Modeling e-Business with eBML

Sarra BEN LAGHA

Maître-assistant
Ecole des HEC, Université de Lausanne
1015 Lausanne
+ 41 (021) 692.34.14
Sarra.Benlagha@hec.unil.ch

Alexander OSTERWALDER

Chercheur
Ecole des HEC, Université de Lausanne
1015 Lausanne
+ 41 (021) 692.34.20
Alexander.Osterwalder@hec.unil.ch

Yves PIGNEUR

Professeur
Ecole des HEC, Université de Lausanne
1015 Lausanne
+ 41 (021) 692.34.16
Yves.Pigneur@hec.unil.ch

❒ Abstract

In this paper we demonstrate that modeling e-business strategies is important in a time where the first e-business disillusionment has taken place. The objective of this Paper is twofold. First we propose a theoretical e-business model framework (eBMF) for aligning e-business initiatives and projects. This framework represents an ontology, which will allow firms to develop a sound e-business model, in an environment that is amongst other things characterized by new forms of network organizations. Second we show why the eXtensible Markup Language (XML) is an adequate technology for describing this theoretical framework in a formal way.

Key-words:
e-business, business model, value creation, network organization, eBML

1. Introduction

The field of e-business is not yet fully understood. After an initial phase of euphoria and the following disillusionment it is time to try to understand what exactly has changed in business and how this new environment functions. In this paper we provide an e-business model framework (eBMF) which helps firms identify business opportunities and align their Internet initiatives and projects, which are often poorly coordinated. This is all the more significant when dealing with networked enterprises, which are characteristic of the new business environment. E-business modeling has similar goals to enterprise modeling in general. Modeling helps firms develop business visions and strategies, redesign business operations, share knowledge about the business and its vision and ensure the acceptance of business decisions through committing stakeholders to the decisions made (Persson & al., 2001)

In the first section, we propose an e-business model ontology (the eBMF) 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 a 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, 2000). Therefore the eBMF will allow firms to express their e-business architecture from a comprehensible business point of view and not only from a technological point of view, as is still often done. The eBMF is composed of four core elements that express the main business issues. These are customer relationship, product innovation, infrastructure management and financial aspects.

The second section illustrates the eBMF with an example of a Swiss company. This illustration also shows that new forms of network organizations emerge with the rise of Information and Communication Technologies (ICT).

The last section presents the second innovation of this paper, which is the e-business modeling language (eBML). eBML is an eXtensible Markup Language (XML) for encoding the eBMF principles in a formal and re-usable way.

2. Business models in the Internet era

Several authors show that with the success of Information and Communication Technologies (ICT) – and particularly the Internet – organizational transformations have taken and are taking place in industries and companies (Tapscott & al., 2000; Timmers, 2000; Martinez, 2000). ICT have enabled a whole new range of business opportunities that yet are to be understood and to be exploited in a profitable kind of way. The advent of the term electronic business model in academic literature[1] seems to be an attempt to classify these opportunities in a structured kind of way (Rappa, 2001; Timmers, 2000; Bagchi & al., 2000). But few authors give the term e-business model a more precise and global content. Even though the literature on e-business models is growing, most of it only partially discusses the subjects of interest. Afuah and Tucci (Afuah & al., 2001) for example, seem to neglect the customer component of a business model. Gordijn, Akkermans and van Vliet (Gordijn & al., 2000) demonstrate the value creation process in a network of partners, but do not describe any of the other necessary components for a complete model from a business point of view. Hamel (Hamel, 2000) however, has quite a complete approach to business models.

[1] The journal *Electronic Markets* from Routledge has devoted a whole number (11 :1) to the subject of e-business models

3. The e-business model framework (eBMF)

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 as well as to new fluid and flexible forms of organization. The firm shall also be able to forecast possible future scenarios and therefore stay competitive in the Internet era. A 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. Our e-business model framework is therefore divided into four principal components (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 ***relationship capital*** the firm creates and maintains with the customer, in order to satisfy him and to generate sustainable revenues. (3) The ***infrastructure and the network of partners*** that are necessary in order to create value and to maintain a good customer relationship. And last, but not least, (4) ***the financial aspects*** that can be found throughout the three former components, such as cost and revenue structures.

