Using Conceptual Modeling and Value Analysis to Identify Sustainable m>Business Models in Industrial Services

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Abstract

The industrial products and service industry is a product oriented industry, where traditional business models based on value chain optimization have been refined over many years. However, in order to increase business value, innovative industrial product companies are increasingly looking for new m-Business services related to their core business. With the emergence of such virtual markets (services, information, knowledge, life-style support, security) we need a new paradigm for understanding and predicting business performance. The concept "value constellation" replaces the value chain.

A m-Business model is not sustainable if it lacks a sound economic value proposition to the end-user. In order to analyze and validate value creation in m-Business systems we suggest using a conceptual modeling methodology with proper value ontology. We will demonstrate how such a methodology will allow us to de-compose value offerings with the aim of identifying new stakeholders and new value constellations.

1. A complex environment

Business models in traditional industrial product companies are well understood and have been refined over literally hundreds of years. In the last couple of decades, industrial product companies have added numerous new business models to their business systems, such as supply chain management, service management and service level management, etc. These business models often introduce additional benefits into the value creation calculations, such as customer loyalty and customer retention, which are, at times arbitrarily, quantified and used in standard methods for justifying investments, such as discounted cash flows.

Common for most of these models is the increased complexity and hence the risk of loosing the metrics for value computation. Further, the models tend to be relatively static. With the introduction of new e-Business and, in particular, m-Business concepts, we aim at defining new business models to model the flow of products, services, and information between dynamically emerging constellations of stakeholders and to identify and explain how value is created and exchanged between actors.

One key word in value constellation is value co-production. Within this framework, it is not companies that compete with each other, but different offerings in terms of combinations of products and services. Value occurs not in a sequential way but in complex constellations of different actors.

1.2. Product companies and services

Producers of industrial products are increasingly facing the need for networking their own and complementary products in order to provide higher value-added solutions for their customers. Given the enormous amount of heterogeneous devices, sensors and actuators already existing in the market, the diversity of the manufactures, and the different clock speed of the technologies, there is a very large potential for innovative m-Business solutions that can add to and exploit the intelligence already embedded in the products. The challenge is to be able to design innovative m-Business solutions that offer real value propositions to the users and that are rooted in sustainable business models.

An important reason for the frequent failure of such ideas is the lack of a sound value proposition to the

users. The solutions are predominantly derived from "technology hype" rather than from real customer needs.

Moreover, some m-Business ideas do not contribute to the firms' profitability but are focused on other business goals such as maximizing market shares or establishing customer loyalty and hence are allowed to sustain despite poor economic performance. In m-Business solutions involving several stakeholders the lack of full understanding of the value creation process often leads to imbalanced revenue streams and unevenly distributed profits across the value system. It follows from basic human character that a business can only be sustainable if its transactions create lasting values to all stakeholders.

1.2. The eu-DOMAIN project

The focus of the work presented here is on m-Business applications in the industrial sector but it can easily be extended to other m-Business services. The work has been done as part of the EU project eu-DOMAIN co-funded by the European Commission [1].

The EU project eu-DOMAIN is developing a new European Ambient Intelligence service platform for automatic, context sensitive offering and contracting of mobile services across heterogeneous networks. The eu-DOMAIN service platform will not only connect people and repositories but also buildings, devices and machines in an interoperable way.

A significant part of the project is oriented towards understanding how stakeholders can construct sustainable business cases for a widespread take-up of innovative m-Business services in a traditional industry. This paper will describe the research results obtained in the project. It will discuss a methodology for a value analysis of m-Business concepts and how the methodology has successfully been used to develop innovative m-Business solutions in a product oriented industry.

2. Value and value creation

When identifying the potential for commercial exploitation of m-Business services specific emphasis has to be put on defining, identifying and measuring value creation and linking it to business opportunities. The process of value creation is essential to developing sustainable business models for both manufacturers, Service Providers and customers and we will therefore take a closer look at value, value creation and value constellations.

Michael Porter [2] defined a value chain as a set of activities through which a product or a service is created and delivered to customers. Individual firms create value for their down-stream customers by adding value to the end-user product, service or a combination of both. The term "value chain" implies that the value is created in terms of buying inputs, adding value to it and selling it to the next link of the chain.

