

ORGANIZATIONAL AND INFORMATION SYSTEM METAPHORS IN THE HEALTH CARE SECTOR – FROM HARMONIZED VALUE CHAIN TO REALISTIC MARKET MODELS

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ABSTRACT

The conceptual models actors in the implementation process of information systems carry towards the systems have a deep impact on their adoption. The metaphors that are provided for health care professionals by information system professionals and especially vendors are often too simplistic. Health care professionals do not understand the social complexity of implementing extensive information systems. This article calls in for more realistic metaphors about organizational reality and its information processing, to be used by information professionals in the health care industry. To draw in a comparison to the health care field, we think we see a similar development there. Until long in the 1980s, and still partly today, cure provision for sick people was based solely on conceptualizing him/her as a physical entity. First more recently a more comprehensive approach has won ground in the field: first now humans are understood as complex systems, whose health is not just a function of physical factors, but which too include a multitude of intertwined social and mental processes.

1. INTRODUCTION

Because of several reasons, the health care sector might not have a similar tradition in the use of information systems than many other industries. First, application of ICT (information and communication technology) is quite a new phenomenon in health care. Second, transformation has been very intensive and fast. Third, the health care is dominated by strong professionals that have their core competencies in other areas than organization and information management, on the contrary to the situation in most established information system users in the commercial, not to speak about the administrative, field.

In any, but especially in this greenfield situation, the conceptual models actors in the implementation process of information systems carry towards the systems have a deep impact on their adoption. Our main argument here is that health care professionals are served with too simplistic models about organizational computing by information system professionals, and especially the firms implementing systems. Health care professionals do not understand the social complexity of implementing extensive information systems.

Organizational and information processing metaphors serve as a basis for the conceptual model actors build towards an information system (Kaarst-Brown and Robey, 1999). In this paper we shortly discuss three types

of organizational models observable in use by health care professionals. The first group is that of simple or more positively put harmonized models, those in our opinion are much used but do not provide a complete picture of the complexity of real world. To this group we include organizational metaphors of

- Value chain
- Care taking -chain
- Governance structure

The second set of metaphors consists of those models that we consider as more appropriate and also established in the information system field, especially in discussions about modern telecommunication-based market forms. These metaphors focus more on the complexity of external interactions of the organization. Here we include the organizational metaphors of

- B2B-marketplaces
- Syndication
- Strategic alliance

Finally, in the third group we "rehabilitate" some older metaphors, which we find appropriate especially for the health care field:

- Superbrain
- Jazz band

The discussed metaphors are of course selected on a subjective basis. There is no complete or authoritative list of possible metaphors. Metaphors are used in daily operative and cognitive interactions, and are unstable: some are trendier in some situations, some are fast forgotten, some have most surely not even emerged yet.

Our main chapters are dedicated to the discussion on these three types of metaphors. For each metaphor, we try to express the main idea. Further we elaborate on its strengths and weaknesses, and finally assess its applicability in the health care sector.

To include some perspective to the discussion, we first discuss the need for metaphors and set out a broad understanding of the organizational reality health care lives in, in order to understand the specific characteristics of the application area. In conclusions, we discuss what could be done to expand the metaphor set used by health care professionals, in order to meet the reality check coming in sooner or later.

Our research questions are

- Which are the metaphors through which intra and- interorganizational activity in health-care is understood
- Which are the merits and shortcomings of each metaphor
- How can we add realism to the metaphors: also which should be deserted and which should be emphasized
- Which would be the implications for information system development in the area

The work is conceptual in nature, but supported with empirical examples from the Finnish environment, where we have participated to several projects in the health care sector since 1997. The more recent of them reported in (Suomi et al., 2000a, Suomi et al., 2000b).

2. THE ROLE AND NEED FOR METAPHORS

The importance of metaphors is clearly expressed by (Shivastra and Barret, 1988):

“The process of giving language to experience is more than just sense-making. Meaning also directs actions toward the object you have named because it promotes activity consistent with the related attribution it carries. To change the name of an object connotes changing your relationship to it because when we name something, we direct anticipations, expectations and evaluations toward it.”