3.1 Product innovation

The product component of the e-business model framework describes the ***value proposition*** a firm wants to offer to a specific ***target customer segment***. To deliver this value, the firm has to possess a certain set of in-house and/or outsourced ***capabilities***.

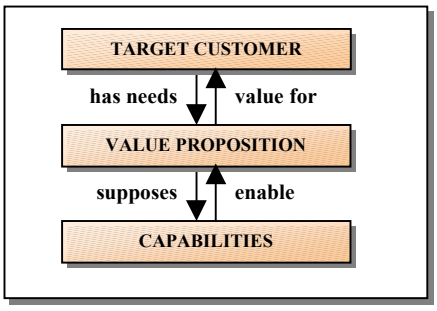

Figure 1: Product innovation

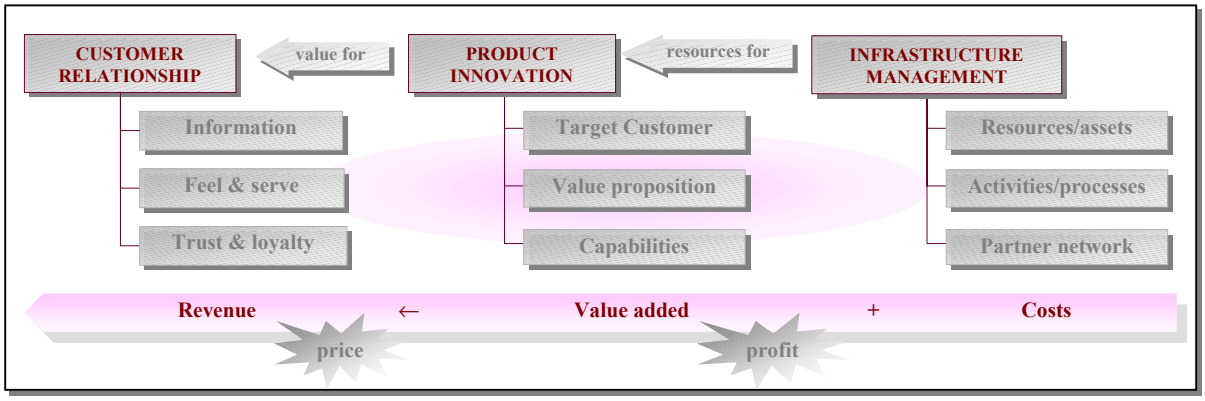

Figure 2 : e-Business Model Framework

Value Proposition. This element refers to the value the firm offers to a specific target customer segment. ICT have had a very important impact on new ways of creating and delivering value, for example through substantial *cost savings* thanks to optimized infrastructure management. Internet technologies for example, have substantially reduced transaction costs inside companies and between business partners. Sometimes firms can even sell directly to their customers through dis-intermediation (Benjamin & al., 1995). The resulting cost savings can then be passed on to customers in form of lower prices. Another important value proposition is *product differentiation* through innovation. This means that a firm offers either entirely new products/services or innovative complementary products/services.

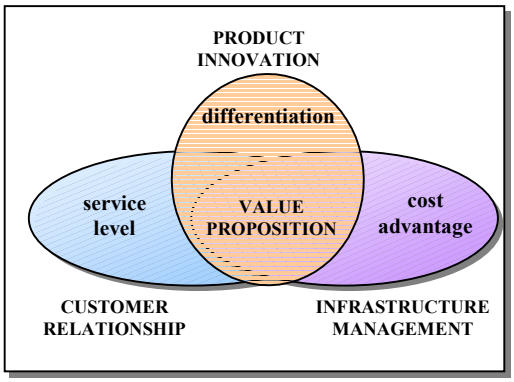

Figure 3: Value Proposition

Online groceries with home delivery such as LeShop[2] are one example of an innovative value proposition based on Internet technology. Customers of these stores can do their shopping from a desktop computer or even mobile device, without suffering the hassles of traditional shopping, such as parking problems and waiting in line. Another source of product differentiation based on ICT is customization. Through mass customization (Piller & al., 2000) and through rule-based one-to-one personalization or collaborative filtering, firms can propose value tailored to the profile of every single customer. The shoe company Customatix[3] for example, lets their customer design their own personal footwear. Another form of value proposition can be the offering of a premium customer service level and customer relationship experience, which accompanies the actual product. ICT allow firms to propose a whole new range of (free) services that augment the value of the sold product. Software firms for example, can make fixes or updates available online, or even offer free web based training that goes with their software. Industrial companies can give customers access to engineers through online discussion forums or even online chats.