Using Rayport and Sviokla's logic [3], it can be argued that the main "goods" that flow through a m-Business organization are information, which propose a "virtual" rather than a physical value chain and that the notion of value chain may not fully capture the value creation opportunities that result from the combination of information, context, physical products, and services, the innovative configurations of transactions, as well as the dynamic integration of resources, capabilities, roles, and relationships among suppliers, partners, and customers.

Normann and Ramírez developed a value creating concept by observing that new technologies are opening up new ways of creating value [4]. They argue that value creation is the process of co-producing offerings (products and services) in a mutually beneficial seller/buyer relationship. In the value constellation relationship, the parties behave in a symbiotic manner leading to activities that generate positive values for them. Value is thus co-produced by actors who interface with each other.

This new logic of value has significant implications for the firm's strategy. According to Normann & Ramírez, strategy is the art of creating value [4]. In a competitive m-Business environment, strategy is no longer a matter of positioning a fixed set of activities along a value chain. The focus of strategic analysis is not the company but the value creating system itself, within which different economic actors – supplier, partners, complementors, and customers – work together to co-produce value. The firms' key strategic task is the reconfiguration of roles and relationships among the constellation of actors in order to mobilize the creation of value in new forms and by new players.

When actors come together to interact in a process of co-producing value, Brandenburg and Nalebuff [5] asserted that business is simultaneously both competition and cooperation. As value is created within these complex constellations, competition is no longer between firms but between offerings, which are, in turn, the result of cooperation between complementors. The offering is the result of a complex set of value creating activities involving different actors working together to produce it for and with the customer.

Finally, Gordijn [6] observed that the adoption of a new service can only be sustainable, when the service is feasible in terms of its value proposition to the customers and when the global profitability is

distributed fairly among all the involved actors. The development of a new m-Business service should thus be decided on the basis of analysis of value creation, distribution and consumption among the stakeholders.

3. Value modeling

Gordijn suggests using a conceptual modeling tool for analyzing value creation. Conceptual modeling comprises the activity of formally defining aspects of the physical and social world for the purpose of understanding and communication [6].

The first key question to be answered in the engineering of a new m-Business offering is the feasibility of the idea in terms of value proposition to the customer and profitability for each of the actors. These questions must be answered for all services, with many different stakeholders and in a short timeframe. Also, stakeholders must have a common, shared understanding of the m-Business idea, before they can engage in a more detailed requirements engineering track.

In the eu-DOMAIN project, we have adopted Gordijn's methodology (termed "e^{3}value") as a suitable conceptual modeling tool having an economic value-aware approach to capture and evaluate value propositions and a sufficient lightweight approach to carry out value analysis in a limited timeframe.

3.1 Lessons learned

Although the e^{3}value methodology is a relatively new approach, it has already been applied successfully to a number of e-Business solutions involving complex value constellations in various domains.

We will in particular point to the following lessons learned:

1. An early application of the e^{3}value methodology was presented by Gordijn in the case of a free Internet Service Provider. Gordijn has also demonstrated how a free on-line newspaper article service can become sustainable by incorporating termination fees derived from Telco's [7].
2. The project BUSMOD successfully used the e^{3}value tool to model the use of Distributed Generators in shifting demand in peak hours and the use of networked business scenarios for small scale hydropower plants [8].
3. Another project, OBELIX, used e^{3}value to develop business models for bundling of electricity services with broadband internet access offered by different providers [9].
4. Finally Osterwalder [10] has investigated how insurgents such as Skype disrupt established markets.

4. m-Business in the industrial sector

Industrial product companies traditionally have expanded their business monolithically from the core manufacturing to various degrees of integrated maintenance concepts. Offerings typically include logistics support for customers, installation and commissioning of products and various degrees of maintenance services.

All of these offerings are closely related to the firms' own products and do not substantially increase the business risks; neither do they add significant value to the business processes over and above keeping the customers happy and maintaining a competitive position in the market.

In order to increase business value, innovative companies are increasingly looking for new services related to their core business. Real value propositions can be developed in the form of asset-preserving offerings such as long term planned, preventive and predictive maintenance and in the form of multi-actor offerings such as remote monitoring and compliance monitoring and documentation.

These services add substantial value to the company's product offerings and represent a reasonable balance between risk and value. Moreover, they are often particularly well-suited for m-Business concepts.

When firms seek to go further in creating value offerings, it inevitably involves some degree of asset management and thus greatly increases responsibility and risk. "Operational Management" and "Facility Management" involve companies taking over large portions of the management responsibilities previously vested with the owner and operator of manufacturing or building operations.

