

Towards Business and Information Systems Fit through a Business Model Ontology

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Abstract

Business and Information Systems (IS) alignment is a key management issue. Yet, little research shows managers how a fit between these "two worlds" can be achieved. The goal of this article is to provide a Business Model Ontology to formulate, understand, analyze and share a company's business model. On the one hand this shall help managers to express their vision and understanding of the business logic of a company. On the other hand it shall help IS staff to analyze the formally expressed business model and point out opportunities and risks from an IS point of view. The Business Model Ontology consists of four main pillars, which are Product Innovation, Customer Relationship, Infrastructure Management and Financial aspects that can be further decomposed into their elements.

Alignment between business strategy and Information Systems (IS) has traditionally been a key issue in IS management (Brancheau et al. 1996). A recent study on 226 companies supports the hypothesis that alignment between business and IS strategies improves business performance (Sabherwal and Chan 2001). Yet, despite this general recognition of the importance of strategic IS alignment, insufficient research has been conducted on how such alignment is achieved and sustained over time (Hirschheim and Sabherwal 2001). In this paper we outline a Business Model Ontology, which aims at building a bridge to connect the "world of business" with the "world of IS".

The paper is structured as follows. The first section explains the role of the business model in aligning strategy and IS. The second section introduces the Business Model Ontology, while the sections 3 to 6 outline its elements. These elements are completed with management tools and illustrative examples derived from the ontology. The final section sketches implications and further research.

1 IS AND BUSINESS ALIGNMENT THROUGH BUSINESS MODELS

Whereas the early work on strategic IS alignment focused on aligning IS strategy to business strategy, the strategic potential of IS later led to the recognition that IS strategy can also affect business strategy (Henderson and Venkatraman 1993; Hirschheim and Sabherwal 2001). In simpler terms, business people have to be able to clearly formulate their vision and what they expect from IS people and IS staff has to be able to point out how Information and Communication Technology (ICT) can improve a company's business goals (see figure 1). However, these two worlds, the one of business and the one of technology, sometimes seem quite distant. On the one hand every manager and entrepreneur has an intuitive understanding of how his business works, but in many cases she or he is rarely able to communicate it in a clear and simple way (Linder et al., 2001). On the other hand, IS people have a clear idea of what ICTs are able to accomplish in IS management, but they struggle to achieve a strategic fit with the big (business) picture.

In this paper we outline a Business Model Ontology that shall help narrowing the gap between IS and business and achieve a better fit for the following reasons:

1. The process of modelling social systems or an ontology – such as a business model – helps identifying and **understanding** the relevant elements in a specific domain and the relationships between them (based on (Morecroft 1994; Ushold and King 1995)). Business models can also serve as a new unit of analysis (Stähler 2002).
2. The use of a formal approach to business models (e.g. our ontology) helps managers and IS staff to easily **communicate and share** their understanding of the business logic among each other (based on (Fensel 2001)).
3. Business models facilitate **change** because of their building-block-like approach to formulating the business logic of a company (Petrovic et al. 2001).