Target customer. A firm generally creates value for a specific customer segment. The definition of the market scope (Hamel, 2000; Afuah & 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). With the expansion of reach by the use of ICT, differentiated strategies for different geographical regions become an important issue even for small firms.

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. The online grocer LeShop for example, wants to help working women with families to improve their shopping experience. But to be able to do home delivery of fresh vegetables in a satisfying way, presupposes a certain range of capabilities, such as quality control, 24h delivery in a time frame and online payment services. Whether LeShop wants to perform these tasks in-house and/or in collaboration with other firms is a matter of strategic decision, which is further detailed in the infrastructure component of the e-business model framework.

3.2 Customer Relationship

The importance of the customer relationship is often forgotten in other business model approaches that are mainly focused on products, value creation processes and exchange patterns between different actors. However ICT offer a range of opportunities to create new and exploit existing customer relationships by ***getting a feel for*** the customer's desires, ***serving*** him and developing an enduring relationship with him. In order to improve the customers experience in doing business, the firm has to gather and exploit ***customer information***. This is important because the notion of branding has also evolved from traditional product and company marketing to include relationship capital (Tapscott & al., 2000) which emphasizes the interaction between the firm and the customer.

[2] http://www.leshop.com (Accessed : 25 June 2001)

[3] http://www.customatix.com (Accessed : 25 June 2001)

More then ever before, the focus has to be on a positive customer relationship which will result in customer trust and loyalty.

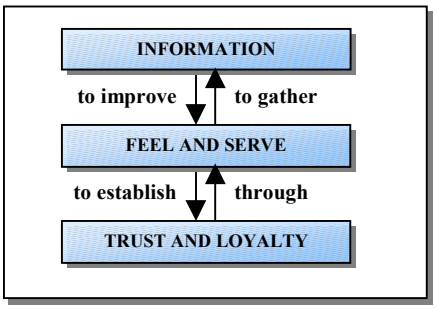

Figure 4: Customer relationship

Information. This element refers to all customer information and knowledge a company can gather and exploit in order to discover new and profitable business opportunities and customer segments and to improve their relationships with their customers. After establishing an *information retrieval strategy*, which consists in the storage of customer transaction history (data warehousing) and customer information collection (customer queries, feedback), a firm can proceed to *customer profiling*. These insights can be used throughout marketing and sales, and especially for customer relationship management (CRM). Hamel (Hamel, 2000) for example calls this 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 product innovation can be improved which, in return, attracts new customers. In addition to product improvement, a better knowledge of its customers allows a firm to establish a personalized relationship tailored to the needs of every single customer. Of course it is important that the firm has a *privacy policy* that it will respect and reveal to its customers.

Feel and serve. Serving the customer includes fulfillment, support and customer relationship management (CRM). A firm must ask itself how it wants to deliver value to its customers and what support and service level it wants to provide. Fulfillment and support refer to the way the firm "goes to market" and how it actually "reaches" customers (Hamel, 2000). A firm must define its *channel strategy* and understand that the Internet has a great potential to complement rather than to cannibalize its business (Porter, 2001). Direct selling for example could improve margins, whereas selling through new Internet mediation services (Sarkar & al., 1995) could mean new market opportunities. After defining channels, the firm has to describe their *transaction cycles* and describe in what way ICT influences them. If a firm chooses to sell directly over the Internet, it can supply its customer with a wide range of basic information on products, prices and availability, or even offer him customized real-time information (i.e., delivery status, product lifecycle management). It is important to mention, that ICT open up new opportunities to customize the different steps in the customer transaction cycle and deeply influence the customers experience in doing business with the firm. Therefore a company should think in what way it could *personalize* its relationship with the customer throughout the transaction cycle.