The application of m-Business concepts in the Facility Management market has a very large potential and several innovative solutions have already been deployed.

4.1 Technologies supporting m-Business

Facilities Managers are pushing industrial product firms to transform today's closed technologies into web-enabled applications running over industry-standard IP networks and are demanding more open systems. The open architecture approach means widespread acceptance and sharing of hardware and software designs, standards, and protocols and is seen as being critical to the successful spread of intelligent building technology.

When energy costs are increasing, a greater utilization of building automation systems to manage costs and utilization are also an integral part of many

intelligent building initiatives. Another area of significant resource expenditure has been fuelled by wireless networks. A survey conducted by the Wireless LAN Association and NOP World Technology showed that the average payback for a wireless installation is about nine months.

One theme that emerges repeatedly among facility managers is the move from "property management" to "infrastructure management". Several studies of commercial and public buildings indicate that only about half of all the problems encountered are due to building problems with the balance being due to equipment, control and system problems. The benefits to facilities and to facility managers who grasp the potential of the intelligent building technology are thus potentially enormous.

4.2 The potential for m-Business

The currently available m-Business technologies support implementation of innovative services for predictive maintenance including accurate monitoring of plant equipment, increase of productivity from continuous operations, and optimization of device utilization.

Recently, a research study on the business value created by mobile & wireless technologies (mobile phones, Wi-Fi, etc.) involving about 70 enterprises has been carried out by Assinform [11}. The results indicate that the level of satisfaction related to the use of m-Business applications is very high in the area of Field Force Automation (FFA), which has a high concentration of mobile service engineers. The study found the positive aspects to be: Limited investments, measurable benefits, and short pay-back time.

New innovative business models tend to include value added services based on bundling of several manufacturers products with system and service integration as well as a new level of intelligence in the products to be used for remote monitoring including compliance monitoring and documentation.

The opportunity of collecting and elaborating data from devices and technical installations could provide precise and updated information on performance, Service Level Agreements compliance, product lifecycle, etc.

According to the report, Collaboration@work [12], more than 10 million Europeans are traveling every day across Europe and working outside their normal workspace. Innovative m-Business systems can thus lead to a substantial improvement of work performance, labor market participation, and geographical mobility.

5. A value model for industrial products

The eu-DOMAIN business system is evolving around a network of business partners engaged in manufacturing, installation and commissioning of technical installations for cooling and air-conditioning in industrial plants. The setting is cold stores facilities in the Italian prosciutto industry, but due to the proprietary nature of the business processes, the involved companies have requested to remain anonymous. We have thus used the company "AJAX" to identify the main player in the scenario.

The first step in developing innovative m-Business processes for this industry involves a managed process of scenario thinking. Scenarios are snapshots of possible/alternative futures that provide coherent, comprehensive, internally consistent descriptions of plausible futures that are built on the imagined interaction of key trends. We used a formal method known as the idon-method to construct scenarios from a varied background of knowledge and guesswork about the relevant environment and the trends and discontinuities likely to happen in the future that will affect the users' business and their way of working. A set of functional user requirements has been derived from the scenarios and related storylines.

Having the scenarios in place, we decided to validate the e^3value tool by modeling an existing well-known offering and comparing the results of the profitability analysis with existing industry estimates and internal company data.

5.1 The baseline scenario

This baseline scenario describes the simple value process of delivering industrial products to customers through a traditional supply chain. We only looked at the physical delivery and installation of industrial products and excluded services for now, because service offerings do not add new aspects to the methodology at this stage.

First, we identified the actors, value objects and interfaces, value offerings and other elements of the value model.

The value model shown in Figure 1 describes the different actors and the value exchanges they perform. The Industrial Customer is part of a limited market segment having a number of identical actors behaving in the same manner. All actors in the market segment request a value object consisting of a complete technical installation. This value object is delivered by downstream actors consisting of Independent Installers, Wholesalers, the AJAX Importer, and the AJAX Manufacturing Company.

