in an e-business model. This project is inspired by the balanced scorecard approach (Norton et al., 1992), which follows financial, customer, learning and growth and internal business process indicators. These are quite similar to the four main pillars of our ontology. In e-business it is not yet clear, which indicators are relevant. Literature in the domain is only beginning to give suggestions for e-business metrics (Working Council for CIOs, 1999).

**Dynamic Equation Level.** The third level of research, which is the system dynamics level, can be attacked when the ontology is defined and the indicators identified. With the help of equations that calculate the influences of the several elements of an e-business model on each other a model could be simulated and better understood. By using simulation for learning, managers can do risk free experiments, without endangering their organization. The concept of management and strategic simulation focuses on learning, rather than wanting to predict the future.

The goal of this third level of research - and at the same time long term vision - is a sort of e-business model flight simulator. Managers would gain important insights on their actions and would learn about their e-business models by playing around with them in a risk-free environment. Further, the use of system dynamics could help companies prepare scenario planning (Van der Heijden, 1996) in order to prepare managers for an uncertain e-business future.

## 4. Conclusion

There are several reasons why academic research should be done in the area of business models and e-business models. First of all, even though many people talk about them, rare are the business model concepts and nonexistent a common understanding of what is meant by a business models. Executives, reporters and analysts who use the term don't have a clear idea of what it means. They use it to describe everything from how a company earns revenue to how it structures its organization [Linder, 2001].

The second reason why the e-business model idea is interesting to study, is because it can be an adequate methodology and foundation for managerial tools and IS Requirements Engineering to react to the increasingly dynamic business environment. As product life cycles become shorter, competition global and the use of ICT an imperative, managers have to find new ways to maneuver and decide in this complex environment. Managers have to understand the new opportunities offered by ICT, integrate them into their existing business models and share them with other stakeholders. The e-business model ontology we propose in this paper and the tools that build on it are a first step to facilitate management under uncertainty.

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