Robert M. Mason (1991a) posits in his paper that metaphors perform a crucial role in enacting strategy and linking strategic thinking with IT planning. According to him, metaphors serve four important roles in that process:

- First, metaphors provide a way to encapsulate features of a situation or process and communicate these aspects to others without having to spell out all the details.
- Second, metaphors perform a significant role in providing a conceptual framework and vocabulary in new situations, setting in which there is little or no previous experience.
- Third, metaphors promote understanding by requiring active engagement in the communication process.
- Fourth, because of the same characteristics that enable us to comprehend one concept in terms of another, metaphors necessarily “highlight” some aspects and “hide” others.

Through these four roles, metaphors exert powerful influences on how problems are defined and solved. Metaphor has been shown to be important in selecting and describing problem solutions, identifying solutions from which to choose, and stimulating creative thinking (Mason, 1991, Tsoukas, 1991).

Especially usable metaphors are in economic analysis, which can be complicated and difficult to summarize. Distinctive features of economic analysis are (Folland et al., 1997):

- The assumption of rationality
- The use of abstraction
- The use of marginal analysis
- The use of models as metaphors.

Information systems and health are both very complex constructions and understanding them thoroughly demands a lot of expertise. Therefore, metaphors are badly needed just in these two areas. By that way it is also possible to create common language between IS- and health care –professionals.

3. ROLES OF IT IN HEALTH CARE

The cumulative amount of knowledge about human, the most complicated mechanism in the world, is immense. No one can completely master it and methods for sharing and exchanging information are badly needed. Information technology, and especially the Internet, has opened up new avenues for this activity. On the same time, because of modern information technology the possibilities to produce new medical information have increased remarkably. Vast data masses can effectively be stored, analyzed and modeled. If we still add to the developments a possibility to interact with the patient in completely new dimensions, say for example through better customer (patient) information management and telemedicine, some of the components in the wheel of IS-based health care industry informatization become apparent (Figure 1) (Suomi et al., 2000a).

The management of the ever-growing mass of information has emerged as one of the key issues in health care. The quality demand for the information is high and thus strict quality controls are needed. The

information is not moving only to one direction. There are usually several internal and external horizontal and vertical interest groups using the information. In the era of paper documents the problem has been that the information in different units inside the organization (not to mention outside co-operators, like social services) has not always been in real time and just in one copy. Electronic information systems have been an effective cure for that. However, the problem haven't vanished totally, but in some cases only changed the form. In the worst situations, without proper management of the systems, result is an incompatible entity of several applications with corrupted information.

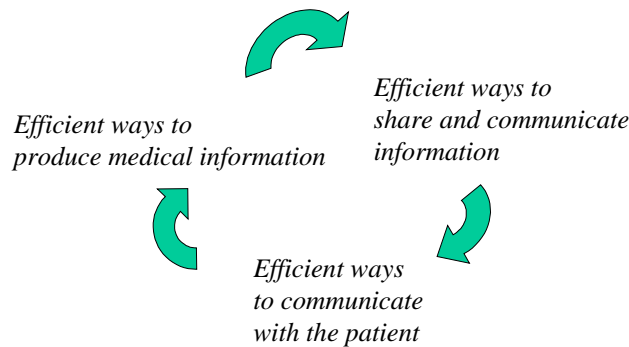


Figure 1: IS-based health care industry informatization

In the health care there are also many traditionally strong interest groups which present their view as the truth. The clinicians are usually the strongest group with a strong professional view to core processes. Another group is the nurses and other nursing staff. The management of the health care offices has a strategic view and the management of the city (politicians and managing office holders) has a view of the whole city and also the view of the voters. With this mix of views the management is not easy and the decisions are usually compromises.

The competition in the area has been somewhat small. In most European countries the public health care have been a backbone of the services and the private sector have had more like a complementary role (Saltman and Figueras, 1997, Jakubowski and Reinhard, 1998). The lack of competition has been one reason for the ineffectiveness of the public health care. Neither the strategic management has been the key issue in the area.

There are many others issues, which are characteristics to the health care area and which are important when management is discussed in the area; organization of the information systems management and development, regional co-operation, defining product structures and costs, restructuring processes, sourcing (in- or out-) decisions, training of the staff etc. The need for the whole new management approach to the area seems increasingly necessary.