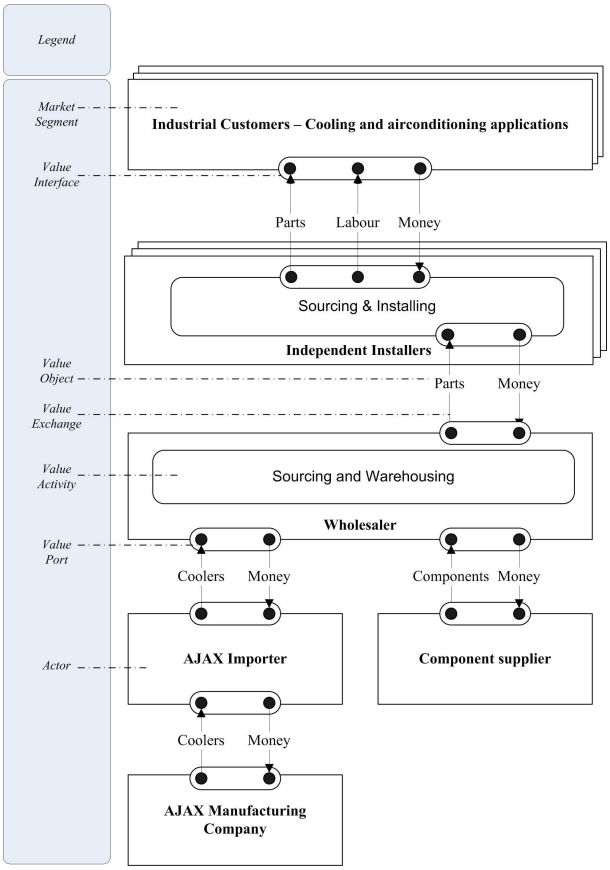

Figure 1. Baseline scenario.

The value model was build using the dedicated modeling tool, the e^{3}value editor, developed by Gordijn, Akkermanns, et. al. [13].

5.2 Validation of the model

The results of the baseline model are presented as economic transaction values as shown in Figure 2. The transaction values were calculated for each actor in the form of in-going value objects and out-going value objects.

Actors have both in-going and out-going value objects with the difference providing the allocated profit for that particular actor. In economic terms, the Industrial Customer only has outgoing economic value (but receives a value object consisting of an installed system in return). For simplicity, we have also omitted the expenditures related to the manufacture of the AJAX products.

From the transaction value sheet, we feel comfortable that the value model correctly handles the different values objects that are being exchanged beteeen actors and that it appropriates the correct values to the individual actors.

Based on the transaction values, we also used the model to calculate actor profitability sheets showing aggregated revenues and expenditures for each actor in the scenario. Using the profitability viewpoint, we calculated profitablity sheets for each actor in the scenario. For this purpose, we introduced formulas into the model. The formulas provide aspects such as total market size (the number of Industrial Customers in the market and the number of Installers) as well as the number of purchases made by each customer in a given timeframe.

Finally, we populated the model with the proper formulas for market shares and values, and calculated profitability sheets for the various actors.

Actor / (€)	Value object in	Value in	Value object out	Value out
Industrial Customers - Cooling and airconditioning applications				
Independent Installer	Buying cooler system		Paid cooler system	3.000
Independent Installer				
Industrial Customers	Installing cooler system	3.000		
Whole Seller			Sourcing parts	1.900
Wholesaler				
Independent Installer	Delivering parts	1.900		
Component Supplier			Sourcing components	300
AJAX Importer			Sourcing coolers	150
Component Supplier				
Wholesaler	Delivering components	300		
AJAX Importer				
Wholesaler	Delivering coolers	150		
AJAX Manufacturing			Importing coolers	100
Grundfos Manufacturing				
AJAX Manufacturing	Eksporting coolers	100		

Figure 1. Baseline scenario - value transaction sheet.

Actor / (€)	Revenues	Expenses	Profits
Industrial Customers	0	-18.000.000	-18.000.000
Independent Installer	45.000	-28.500	16.500
Wholesaler	11.400.000	-2.700.000	8.700.000
Component Supplier	1.800.000		1.800.000
AJAX Importer	900.000	-600.000	300.000
AJAX Manufacturing	600.000		600.000

Figure 3. Baseline scenario - actor profitability sheet.

The formulas allowed us to calculate total market size and actor profitability as shown in Figure 3. The actor profitability sheet shows us that the total market size is in good agreement with our expectations and that each actor is profitable, which we also would have expected. We also find that the modeling of value transactions and market dynamics is sound and robust and it is our conclusion that the e^3value methodology can be used to accurately model complex, dynamic value constallation in m-Business applications.