Trust and loyalty. The element of branding and corporate image has not lost its importance in the era of the Internet, but it has profoundly changed its appearance. Tapscott, Lowi and Ticoll (Tapscott & al., 2000), for example, think that advertising, promotion, publicity, public relations and a lot of other aspects of corporate communications are becoming archaic concepts. Branding shifts towards relationship dynamics (Hamel, 2000) where emotional, as well as transactional elements in the interaction between firm and client, form the image of a company. It's the firm's ability to engage customers, suppliers, and other partners in mutually beneficial value exchanges that determines its relationship capital (Tapscott & al., 2000) and establishes trust and loyalty. Their exists a certain number of mechanisms to build trust in e-business environments, such as, for example, virtual communities (Hagel & 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).

3.3 Infrastructure management

In the product component of the e-business model framework we have described the capabilities which are needed in order to create and deliver the value proposition. The infrastructure component describes the value system configuration (Gordijn & al., 2000) that is necessary to deliver the value proposition; in other words, the relationship between in-house *resources and assets,* the *activity and process configuration* of the business the firm is operating in and the firms *partner network*.

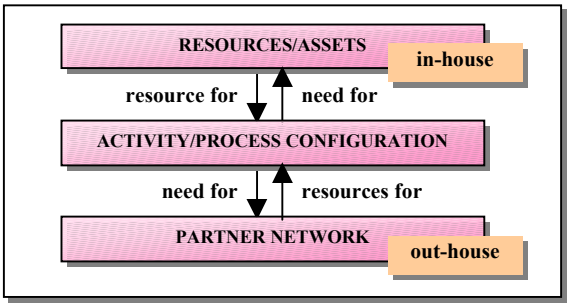

Figure 5: Infrastructure management

Resources and assets. In order to create value, a firm needs resources (Wernefelt, 1994). 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.

Activity and processes configuration. The main purpose of a company is the creation of value that customers are willing to pay for. This value is the result of a configuration of inside and outside activities and processes. To define the value creation process in a business model, we use the extension of the *value chain framework* (Porter, 2001) such as defined by Stabell and Ffeldstad (Stabell & 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), and e-procurement. In the food retailing business for example, ICT have made Vendor Managed Inventory (VMI) possible, where suppliers directly control the stock of a firm and substantially reduce inventory costs.

Partner network. This element of the e-business model framework is closely tied to the value proposition and the value creation process. The partner network details how the value creation process is distributed among the partners of the firm. In the product component it was all about *what* value to deliver and *what* capabilities are necessary. In this element it is about *how* to create value with a network of partners. Management literature defines strategic networks as "stable inter-organizational 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 & al., 2000). Shrinking transaction costs make it easier for firms to vertically disintegrate and to reorganize in partner networks. Firms can focus on their core competencies and activities in the value creation process and rely on partner networks for other non-core competencies and activities. In e-business literature there are several terms arising for these new forms of strategic networks in the value creation process, such as b-webs (Tapscott & al., 2000) and value networks (Brandenburger, 1996).

3.4 Financial aspects

Of course, the financial perspective also belongs to our e-business model framework. But rather than qualifying financial aspects such as the revenue or pricing model of a firm as the unique and most important element of a business model, we consider them as the fourth component and as the consequence of the formerly described. Financial aspects can be understood as *costs* required to get the infrastructure to create value and as *revenues* of sold value. The difference between revenues and costs determines the *profitability* of a company.

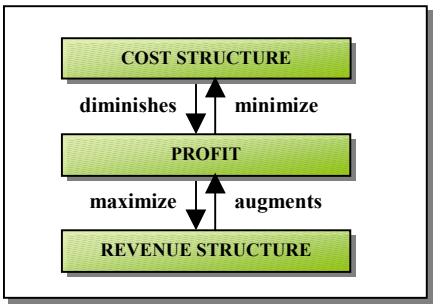

Figure 6: Financial aspects

Revenue structure. This element measures the ability of the firm to translate the value it offers to its customers into money and therefore generate incoming revenue streams. A firms revenue model can be composed of different revenue streams that all have different pricing models. An online media company for example can sell its content in several ways. It can collect subscription fees from its private customers and demand fix prices for content elements (articles, films and audio) from its business customers. The media company may also live from advertising and sponsoring that it can sell or auction to business customers or it may want to take commissions or transaction cuts from people that buy at other businesses through the firms Web site. Firms selling over the Internet should consider an appropriate pricing strategy and pricing mechanism in order to maximize revenues. First they have to be aligned with the nature of the product. For example, an airplane engine price is set differently than the price of an electronic camera. Second, they have to aim at achieving the highest price the customer is willing to pay for the offered value. It is important to mention that ICT have had an important impact on pricing and have created a whole new range of pricing mechanisms (Klein & al., 2000).