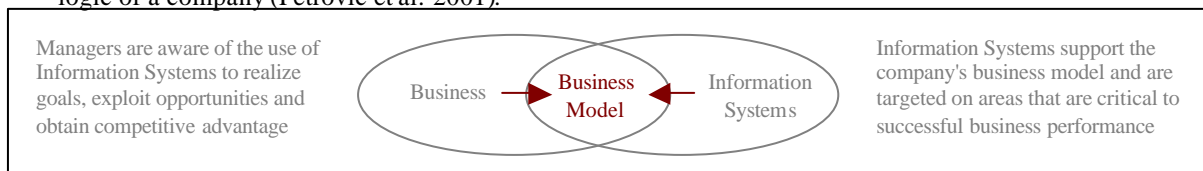


Figure 1: Business Strategy and Information Systems Alignment

2 THE BUSINESS MODEL ONTOLOGY

The Business Model Ontology is a conceptual tool that contains a set of elements and their relationships and allows expressing the business logic of a specific firm. It makes it possible to easily capture, model, understand, share (Peterovic et al. 2001), observe over time, and, maybe even measure and simulate business models. In general, some authors see business models as a new unit of analysis and interesting tool for innovation (Stähler 2002). Our ontology can be broken down into four simple pillars, which are the "what", the "who", the "how" (Markides 1999) and the "how much" of a firm. In other words, these pillars allow to express *what* a company offers, *who* it targets with this, *how* this can be realised and *how much* can be earned by doing it. These pillars can be translated into four main business model blocks that are then further decomposed: Firstly, the PRODCUT INNOVATION block, which describes the value proposition of a firm. Secondly, the CUSTOMER RELATIONSHIP block, which describes how a firm gets in touch with its customers and what kind of relationships it wants to establish with them. Thirdly, the INFRASTRUCTURE MANAGEMENT block that describes what activities, resources and partners are necessary to provide the first two blocks. And finally, the FINANCIAL ASPECTS block, which describes the revenue flows and the pricing mechanisms of a firm, or, in other words, how a company makes money through the other three blocks (see figure 2).

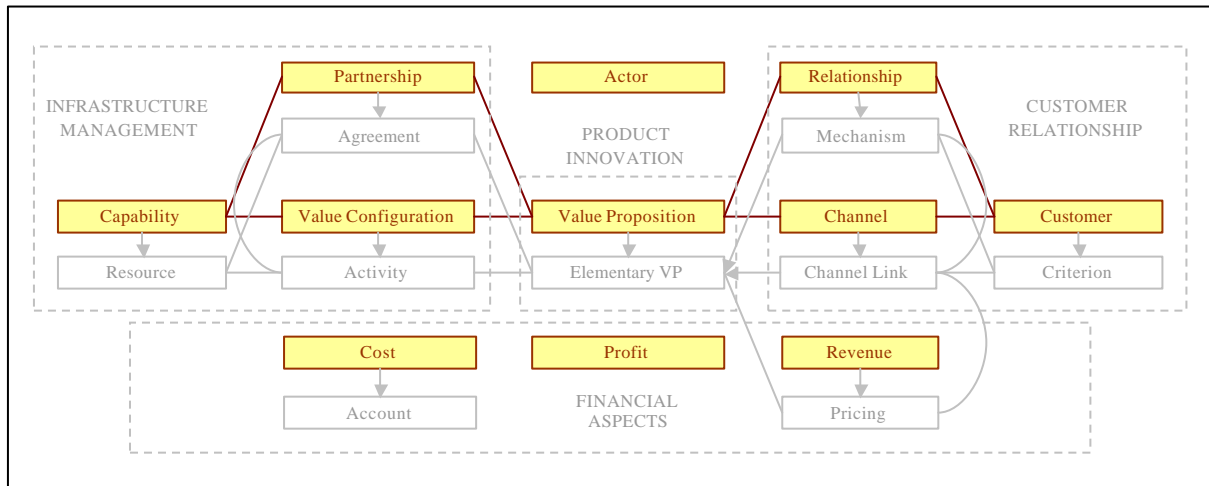


Figure 2: Business Model Framework

3 PRODUCT INNOVATION & VALUE PROPOSITION

PRODUCT INNOVATION covers all aspects of value that the firm offers its customers. This comprises not only the company's bundles of products and services but the manner in which it differentiates itself from its competitors. Product innovation is composed of the VALUE PROPOSITION element, which can be decomposed into its ELEMENTARY VALUE PROPOSITIONS (see figure 2).

In figure 3 we illustrate a tool derived from our ontology that maps the VALUE PROPOSITION of easyMoney.com, a credit card company founded by Haji-Ioannou who is better known for founding easyJet, the successful European no-frills airline. Its value proposition consists of customized credit cards at attractive prices. Through transparent pricing, clear product offerings, the use of ICT and avoiding cross-subsidies between products and customers the credit card client only pays for what he gets. The tool classifies the ELEMENTARY VALUE PROPOSITIONS of easyMoney according to their stage in the value life cycle, in other words, at the moment of the *value creation* (e.g. customization), its *appropriation* (e.g. Amazon's one-click shopping), its *consumption* (e.g. listening to music), its *renewal* (e.g. software updates) or its *transfer* (e.g. disposal of old computers, selling of used books). For every stage of the value life cycle the tool assesses easyMoney's value level and price level for the aggregated ELEMENTARY VALUE PROPOSITIONS, which makes them comparable to the one's of its competitors (i.e. traditional credit card companies). The value scale is qualitative and ranges from *me-too* value (e.g. commodities), over *innovative imitation* (e.g. Pocket PC vs. Palm) and *excellence* (e.g. Swiss watches) to *innovation* (e.g. Viagra in the 90's). The price scale is also qualitative and goes from *free* (e.g. online newspapers) over *economy* (e.g. Southwest, EasyJet, RyanAir) and *market* (e.g. stocks) to *high-end* (e.g. Rolex).