6. New sustainable m-Business models

In order to increase business value, product companies have been looking for other, related services they can offer to existing customers. Value can be derived from long term planned, preventive and predictive maintenance services and value added services such as remote monitoring, compliance monitoring and documentation. All of these products and services add value to the company's product offerings and represent a reasonable balance between risk and value.

6.1 m-Business delivered on the eu-DOMAIN platform

In the eu-DOMAIN project we focus on value added services that involve complex constellations of product companies, content providers and Service Providers. The eu-DOMAIN Ambient Intelligence Service Platform is a web based infrastructure that offers all eu-DOMAIN functionalities to customers and corporate users such as industrial product companies, healthcare providers, etc. The service is typically offered by a Service Provider. Various content providers may enter the value constellation with the aim of enriching the offerings from which the customers can chose. As in any other m-Business system, the real challenge is not to develop the technical application but to define the value proposition and the corresponding business model.

To this aim, a large variety of different offerings, value constellations and business models have been investigated. For this presentation, we will focus on one m-Business application consisting of remote on-line access to an industrial installation with additional support for scheduled maintenance and installation. This application involves several new actors and new m-Business services.

The business model originated from a technology enabled service concept, by which the supplier of an industrial installation can provide mobile Field Service Technicians with direct access from their mobile terminals to both the control centre of the installation and to back-office repositories with product documentation, maintenance records, workflow procedures, etc.

The ability to combine information from several sources allows for the creation of precisely targeted workflow instructions adjusted to the actual service problem including necessary documentation, tools and parts to be used and fully taking into consideration the location and the service history of the installation.

Product companies can thus dramatically reduce intervention costs by a continuous and remote monitoring of the installations. It also gives birth to condition-based maintenance, an alternative to the classical, time driven approach.

Instead of using expensive field assets (people, trucks, equipment) to fix a machine or device, product companies and their employees will be able to remotely diagnose and order parts for repair, and, in some cases, even provide fixes without having to make a visit to a customer site. Further, the remote accessibility to installations enables new services targeted at the Industrial Customers and Facility Managers, including remote asset monitoring, alarm handling, remote metering, etc.

From a technical point of view, user requirements are easily described. However, we need to develop the proper business models before proceeding with the implementation.

6.2 A value model of an advanced m-Business service

The value model of the proposed m-Business service was performed in a similar way as the baseline scenario, but with additional actors.

The Industrial Customers buy maintenance contracts from AJAX Manufacturing Company and the work is carried out by local Service Partners. Some of the customers also request on-line accessibility and remote monitoring of the technical installations. The Service Provider is a new actor offering the eu-DOMAIN infrastructure, which forms the basis for the new service. The Utility Company is also a new actor requesting remote (automatic) meter reading. The full value model developed with the e^{3}value methodology is shown in Figure 4.

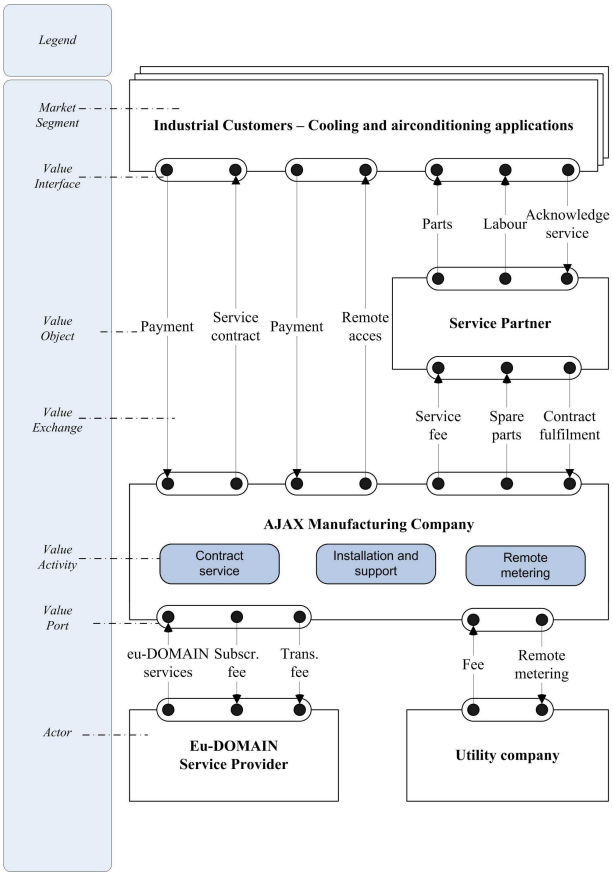

Figure 4. The advanced m-Business value model for industrial services.