4. HARMONIZED MODELS

4.1 Value Chain

Porter made the value chain concept popular (Porter, 1985). Since then the concept has been widely used, but has too awoken a lot of critique for its simplicity, see for example (Hendry, 1990). The basic idea of the value chain is a one-directional flow of material and information in a production process. The value chain emphasizes the resources needed for production, but does not mention information or information systems, at least not explicitly.

The strength of the value chain is its simplicity. It paved the way to the thinking that organizations should concentrate on the main value adding activities later called core competencies. The weakness of the value

chain lies in its one-direction flow of activities. The value chain is unable to explain complicated market-based interactions, not to speak of modern virtual organizations.

Modern health care must happen in a network, where different parties provide their input to an end product, be it a healthy individual, or the health of a population in general (see also our discussion on the superbrain metaphora). This network is very unstable, often conflict-laden and most surely less than optimal in performance. It is far away from the romanticized “value chain” of business literature, and even further away from the like “seamless care taking-chain” proposed in health care language. The chain metaphor is one-dimensional and flows to one direction, whereas in practice the activities take place in many directions and in a networked mode.

4.2 Care Taking-Chain

In the model of care taking-chain the main focus is on the customer. In the model various health care providers form a chain where the customer is moving depending on the treatment needed. In the Finish health care the most discussed chain is between social services, primary municipal health care and special health care. Patients don't have to take care of difficult bureaucratic activities. They receive all necessary treatments without needless and sometimes even double examinations or explanations. Information of the patient is in real time in every organization.

It is questionable if the idea adopted from the value chain model where focus is in the industry product is adaptable to the environment where the human is in the central role. In the case of human the chain, routines and the product thinking might sound somewhat cold and inappropriate. One can't help from thinking a human in a conveyor where you don't have to do anything, say anything and interact with anything (anyone).

There is also a question of responsibility. The chain should be seamless only to the patient. Under the invisible chain there are several organizations interacting in complicated system where the responsibilities should be clear. If the node is too loose there might emerge conflicts of responsibilities between organizations. Therefore the organizations should maintain the clear lines between each other.

The idea of care-taking chain should not however be abandoned. For the elderly people the idea that all the patients' information concerning health is taken care by an invisible chain might be good news. The question is, how much the patients want to interact with the organizations and the health care staff. The need to control and possess your own information is usually strong. The invisible chain thinking can reduce it. The model sounds also slightly passivating. The idea in modern thinking is however to activate people to participate more to the society's activities and also to allow patient to participate more on his/her own care. Providing also a possibility for the patient to control and check the information might help the model to fit better to the health care sector.

4.3. Governance Structure

A typical way to look at an organization is to see it as a governance structure. The basic alternatives for governance are market and hierarchy. In sourcing decision terms we speak of in- and outsourcing.

Researchers have suggested several reasons why firms outsource their IS. These key drivers include financial reasons, such as reducing costs, generating cash, and replacing capital outlays with periodic payments. Firms also outsource IS to simplify the management agenda and focus on their core competencies. Technical reasons for outsourcing, such as improving the quality of IS, gaining access to new talent and technology, and the easy availability of vendors with expertise and economies of scale have also been proposed. “Political” reasons for outsourcing include dissatisfaction with the IS department and the chief information officer, viewing IS as a support function, pressure from vendors, and a desire to follow a trend that has received wide coverage in popular press (Smith et al., 1998).

The conventional guideline is that all new and strategically important tasks should be performed internally. According to (Reponen, 1993) organizations should consider a combination of different alternatives along

the spectrum of total outsourcing or insourcing. Organizational decisions should be made consciously and they should be based on the company's IS strategy.

Information and knowledge is considered as one of the most important resource in health care and that makes management of information an important issue. Health care organizations have started to adopt information systems quite lately and there has not yet cumulated expertise and traditions to manage them. The lack of expertise has resulted that information systems have developed as difficult, complex and expensive entities to control and therefore the trend is towards outsourcing.