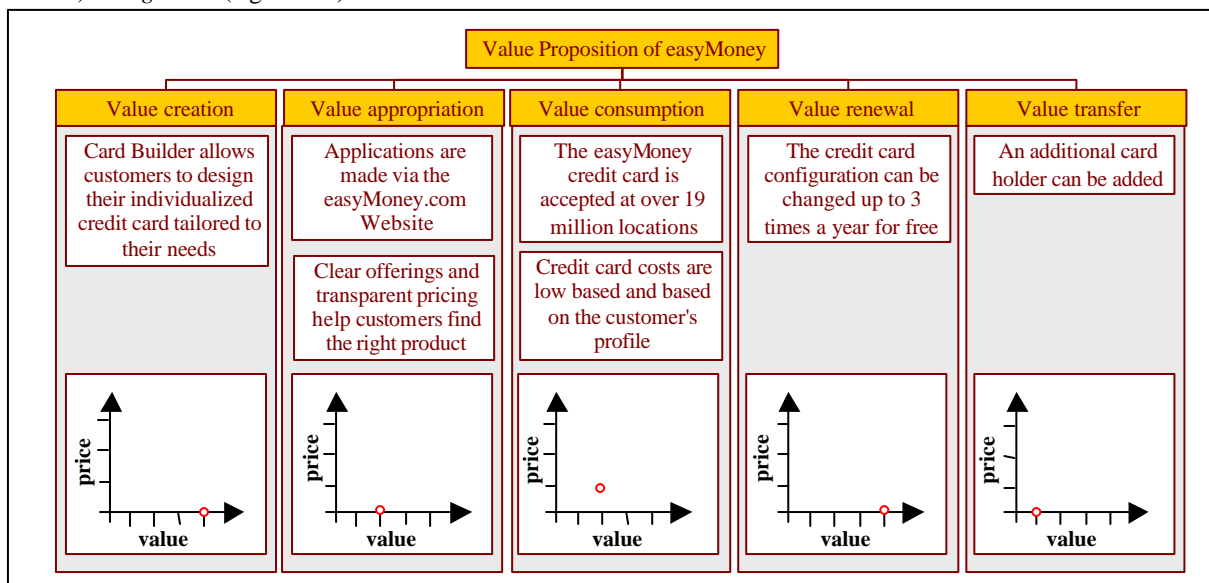


Figure 3: easyMoney's Value Proposition

4 CUSTOMER RELATIONSHIP

CUSTOMER MANAGEMENT covers all customer related aspects. This includes the definition of TARGET CUSTOMERs, the CHANNELs to reach and communicate with him, as well as the RELATIONSHIP the firm aims to establish with the customer (see figure 2).

4.1 Target Customer

A firm generally creates value for a specific TARGET CUSTOMER segment. IS helps companies make the strategic choice to target their market at any level between “mass” and “one-to-one by balancing revenue against cost (Wedel 2001). Especially post-hoc market segmentation techniques like data mining, multidimensional segmentation and data clustering with artificial neural networks can lead to more efficient marketing and enhance profitability (Neal and Wurst 2001).

4.2 Channels

CHANNELS refer to the way a firm “goes to market” and how it actually “reaches” its customers (Hamel 2000). ICT has had an important impact on channels by increasing the range of them and making new ways of reaching the customer possible. The process of eliminating middlemen (disintermediation) (Benjamin and Wigand 1995), shortening channels (direct selling), introducing new mediation (cybermediaries) (Sarkar et al. 1995) or cross-channel selling have made channel management increasingly complex and indispensable. The expansion of the range of channels has also multiplied the potential conflicts between channels (Anderson et al. 1997). A channel can be decomposed in its CHANNEL LINKS.