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 structure. This element simply measures the ability of a firm to create positive cash flow.

4. Case study: ColorMailer[4]

To illustrate our purpose of e-business modeling, we use a case study of an existing Swiss business in the photography industry named ColorMailer (Bauer & al., 2001). In this example we describe the essential lines of the ColorMailer business model using the eBMF. We particularly detail the "infrastructure management"-component, but neglect the financial aspects. In the following section we will formalize this description with the eBML language.

Under the brand name ColorMailer, the Swiss firm Colorplaza SA[5] offers products and services in the domain of digital imaging for private customers. The firm bets on the increasing number of owners of digital cameras and scanners, which it estimates at 30 million people.

4.1 The "product innovation"-component

Value Proposition. ColorMailer differentiates itself from the classical photography industry by introducing a fully digital imaging value chain. Customers upload their digital images from their computer to the ColorMailer Website over the Internet. Then they decide on what physical material they want their images printed on. They can choose between photographic paper, T-shirts, gifts or other items, which are then directly delivered to their homes. Compared to traditional photography development their are several advantages. First of all, the whole process is accelerated. Second the customers can manipulate (correct) their images before getting them

[4] http://www.colormailer.com/ (Accessed : 25 June 2001),

[5] http://www.colorplaza.com (Accessed : 25 June 2001)

printed. And last, but not least, the customer can get all the work done from his home (or office).

Target Customer. ColorMailer targets all persons, which are in possession of a digital device that produces digital images (digital cameras, scanners, webcams, etc.). They estimate this segment to 5 to 7 percent of the population. The Website is in ten different languages, because ColorMailer targets an international public (essentially European). Therefore prices can be displayed in 15 different currencies.

Capabilities. In order to correctly provide the value proposition explained above, ColorMailer has to assure a number of capabilities. First, customers have to be able to easily upload large bulk of digital image data (40 images represent about 10Mb of data). Second, customers have to be able to choose in what format and on what material they want to get their images printed on. Third, ColorMailer has to assure the product delivery to the customer's address.

4.2 The "customer relationship"-component

Information. ColorMailer plans to collect information on customers, in order to set up customer profiling and "one-to-one marketing".

Feel and serve. The firm relies on three different sales channels, which are direct sales, sales through partners and sales through affiliates. The communication with its direct customers solely takes place over the ColorMailer Website and by e-mail. To upload images, the customer has to proceed to a onetime download of special software. Once installed, images can automatically be uploaded to the Website. As described above, the final product is delivered to the customer's address. For the second sales channel through partners, everything happens the same way, except that ColorMailer works in the background. The customer thinks he is only dealing with the ColorMailer partners. In the third sales channel, customers are deviated from an affiliate Website to the ColorMailer Website, where the sale finally takes place.

Trust and loyalty. Through premium quality and quick delivery the company wants to make its customers loyal. It has also initiated a loyalty program from which regular customers shall benefit. In order to reduce fear of international customers from a barely known brand, ColorMailer has set up country-specific Websites for Switzerland, Germany, the UK and Australia. And by partnering with companies like Sony Europe and Interdiscount, the firm can benefit from other well-known brands.

4.3 The "infrastructure management"-component

ColorMailer can be identified as a production company. It transforms the (virtual) digital images of its customers into physical products. This value creation process of our example firm can be described with the value chain theory by Porter (Porter, 2001). A value chain is characterized by primary and secondary activities. Porter identifies five primary activities, which are *inbound logistics*, *operations*, *outbound logistics*, *marketing* and *services*. In this paper we substitute inbound and outbound logistics with the more up-to-date concept of *supply chain management* (Johnson & al., 2001). Secondary activities are *firm infrastructure*, *human resource management*, *technology development* and *procurement*.