5. MARKET-ORIENTED MODELS

5.1. B2B-Marketplaces

At the broadest level there are two ways how company can buy services or products. It can either use systematic sourcing or spot sourcing. In systematic sourcing it can use negotiated contracts with qualified suppliers. In the spot sourcing it uses often different suppliers to fulfill the immediate need at the lowest possible cost (Kaplan and Sawhney, 2000). Both can be used in business-to-business (B2B) marketplaces where the purpose is to offer an effective channel for customers and suppliers to trade.

New and effective marketplace to do B2B is offered by Internet. There are several reasons why companies have started to use internet as a business place; huge number of buyers and sellers together, automated and cost effective transactions, giving sellers access to new customers, pioneering possibilities, less credit losses, and also "because our competitors are doing this". (Kaplan and Sawhney, 2000, Puhakainen and Malinen, 2000). In the information systems point of view, the Internet has facilitated use of several applications: supplier management, inventory management, distribution management, channel management and payment management. Those applications can be use to do orders, check stocks, choosing appropriate distribution channels, check terms of payment etc. to rationalize orders. (Kalakota and Whinston, 1997).

The strength of B2B marketplaces is the effectiveness. Supplier can meet provider and vice versa in a place agreed beforehand and the arduous and expensive search for best partner can be forgotten. Another strength is trust (if the marketplace is reliable) when the partners in the marketplace are known. The weaknesses of using B2B marketplaces can be commitment to one or only few partners when the price, service or other functions of other possible partners can be missed.

The health care sector is quite rigid when considering products or services supply. When the organization is supplying outside, there is usually a public competitive bidding for suppliers. Usually one or few supplier is chosen and the prices are fixed after the process. It can be considered as a systematic sourcing but the problems are that the contracts usually last several years and are not negotiable. In the B2B idea is that the suppliers and the vendor could effectively compare the partners and easily change it.

Inside the organization however the supply of services is more straightforward. The services are acquired from certain vendor (unit) and the prices, quality and the trust are expected, which all are included to B2B marketplace idea. The lack of B2B model in completely insourced health care services is that there are no alternative service providers. In the case of mixed sourcing options where there are both external and internal providers, the B2B model is in more appropriately environment. Then also the selection of providers is included. Use of B2B marketplace model could clarify the organizational structures in health care e.g. that who is doing "business" with whom and is there any alternative places to gain those services.

5.2 Syndication

Syndication involves the sale of the same good to many customers, who then integrate it with other offerings and redistribute them. In the traditional business world the fixed physical assets and slow moving information of the industrial economy the syndication has been rare. The increased use of information

systems has made use of syndication possible. Information systems offer a fluid and flexible networks which syndication requires operating. The features of syndication are that it works only with information goods, it needs modularity and it requires many independent distribution points. (Werbach, 2000).

In the health care organizations there are usually several health stations. Those all offer mainly the same products or services to the clients. In addition those all are independent and inside the units several service products can and has to be put together to achieve the required service. The service provided from the stations is usually information. These cover all the features that determine syndication.

The information between health care units is more often transferred via data networks. Also the use of internet is increasing and thus the health care products form an ideal entity to use syndication as a metaphor for effective distribution of health care products. Although not all the products are of course possible to offer through networks like operations, the knowledge used to perform those can be acquired through idea of syndication. The patient record systems offer information in the network to all members in the health care staff (authorized) who need it to perform good treatment.

5.3 Strategic Alliance

Strategic alliances are one way to expand or secure own activities or markets. The definition of strategic alliances varies a lot but in a widest definition it includes forms like joint venture, marketing and distribution, franchising, R&D, licensing, consorting and subcontracting. Like already the word “strategic” points out, all the partners in co-operation should benefit from it in long-term and if possible the scale of benefits should be equal. For strategic alliances it is also characteristics that those are carried out with competitors and that the companies involved can be different in size. (Lorange and Roos, 1992, Goold et al., 1994, Faulkner and Johnsson, 1992)

Motives for forming strategic alliances are several. They can be external motives like ever changes in R&D environment, benefits of scale, increasing instability, government’s activities and increasing competition and internationalization. Internal motives can be lack of resources, reducing risks, transaction costs, speed of products life cycle and learning. (Lorange et al., 1992). It is obvious that the motives differ from companies depending e.g. size and products but there are several motives that can be identified in all companies.