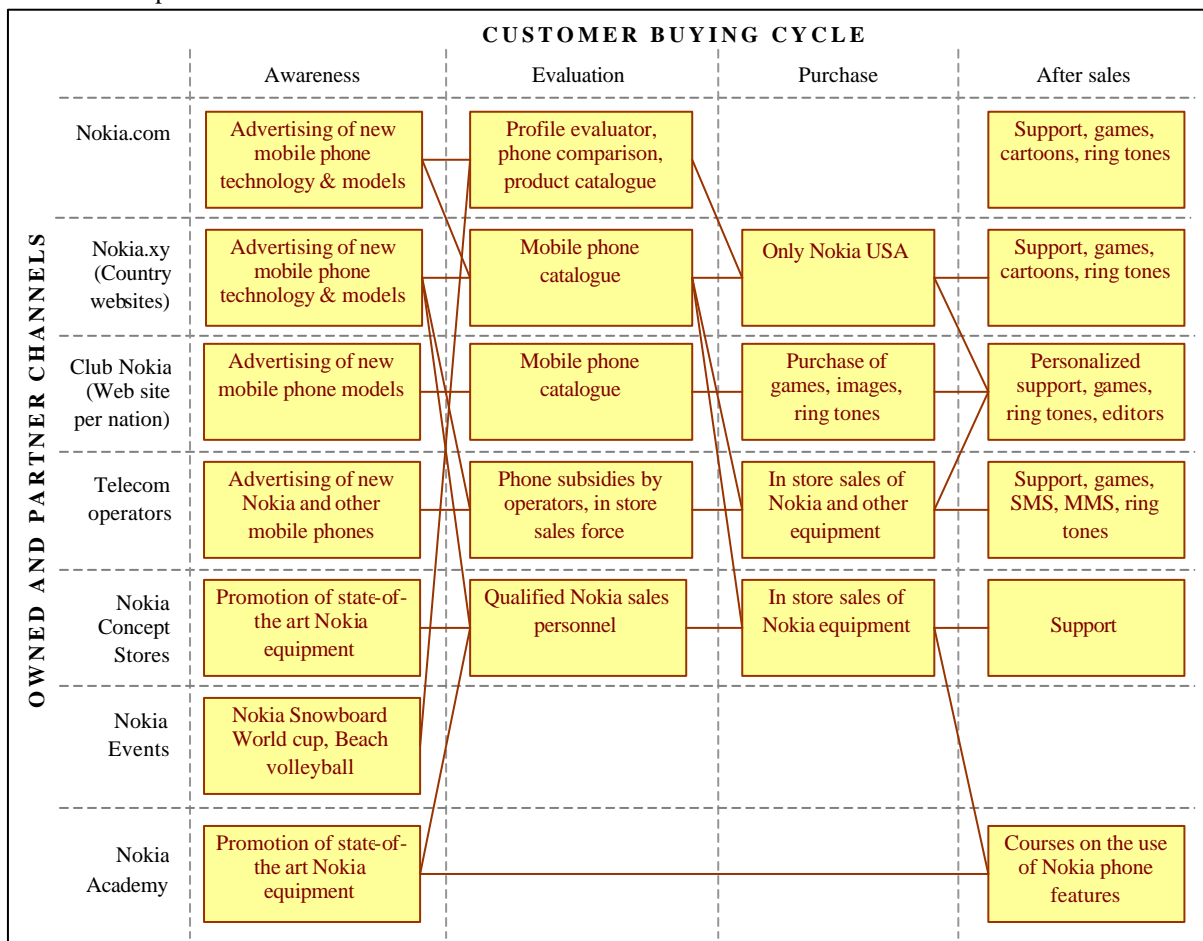


Figure 4: Channel Strategy at Nokia Mobile Phones

In figure 4 we sketch a channel design tool based on the so-called Hybrid Grid (Moriarty and Moran 1990; Dolan 2000) that can be derived from our ontology. This tool consists of a matrix with the different phases of the customer's buying cycle on the one axis and a company's range of CHANNELs on the other axis. The customer buying cycle reflects all possible contact points between a supplier and a customer and is divided into four phases, namely the customer's awareness, his evaluation of the company's VALUE PROPOSITION, the moment of purchase and after sales (Ives and Learmonth 1984; Ives 1999; Muther 2002). The tool in figure 4 maps the channel strategy of Nokia, the world's largest mobile phone manufacturer. The boxes which you find at the