The remote asset management service is offered as an addendum to the service contract. During the value model analysis it became clear that the new value proposition was not sufficiently attractive to the customers to justify the added cost of the Service Provider. The number of customers and price per contract were insufficient to make the Service Provider profitable. The unprofitable situation had a number of ramifications that were addressed.

The Service Provider can hope for long term profitability through the acquisition of additional customers or higher fees. Alternatively AJAX can offer to subsidize the service based on a valuation of perceived customer loyalty. However, none of these routes were found to be feasible.

We therefore turned to a decomposition of value activities as a way to discover new profitable activities that could be included in the value model.

We first noted that AJAX undertakes several value activities to support customers and Service Partners. One value activity is concerned with the offering and establishment of service contracts, including the involvement of Service Partners. We term this value activity “Contract service”. Another value activity is concerned with internal support for the field service technicians.

Due to increased complexity of the installations, there is a strong need for service training and upgrade of the knowledge of the service personnel, in particular the service personnel employed by the independent Service Partners. The cost of education and of supporting the service technicians during installation and commissioning are very high and increasing. We term this value activity “Installation and service support”.

Having already established remote accessibility to all installations in the market segment, this facility can now be considered for improving the value activity of “Installation and service support”. Instead of using expensive field assets to support the service organization, AJAX will be able to remotely diagnose and provide fixes to the Service Partners. Such a service could lead to substantial savings on service support costs and the overall value proposition is now of much higher value to AJAX.

However, our second business model only showed marginally higher profitability for AJAX because we selected to pass most of the savings on to the Service Provider. The Service Provider, in turn, was still unprofitable, albeit at a very much reduced level.

6.2 Introducing new actors

The continued unprofitable situation had again a number of implications that needed to be addressed: The Service Provider can accept the non-profitability situation for a transitional period, assuming that it can be corrected either by increased usage or by additional customers opting to have the service.

Alternatively, a new actor can be brought into the model. Since the latter solution seemed to have the highest potential, we used it as basis for the final extension to the business model where we decompose the value object of "Remote access".

In today's world of deregulated energy companies, customers move between suppliers in a competitive environment. Every change of supplier requires high accuracy reading of energy consumptions such as electricity, gas, water, etc. Remote meter reading, now increasingly being referred to as Automatic Meter Reading (AMR), has thus become an important contributor to success in all utilities.

The remote access already established by AJAX can be used for high accuracy temporal data about energy supply and consumption, such as usage patterns over the day, week and month and many other useful data.

The AJAX installation becomes a component in the information network; the information becomes a commodity and AJAX has a new value object, which is of interest to a completely new actor in the scenario: The Utility Company. The new actor infuses sufficient economic value into the business system to allow all stakeholders to enjoy sustained profitability. The new value object of "Remote meter reading" is being offered to the Utility Company against a fee. We have not investigated the market for remote metering or AMR in detail, but, for simplicity, we have assumed that an annual fee of 30€ would be interesting to all parties. The value transaction sheet for the advanced business model is shown in Figure 5.

Although the contribution to the overall economic system is small, the contribution from the Utility Company makes the Service Provider profitable as can be seen from Figure 6.

Actor / (€)	Value object in	Value in	Value object out	Value out
Industrial Customers - Cooling and air conditioning applications				
Service Partner	Localisation (parts & labour)		Acknowledge work	
AJAX Manufacturing	Service contract		Payment for service contract	5.000
AJAX Manufacturing	Provide on-line access		Payment for on-line access	200
Service Partner				
Industrial Customers	Acknowledgement of work		Performing (parts & labour)	
AJAX Manufacturing	Payment and spare parts	1.000	Fulfilling service contract	
eu-DOMAIN service provider				
AJAX Manufacturing	Payment subscription fee	300	eu-DOMAIN services	
AJAX Manufacturing	Payment transaction fee	170	--	
Utility Company				
AJAX Manufacturing	Meter readings		Pay fee	30
AJAX Manufacturing				
Industrial Customers	Payment for service contract	5.000	Service contract	
Service Partner	Acknowledge work		Payment and spare parts	1.000
Industrial Customers	Payment for on-line access	200	Provide on-line access	
Utility Company	Fee for meter reading	30	Provide meter reading	
eu-DOMAIN service provider	eu-DOMAIN services		Payment subscription fee	300
eu-DOMAIN service provider	--		Payment transaction fee	170

Figure 5. Extended scenario - value transaction sheet.