The health care sector differs a lot from traditional company, which faces competition. Health care don’t face equal problems of multinational or high tech companies which struggle to survive. One important distinction is in shareholder thinking when owners of private company is expecting profits, the shareholder in health care is expecting better service (customer) and effectiveness (government). Owners of the both sectors have their expectations of the business although the outcome is different.

The strategic alliance as a metaphor is adapting well in the health care area. While the demand of services is increasing (Saltman and Figueras, 1997) the supply of them lacks resources. Other internal factors like high transaction costs, increased volume of new treatments (product cycle), new technology (clinical) and need for constant learning as well as external factors like governments demands (requirements for the municipalities), R&D and benefits of scale are making use of strategic alliance suitable for the area.

Externally, the basic chain of health care is including most often at least social services, basic health care and special health care, which work in co-operation. However the effectiveness of this chain is not best possible and there are several overlaps. Competition is not a reason for the overlap, but the lack of co-operation and the lack of knowledge of partner’s functions are. One of the basic ideas of the strategic alliance is that the individual and internal goals of the partners don’t have to be convergent but they have to co-operate to achieve those goals, (Shaugnessy, 1995). In health care the common goal is of course healthy citizen but each partner have specific resources to realize that goal. With alliance both goals are achievable.

6. "REHABILITATED" MODELS

6.1. Superbrain

The superbrain metaphor was used in the 1960s and 1970s as a metaphor for regional policy. Proponents of the metaphor wanted to support the development of big cities at the cost of rural areas. The idea is that by concentrating activities to the large unit it is possible to achieve cumulation of knowledge, innovation processes and social networks.

Current research stresses that in order to build up a superbrain all activities must not be collected to a single physical place. Virtual organizations can take up the place of a superbrain. A good example is the "open source software movement". A group of free individuals jointly contributes to a common goal.

Joint work for a common goal is usual in health care too. The health of an individual is a joint effort of many different professionals that must all work towards the same goal. One doctor must coordinate the activities, but very many different skills are needed, and there must be tools and techniques to bring these skills together. Why not then to mirror this kind of activity in the metaphors of health care too.

According to (Markus et al., 2000), the open source software movement and other virtual organizations have the following glue elements that keep the work concentrated:

- Managed membership
- Rules and institutions
- Monitoring and sanctions
- Reputation.

We feel that these elements are well visible in the health care industry. The profession is highly regulated (managed membership) and covered with a multitude of rules and institutions. Reputation is a key motivating factor for health care professionals, especially in the category of top performers. Just the monitoring and sanctions toolkit is yet underdeveloped in our point of view.

We can see very practical superbrain developments in health care. Physically hospitals grow bigger and bigger and concentrate on a few units. In the virtual organization, the trend is the same. Huge Internet-based portals and hospitals provide access to a multitude of data, information, knowledge and personal consultation when needed.

6.2. Jazz-Band

The production of music differs a lot from music type to another. A symphony orchestra is lead by a single orchestra conductor and the orchestra is playing by a way he/she sees it is best. There is not usually space for individualist. The violins cant start improvising without conductor let them to do so. Less management oriented music type can be pop music where the song is always played according same notes but there is possibility to improvise during the solo parts. Maybe the most improvised music type is jazz music, where the band members have lots of freedoms. In the jazz type called jazz-fusio, all the musicians seems to play different song, but the result is desired. The band acts as a highly trained self-steering organization, where all the professionals know what to do to achieve the required goal. Nobody have to manage them during the session. However during the training period there can be a manager who gives the guidelines how and what to play. (Zack, 2000, Hatch, 1998, Lewin, 1998).

The health care environment in the best situation can act like a jazz band. There are only educated professionals working in the organization who all know their job. The organization doesn't need a daily management to do their duties but in the long run somebody have to draw the guidelines – strategy – what the eventual goal is. The organization is as jazz band, a self-steering. The model also stresses the character of

health care where professionals to need to have freedom to make own decisions. In an emergency situation there is usually no time to discuss the working or the strategic effect of the operation.