intersection of the CHANNELS and the four phases of the customer buying cycle represent the aggregated CHANNEL LINKs of the company. These CHANNEL LINKs are connected to each other inside and/or across different CHANNELS to exploit cross-channel synergies. Nokia's most important sales channels are the national mobile phone network operators, which sell the bulk of its phones, and, the various electronics or other retailers. But the other channels, such as Nokia.com, Club Nokia or Nokia Academy (i.e. courses to learn about Nokia phone features) also have a very important role to play. Club Nokia, for instance, is an online club that owners of a Nokia phone can join by entering the serial number of their device. With this Nokia re-establishes a direct communication link with its final customer, which has traditionally been the operators' sphere of influence. This IS based channel strategy has an enormous value in loyalizing customers, selling them additional products and collecting information on their behaviour.

4.3 Relationship

When "getting in touch" with the customer the firm automatically establishes a certain CUSTOMER RELATIONSHIP. This can be a first time relationship (e.g. customer acquisition), an existing relationship (e.g. customer retention, add-on selling), or a one time relationship (e.g. transaction). ICT has an important role to play in managing customer relationships because it provides the RELATIONSHIP MECHANISMS for personalization (e.g. Amazon's book recommendations) (Piller and Moeslein 2002), trust (e.g. the TRUSTe label, eBay's escrow service or SGS's certification and verification) (Friedman et al. 2000; Dimitrakos 2001) and brand building (e.g. communities).

5 INFRASTRUCTURE MANAGEMENT

INFRASTRUCTURE MANAGEMENT describes the CAPABILITIES, VALUE CONFIGURATION and PARTNERSHIPS necessary in order to create value and reach the customer (see figure 2).

5.1 Capabilities & Resources

A firm has to ensure that it disposes of the necessary CAPABILITIES to deliver its value proposition (e.g. home delivery of small quantities for online retailers)(Bagchi and Tulske 2000). CAPABILITIES are based on a range of RESOURCES that can be owned by the firm or a partner organization.

5.2 Value Configuration & Activities

The value proposition of a firm is the outcome of a VALUE CONFIGURATION of in-house and outsourced activities and processes (Gordijn et al. 2001). This configuration can take the form of a *value chain* (Porter 2001), a *value shop* or a *value network* (Stabell and Fjeldstad 1998).

We illustrate the VALUE CONFIGURATION, ACTIVITIES, RESOURCES and PARTNERSHIPS through ColorPlaza, a Swiss company in the photography industry (see figure 5 and table 1). ColorPlaza let's their customers upload their digital photos over the Internet and get them printed on photo paper, t-shirts and other gadgets, which are then delivered directly to their homes. In fact, ColorPlaza was so successful with this service that it is now sold under the name of big partners, such as Sony Europe, Nokia or Microsoft (through the Windows XP operating system). These tight co-operations are based on a close integration of the IS' of the different partners involved.

ACTIVITY name	Upload of digital images & order	Transfer of digital images to the printing facilities	Receive primary material (photo paper or goods)	Print digital images on photo paper or goods	Pack goods for delivery	Deliver packages	Answer complaints	Sell ColorMailer services
ACTIVITY description	The digital images have to be uploaded from the customer's camera or PC	The digital images have to be transferred from the customer to the printing facilities	The primary material to print on has to be received and eventually stored	The digital images have to be printed on either photo paper or goods, such as t-shirts, cups etc.	The order has to be packaged for home delivery	The orders have to be delivered to the customer's home	Possible complaints have to be answered to the customer's satisfaction	Color Mailer's services have to be marketed to potential customers
ACTIVITY Nature	Inbound logistics	Inbound logistics	Inbound logistics	Operations	Outbound logistics	Outbound logistics	Services	marketing
Related to RESOURCE	Shares image network	Fits print infrastructure	Fits print infrastructure	Flows to packaging staff	Shares delivery network	Flows to customer	Shares call center	
By ACTOR	Customer	FotoWire	ColorPlaza	ColorPlaza	ColorPlaza	Postal service	ColorPlaza	ColorPlaza Sony Nokia Agfa Microsoft