Activity and process configuration. In our example we can easily identify the necessary activities and process in order to do business. ColorMailers *operations* consist of printing the digital information (binary images) onto different physical items. The inputs it needs to do this, mainly the bits and bytes of the digital photos, are uploaded to the firms production infrastructure via a suppliers network (even though the end-customer does not realize he is dealing with a third party). This supplier named FotoWire[6] is specialized in the transmission and handling of digital images. After the print, ColorMailer staff packs the items. The following home delivery to the final customer is done via ordinary postal service. The delivery and the image upload can be considered as part of ColorMailers *supply chain management*. Another important primary activity is marketing and sales which contains two major sales channels. The first one is sales

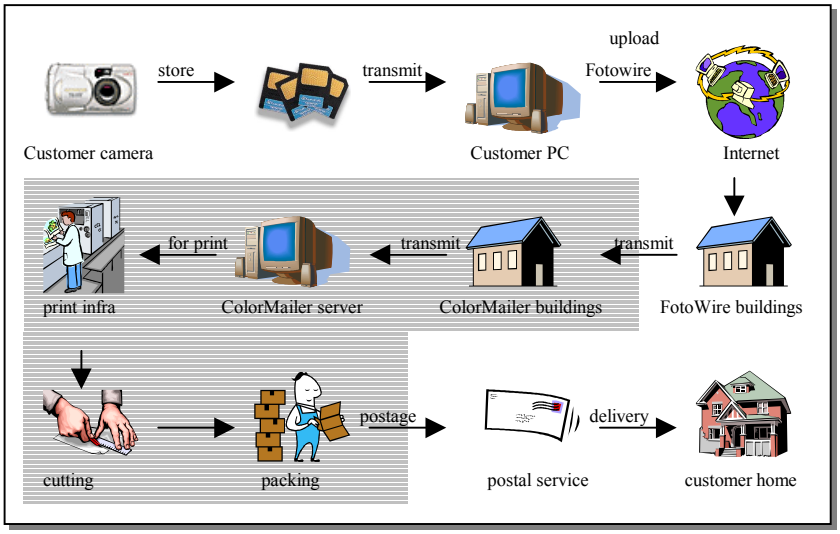

Figure 7 : Infrastructure management ColorMailer

[6] http://www.fotowire.com (Accessed : 25 June 2001)

over the ColorMailer-Website and the second one is sales through partner Websites, such as Sony Europe[7] and Interdiscount[8]. In this second case the end customer does not realize that he deals with ColorMailer, because the sales run under the partners brand name. An important secondary activity that must be mentioned, is the *technology development* and maintenance of the software, which allows customers to upload their images. FotoWire takes care of this process.

Resources and assets. ColorMailer disposes of different in-house resources and assets. These consist of *an Agfa Print Infrastructure* and *15 people*, who all work in an *office* in Vevey, Switzerland. The firm maintains its own *Web servers*, which host the Website and the downloadable transmission software. As mentioned above, the image transmission takes place on the FotoWire Network.

Partner Network. ColorMailer does not own the whole value chain, but relies on a network of partners and suppliers in order to do business in a profitable manner. For example, for image transmission, the firm uses the specialized *FotoWire Network,* which it shares with other companies. It would be too expensive and too complex for ColorMailer to develop and maintain an image transmission network on its own. For home delivery of its products, the firm relies on the *Swiss postal service*. For Sales it cooperates with its two main partners, *Sony Europe* and *Interdiscount*.

5. Encoding the eBMF with XML

5.1 Why XML ?

In the last few years, the eXtensible Markup Language (XML) (W3C, 2000) has rapidly become the first choice for defining document and data interchange formats. Many existing technologies are being re-engineered to take advantage of XML's qualities such as interoperability and reusability (Dumbill 2001). A multitude of XML consortiums and projects (xCBL[9], cXML[10], etc.) intend to rewrite the concepts of the aging Electronic Data Interchange (EDI) with XML syntax for business applications on the Internet (Haifei, 2000). One of the most important projects is the joint initiative of Organizations for the Advancement of Structured Information Standards (OASIS) and the UN's Center for Trade Facilitation and Electronic Business (UN/CEFACT). It focuses on enabling transactions across industries and businesses, particularly smaller companies, generally left out of EDI in the past (Kotok 2001).