7. CONCLUSIONS

The metaphors we used are summarized in Table 1.

Our analysis clearly shows that the currently used metaphors are inadequate in describing the organizational complexity of health care. So might the new ones be also, put adding more components to the metaphor portfolio will surely help the situation.

Metaphor name	Main message	Strengths	Shortcomings	Contribution to the health care field
Value chain	Streamline flow of material and information in a production process	Simplicity Concentrates on core competencies	One-dimensional flow of material and information Information processing capabilities in no role	Health care happens in a complicated network – value chain too simplistic
Care-taking chain	Customers as objects in a flow of operations	Customer orientation	Little emphasis on responsibilities over and owners of actions	Understanding health care as a value chain is one possible metaphor
Governance structure	Search for each activity the most effective and efficient resource	Suits well the modern network organization	With outsourcing, own control and learning experience might be lost	In health care, where expertise is fragmented and scarce, outsourcing activities is a natural tendency
B2B marketplace	Professional organizations are meeting in a regular place to do business	Effective Focused Reliable (needs authorization/ Recommendations)	Inability to see other options	Internally can give value and clarity to the organization
Syndicate	Way to integrate different information services to one complete product	Fits for area where information is fragmented	Several limitations for use Information products only	Ideal for the health care where several (often) independent services form one product
Strategic alliance	Through co-operation partners can achieve equal and separate goals	Co-operation gives strength to otherwise weak areas	Opportunism Lack of balance of partners (size, outputs, interest etc.)	Between different external and internal interest group network clarifies the goals of the groups
Superbrain	Cumulation of knowledge and innovation; big challenges need joint efforts	Places knowledge and innovation in a central place. In line with practical developments in health care field	Not supporting current trends of decentralization	There is a need to take a closer look to the mechanism that make a superbrain born and work
Jazz band	A self steering organization	Stresses the professional skills Possibility to improvising	Not good for organizing purposes	Management of highly skilled professionals must be flexible

Table 1: A summary of the discussed metaphors

What could then be done in order to get the more complex and realistic metaphors into a wider use in the health care field? We propose the following actions:

- Health care organizations often work with modest resources in the health care, especially as it comes to senior managers in the health care sector. That is why they are left on the mercy of vendors and solution suppliers, who of course want to give a positive and fluent picture about the usage of their products. Our advice is to involve more experienced information system professionals to the field.
- Failing projects often teach more than successful ones. Discussion about them should emerge. Even more forums for practical and academic discussion on the field should be established.
- Simply let time run. The field is in the enthusiastic contagion phase (Nolan, 1973), more recently (Damsgaard and Scheepers, 2000), where problems are not thought of and most of them have simply not emerged yet. The famous Finnish saying by the Finnish Prime Minister Paavo Lipponen suits here well: "Let the Siberia teach".
- Put the gravity point of activity on humans. Information systems are not running without dedicated users. In project plans, education and tutoring the usage of systems should be given more emphasis at the cost of the technical infrastructure.

Metaphors of organization clearly guide our thinking and actions. Surely there is no single and right metaphor. The bigger the spectrum of different organizational models available and meaningful for an organization by its members, the richer the understanding of the organizational reality. Richer understanding of the organization makes it possible find richer alternative solutions to problems, also fosters innovation, that is badly needed in the health care sector with its cumulating pressures.

In general, we feel that the current trendy metaphors in the health care, such as care-taking chain and outsourcing, are copied from the manufacturing industry and data a few years back. More modern metaphors used in the Internet-economy, such as syndicates and strategic alliance have not yet found their way to the health care sector. In this aspect too, the flow of innovations should be faster. In a modern human information economy, health care should be the place where metaphors are born, not a place to where they are without any critic and discussion copied.