Table 1: ColorMailer activities

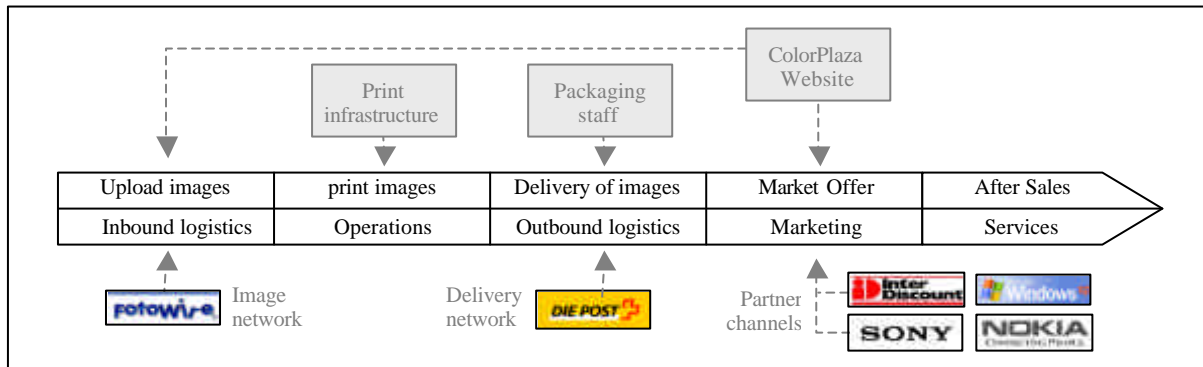


Figure 5: Value Configuration at ColorPlaza

5.3 Partnerships & Agreements

PARTNERSHIPS help firms leverage their core competencies. They can take different forms, such as integrated value chains (e.g. Collaborative Planning, Forecasting and Replenishment (CPFR) at Wal-Mart), online platforms (e.g. Nestlé, Danone and Henkel's CPGmarket.com) or co-opetition agreements (e.g. the consortium of device manufacturers to create the mobile phone operating systems Symbian).

6 FINANCIAL ASPECTS

The FINANCIAL ASPECTS are the culmination of a business model. The neatest VALUE PROPOSITION and the finest CUSTOMER RELATIONSHIP are only worth something if they guarantee the company a sustainable financial success. This simply means that the revenue model and the costs have to be in balance in order to make a profit possible.

6.1 Revenue Model

A sound business model is one in which a firm can translate its VALUE PROPOSITION into a range of REVENUE streams from its customers. A REVENUE stream can have a set of different PRICING mechanisms. New pricing mechanisms enabled by ICT and particularly by the Internet can have an important impact on revenue and profit (e.g. auctions, pay-per-use, yield management)(Klein and Loebbecke, 2000).

6.2 Cost structure

The COST STRUCTURE measures all the costs the firm has to incur to create, market and deliver its VALUE PROPOSITION. It sets a price tag on all the resources, assets, activities and partner network relationships that cost the company money. These costs are booked in the firms ACCOUNTS.

7 IMPLICATIONS AND FURTHER RESEARCH

The Business Model Ontology has the goal of providing a framework to better formulate, understand, analyze and share a company's business model. We use it to achieve a better fit between business and IS based on an improved communication, better understanding and increased flexibility of the business logic of company. From managers it implies that they express their business vision and their understanding of the business in terms of the Business Model Ontology. From IS staff it implies that they analyze the formally expressed business model and point out opportunities and risks from an IS point of view.

Further research includes computerizing the Business Model Ontology to fully exploit the conceptual foundation outlined in this paper. For instance, one could imagine a visualization tool to display channel strategies and partner networks or analyze and compare value propositions, similar to the examples sketched above. Business models could also be used to as a scenario-based forecasting approach (Van der Heijden 1996) that would be helpful before defining a strategy of adoption, deployment, and management of a business logic. Finally, one could even imagine a business model simulator (Sterman 2000; Richards and Morrison 2001) where stakeholders would gain important insights on their actions and would learn about their business models by simulating and experimenting with them in a risk-free environment.