But XML is not limited to transaction purposes and can serve a wide range of other goals. It is a metalanguage, which means that it is a standardizing format for describing structured information. XML provides a means of including metadata in documents. This makes it ideal for our purpose of describing the eBMF in a formalized manner.

So eBML does not represent a structure for the exchange of messages or documents, but focuses on e-business modeling. Rather than concentrating on e-business processes, like for example ebXML[11], eBML is situated at a higher level of abstraction, the one of the e-business model (BM) of a firm. eBML will help us encode a BM of any given company. A BM expressed in eBML is an XML document that respects the constraints and the rules imposed by the e-business modeling framework eBML.

This formal representation and the multitude of existing tools to manipulate XML documents have a number of advantages. It becomes easy to verify the validity of a BM to the eBMF. Different BMs can be compared or can be evaluated to one another. Generating different views (such as specific documents) in function of different needs (such as descriptions, graphical representations, business plans, reports for financing, reports for eventual partners, acquisitions or mergers, etc.) becomes possible. The maintenance and the exchange of BMs in heterogeneous IT environments and the construction and development of an ontology for e-business modeling expressed by an XML vocabulary becomes easy.

5.2 The E-business modelling language (eBML)

The language eBML is an XML Document Type Definition (DTD) or an XML schema. It is composed of a number of concepts (called elements) that represent the vocabulary of a model and the relationships between the elements (principally hierarchical). Together they represent the construction rules of a model. The elementary elements are found on the lowest hierarchical level and contain a textual description of the concepts they represent. The content of each element is delimitated by an opening tag in the form of <element> and a closing tag in the form of </element>.

In this section we express the formerly illustrated ColorMailer example in eBML and focus on the *infrastructure management* component. This will give us an XML document, which contains a detailed description of the value creation configuration of the firm, and how it is distributed among its partners and suppliers. The overall structure of the formalized eBMF is as follows. Each tag is the top level of a subtree of tags (subelements). We illustrate the following with snippets of XML.

An eBML document always starts with the tag of the root element <eBusinessModel> and ends with the tag </eBusinessModel>. The subtree contains the four main components of the eBMF which become the elements <ProductInnovation>, <CustomerRelationship>, <InfrastructureManagement> and <FinancialAspects>. These elements will contain their respective subtrees defined in the DTD of eBML.

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[7] http://registration.sonystyle-europe.com/Printservice/index.asp (Accessed : 25 June 2001)

[8] http://www.interdiscount.ch (Accessed : 25 June 2001)

[9] www.xcbl.org (Accessed : 25 June 2001)

[10] www.cxml.org (Accessed : 25 June 2001)

[11] ebXML enables a global electronic marketplace where enterprises of any size and in any geographical location can meet and conduct business with each other through the exchange of XML-based messages www.ebxml.org (Accessed : 25 June 2001)

```
<eBusinessModel>
    <ProductInnovation>
    …
    </ProductInnovation>
    <CustomerRelationship>
    …
    </CustomerRelationship>
    <InfrastructureManagement>
    …
    </InfrastructureManagement>
    <FinancialAspects>
    …
    </FinancialAspects>
</eBusinessModel>
```

Figure 8: Main elements of eBML

In this paper we detail the subtree of the <Infrastructure-Management> element, which contains the subelements <ResourcesAndAssets>, <ActivityAndProcessConfiguration> and <PartnerNetwork>. The first one of these three subelements is a sort of container that will describe all in-house resources and assets[12] the firm has decided to posses. These resources will allow the firm to fulfill a part of the activities and processes described in the <ActivityAndProcessConfiguration> element. This second subelement contains all general activities and processes necessary, in order to operate business and to provide value to the customer. The third subelement contains all partners and suppliers that represent out-house resources of the firm. The partners and suppliers fulfill all activities and processes that are not taken care of by the firm.

```
<InfrastructureManagement>
    <ResourcesAndAssets>
        …
    </ResourcesAndAssets>
    <ActivityAndProcessConfiguration>
        …
    </ActivityAndProcessConfiguration>
    <PartnerNetwork>
        …
    </PartnerNetwork>
</InfrastructureManagement>
```