REFERENCES

- Damsgaard, J., and Scheepers, R. (2000). Managing the crises in intranet implementation: a stage model. *Information Systems Journal* 10, 131-149.
- Faulkner, D., and Johnsson, G. (1992). *The Challenge of Strategic Management*. Kogan Page Ltd., London.
- Folland, S., Goodman, A. C., and Stano, M. (1997). *The economics of health and health care*. Prentice-Hall, New Jersey.
- Goold, M., Campbell, A., and Alexander, M. (1994). *Corporate Level Strategy: Creating value in the Multibusiness Company*. John Wiley & Sons Inc., New York.
- Hatch, M. J. (1998). Jazz as a metaphor for organizing in the 21st century. *Organization Science* 9, 556-557.
- Hendry, J. (1990). The Problems with Porter's Generic Strategies. *European Management Journal* 8, 444-450.
- Jakubowski, E., and Reinhard, B. (1998). Health Care Systems in the EU: a Comparative Study (Edited:., Champers and R. Graham, eds.). European Parliament, Luxembourg, European Parliament Directorate General for Research: working paper. Public Health and Consumer Protection Series.
- Kaarst-Brown, M. L., and Robey, D. (1999). More on myth, magic and metaphor: cultural insights into the management of information technology in organizations. In *Information Technology & People*, Vol. 12, pp. 192-217.

- Kalakota, R., and Whinston, A. B. (1997). *Electronic commerce : a manager's guide*. Addison-Wesley Pub., Reading, Mass.
- Kaplan, S., and Sawhney, M. (2000). E-Hubs: The New B2B Marketplaces. *Harvard Business Review* 78, 97-103.
- Lewin, A. Y. (1998). Jazz improvisation as a metaphor for organization theory. *Organization Science* 9, 539.
- Lorange, P., and Roos, J. (1992). *Strategic Alliances: Formation, Implementation and Evolution*. Blackwell Publisher, Cambridge, Massachusetts.
- Lorange, P., Roos, J., and Bronn, S. (1992). Building Successful Strategic Alliances. *Long Range Planning* 25, 10-17.
- Markus, M. L., Manville, B., and Agres, C. E. (2000). What makes a virtual organization work. *Sloan Management Review*, 13-26.
- Mason, R. M. (1991). Metaphors and strategic information systems planning. In HICSS, pp. 231-240. IEEE.
- Nolan, R. L. (1973). Managing the Computer Resource. In Communications of the ACM, Vol. 16, pp. 115-126.
- Porter, M. (1985). *Competitive Advantage*. The Free Press.
- Puhakainen, J., and Malinen, P. (2000). European SMEs and Electronic Commerce - A Seller's Perspective in Business-to-Business Operations. TUCS - Turku Centre for Computer Science, Turku.
- Reponen, T. (1993). Strategic information systems - a conceptual analysis. *The Journal of Strategic Information Systems* 2.
- Saltman, R. B., and Figueras, J. (1997). European Health Care Reform: Analysis of Current Strategies. European Series, WHO regional publications.
- Shaugnessy, H. (1995). International Joint Ventures: Managing Successful Collaborations. *Long Range Planning* 28, 10-17.
- Shivastra, S., and Barret, F. J. (1988). The transforming nature of metaphors in group development: A study in group theory. *Human Relations* 41, 31-64.
- Smith, M., Mitra, S., and Narasimhan, S. (1998). Information Systems Outsourcing: A Study of Pre-Event Firm Characteristics. *Journal of Management Information Systems*.
- Suomi, R., Tähtkäpää, J., and Holm, J. (2000a). Different Conceptual Approaches to Understand Health Care Information Systems. In IRIS 23 (Information Systems Research Seminar in Scandinavia) Laboratorium for Interaction Technology, University of Trollhättan Uddevalla.
- Suomi, R., Tähtkäpää, J., and Holm, J. (2000b). Multidimensional evaluation of a health care network solution. Case Primus-Turku Finland. In 7th European Conference Evaluation of Information Technology (ECITE), 28-29th September, Trinity College, Dublin, Ireland.
- Tsoukas, H. (1991). The missing link: A transformational view of metaphors in organizational science. *Academy of Management Review* 16, 566-598.
- Werbach, K. (2000). Syndication: The Emerging Model for Business in the Internet Era. *Harvard Business Review* 78, 85-93.
- Zack, M. H. (2000). Jazz improvisation and organizing: Once more from the top. *Organization Science* 11, 227-234.