8 REFERENCES

- Anderson, E., G. Day and K. Rangan (1997). Strategic Channel Design. *Sloan Management Review*, Summer.
- Bagchi, S. and B. Tulske (2000). e-business Models: Integrating Learning from Strategy Development Experiences and Empirical Research. 20th Annual International Conference of the Strategic Management Society, Vancouver.
- Benjamin, R. I. and R. T. Wigand (1995). Electronic markets and virtual value chains on the information highway. *Sloan Management Review*, Winter, 36(2): 62-73.
- Brancheau, J. C., B. Janz and J. C. Wetherbe (1996). Key issues in information systems management: 1994-95 SIM Delphi results. *MIS Quarterly*, 20(2): 225-242.
- Dimitrakos, T. (2001). *System Models, e-Risks and e-Trust*. IFIP I3E, Zurich, Kluwer Academic Publishers.
- Dolan, R. (2000). *Going to Market*. Teaching Note, Harvard Business School
- Fensel, D. (2001). *Ontologies: Silver Bullet for Knowledge Management and Electronic Commerce*. Heidelberg, Springer-Verlag.
- Friedman, B., P. Kahn and D. Howe (2000). Trust Online. *Communications of the ACM*, December, 43(12).
- Gordijn, J., J. Akkermans and J. van Vliet (2001). Designing and Evaluating E-Business Models. *IEEE Intelligent Systems*, July/August, 16(4): 11-17.
- Hamel, G. (2000). *Leading the revolution*. Boston, Harvard Business School Press.
- Henderson, J. C. and N. Venkatraman (1993). Strategic Alignment: Leveraging Information Technology for Transforming Organizations. *IBM Systems Journal*, 32(1): 4-16.
- Hirschheim, R. and R. Sabherwal (2001). Detours in the Path toward Strategic Information Systems Alignment. *California Management Review*, Fall, 44(1): 87-108.
- Ives, B. (1999). Customer Service Life Cycle. Center for Virtual Organization and Commerce, Louisiana State University. [accessed: November, 2002] <http://isds.bus.lsu.edu/cvoc/projects/csle/html/>
- Ives, B. and G. Learmonth (1984). The information system as a competitive weapon. *Communications of the ACM*, 27(12): 1193-1201.
- Markides, C. (1999). *All the Right Moves*. Boston, Harvard Business School Press.
- Morecroft, J. D. (1994). Executive Knowledge, Models, and Learning. In Morecroft. *Modeling for Learning Organizations*. J. D. Morecroft and J. D. Sterman. Portland, Productivity Press: 3-28.
- Moriarty, R. and U. Moran (1990). Managing Hybrid Marketing Systems. *Harvard Business Review*, November-December.
- Muther, A. (2002). *Customer Relationship Management - Electronic Customer Care in the New Economy*. Heidelberg, Springer.
- Neal, W. and J. Wurst (2001). Advances in Market Segmentation. *Marketing Research*, Spring, 13(1): 14-18.
- Petrovic, O., C. Kittl and R. D. Teksten (2001). Developing Business Models for eBusiness. International Conference on Electronic Commerce 2001, Vienna.
- Petrovic, O., C. Kittl and R. D. Teksten (2001). Developing Business Models for eBusiness. International Conference on Electronic Commerce 2001, Vienna.
- Piller, F. and K. Moeslein (2002). From economies of scale towards economies of customer integration: value creation in mass customization based electronic commerce. Working Paper, Dept. of General and Industrial Management, Technische Universität München
- Porter, M. (2001). Strategy and the Internet. *Harvard Business Review*, March.
- Richards, I. and J. Morrison (2001). Using flight simulators to build robust dot-com strategies. *Accenture*
- Sabherwal, R. and Y. E. Chan (2001). Alignment Between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders. *Information Systems Research*, March, 12(1): 11-33.

- Sarkar, M., B. Butler and C. Steinfield (1995). Intermediaries and Cybermediaries: A Continuing Role for Mediating Players in the Electronic Marketplace. *Journal of Computer-Mediated Communication (JCMC)*, 1(3).
- Stabell, C. B. and O. D. Fjeldstad (1998). Configuring value for competitive advantage: on chains, shops, and networks. *Strategic Management Journal*, 19: 413-437.
- Stähler, P. (2002). Business Models as an Unit of Analysis for Strategizing. International Workshop on Business Models, Lausanne, Switzerland.
- Sterman, J. D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston, McGraw-Hill.
- Ushold, M. and M. King (1995). Towards a Methodology for Building Ontologies,. Workshop on Basic Ontological Issues in Knowledge Sharing held in conjunction with IJCAI-95, Montreal.
- Van der Heijden, K. (1996). *Scenarios: The Art of Strategic Conversation*, John Wiley & Sons.
- Wedel, M. (2001). Is Segmentation History? *Marketing Research*, Winter, 13(4): 26-29.