Market segment / actor (k€)	Revenues	Expenses	Profits
Industrial Customers - Cooling and air co	0	6.240	-6.240
Service Partner	2.400	0	2.400
eu-DOMAIN service provider	564	543	21
Utility Company	0	36	-36
AJAX Manufacturing	6.276	4.104	2.172

Figure 6. Extended scenario - actor profitability sheet.

The business system is now overall profitable and each actor is individually profitable, which indicates a high chance of the business model being sustainable over time.

The profitability sheet does not claim to be accurate in absolute terms, but indicates that sustainability can be achieved by carefully focusing on the value objects, decomposing actor activities into relevant value activities and by introducing new actors into the business system to achieve additional funds.

7. Conclusion and future work

Our work has shown the importance of applying a value based approach to business modeling of new m-Business solutions rather than a process oriented or technology oriented approach.

We have also demonstrated that a formal value modeling ontology is useful and provides excellent understanding of the m-Business system in itself, the value creation process and the exchange of value objects between actors as well as a tool for de-composing and re-composing value activities in order to develop new, innovative business models.

In our work, we have focused on industrial services and have demonstrated how a sustainable business model can be developed for a m-Business system and how the value analysis can be used, not only to find new value objects to be considered by the existing actors (such as cost savings) but also how the emergence of new value objects can bring entirely new actors into the business system for improved performance and sustainability of the m-Business model.

The models we have investigated so far have been of moderate complexity, but our current work is aiming at using the same methodology of value analysis in the healthcare sector, which is characterized by many more actors, including actors that operate on a not-for-profit basis.

8. References

[1] The eu-DOMAIN project, co-funded by the European Commission under contract no. IST-2003-004420, http://www.eu-domain.eu.com, 2003.

[2] M. E. Porter, *Competitive Advantage - Creating and Sustaining Superior Performance*, Free Press, New York, NY, 1985.

[3] J. F. Rayport and J. J. Sviokla, "Exploiting the virtual value chain", *Harvard Business Review 73*, 1995.

[4] R. Normann and R. Ramírez, *Designing Interactive Strategy - From Value Chain to Value Constellation*, John Wiley & Sons Inc., Chichester, UK, 1994

[5] A. Brandenburg and B. J. Nalebuff, *Coopetition*, Bantam Books, 1996.

[6] J. Mylopoulos, "Conceptual modeling and telcos", *Conceptual Modelling, Databases and CASE: An Integrated View of Information Systems Development*, Wiley, New York, NY, 1992

[7] J. Gordijn, *Value-based Requirements Engineering – Exploring Innovative e-Commerce Ideas*, SIKS Dissertation Series No. 2002-8, Amsterdam, 2002.

[8] H. Akkermans, J. Gordijn (editors), *Business Models for Distributed Energy Resources in a Liberalized Market Environment*, Report of the BUSMOD project co-funded by the European Commission under contract no. NNE5/2001/256, 2004.

[9] A. Z. Morch, H. Sæle, A. Lambine, and Z. Baida, *Energy E-services Case Study Results for TrønderEnergi AS*, Deliverable of the OBELIX project co-funded by the European Commission under contract no. IST-2001-33144, 2004.

[10] A. Osterwalder, J. Ondrus, and Y. Pigneur, "Skype's Disruptive Potential in the Telecom Market - A Systematic Comparison of Business Models", *HEC LAUSANNE* Working paper, Preliminary draft, May 2005.

[11] ASSINFORM, Associazione Italiana per l'Information Technology, belonging to the Confederation of Italian Industry and The School of Management, Polytechnic of Milan, 2004

[12] Collaboration@work, *The 2003 report on new working environments and practices*, Commission for the European Communities, Information Society DG, October 2003.

[13] J. Gordijn, H. Akkermans, A. Koks, and J. Schildwacht, *User manual e3value editor*, Deliverable of the BUSMOD project co-funded by the European Commission under contract no. NNE5/2001/256, Vrije Universiteit Amsterdam, 2004.