Figure 9: Infrastructure management element

Concretely, an eBML document will contain the name and description of every in-house resource between the <ResourceAndAssets> tag. In the example we illustrate this by the ColorMailer print infrastructure.

```
<InfrastructureManagement>
    <ResourcesAndAssets>
        <Resource number="004" type="tangible">
            <ResourceName>
            Agfa Print Infrastructure
            </ResourceName>
            <ResourceDescription>
            ColorMailer disposes of a modern printing
            infrastructure from Agfa. With this equip-
            ment digital images can be printed onto
            photographic paper, T-shirts and other
            items.
            </ResourceDescription>
        </Resource>
        …
    </ResourcesAndAssets>
```

The ColorMailer activity consists in printing digital images, which is essentially a production activity. This can be generalized with the value chain concept explained in section 3.3. The <ValueChainActivity> tag will contain the activities necessary to operate business.

```
<ActivityAndProcessConfiguration>
    <ValueChainActivity>
        <ActivityName>
            Printing images on physical material
        </ActivityName>
        <ValueChainActivityDescription
        type="operations">
            This activity consists of printing the virtual
            digital images on different physical materials,
            such as photographic paper, T-shirts and
            mouse pads.
        </ValueChainActivityDescription>
        <UsesResource>004</UsesResource>
    </ValueChainActivity>
    <ValueChainActivity>
        <ActivityName>
            Digital Image Upload
        </ActivityName>
        <ValueChainActivityDescription type="Supply
        Chain Management">
            In order to print the digital images on physi-
            cal items, this binary information must be
            transmitted to the production facilities over a
            network. Digital image transmission is a
            complex problem because of the large file
            size of the images.
        </ValueChainActivityDescription>
            <UsesPartnerResource>001
            </UsesPartnerResource >
    </ValueChainActivity>
</ActivityAndProcessConfiguration>
```

The partner and supplier resources of the ColorMailer BM are between the <PartnerNetwork> tags. As an illustration we have used one partner or the firm, which is FotoWire.

```
<PartnerNetwork>
    <Partner number="001">
        <PartnerName>FotoWire</PartnerName>
        <Role>
            <RoleName>
                Digital Image Transmission
            </RoleName>
            <Outsourcing>
                The image transmission network of Fo-
                toWire is shared with other similar com-
                panies
            </Outsourcing>
        </Role>
        <Role>
            <RoleName>
                Transmission Software
            </RoleName>
```

[12] see 3.3 Infrastructure Management

```
            <Outsourcing>
                FotoWire regularly updates and maintains
                the digital image upload and transmission
                software in order to stay state of the art.
            </Outsourcing>
        </Role>
    </Partner>
</PartnerNetwork>
```

6. Conclusion

The major innovation and contribution of this paper is the e-business model framework (eBMF) and the e-business modeling language (eBML). eBMF aims to help managers design new business models by using the suggested framework and by asking the right questions, such as, what exactly is my value proposition ? How do I get a good feel of the needs of my customer? How can I deliver the intended added value to the market? What would be the required and most appropriate resources, assets, partners and suppliers?

The eBML language shall help to encode new and existing e-business models (eBM) in order to assess, share, compare and exploit these models. An eBM encoded with eBML possesses all the advantages that an ordinary XML document has. It can easily be transformed into several different formats and documents (business plans, graphical representations, reports for financing, documents for knowledge sharing, etc.) in function of different needs (mergers & acquisitions, redesigning business models, planning e-business processes, ensuring acceptance by stakeholders, etc.). However, the formalization of the eBMF could also have been done with other modeling tools such as, for example, the Unified Modeling Language UML.

Further research in progress, based on this paper, is a field study for observing, analyzing, and cataloguing typical eBMs within a knowledge base. By encoding this base with eBML and integrating it into a decision support system it can help business model creators to design, critique, and simulate new business models.

Research also aims to transform eBML documents into their corresponding ebXML documents, which could represent the business process level of an eBM.

Another field of interest is System Dynamics. Simulation based on eBMs encoded with eBML could help answering the following questions, proposed by Warren (Warren, 1999): Why has the historical performance of my business followed the time-path that it was? Where will the path of future performance take us if we carry on as we are? How can we alter that future for the better?

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