

Pascal Sieber and Joachim Griese (Eds.)
Organizational Virtualness

Proceedings of the VoNet - Workshop, April 27-28, 1998

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Pascal Sieber and Joachim Griese (Eds.)

Organizational Virtualness

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Contents

Preface	V
Call for Papers	VII
Resumée of VoTalk	9
<i>Nicole Strausak</i>	
Invited Papers	
The Realities of Virtuality	25
<i>David J. Skyrme</i>	
Global Virtual Teams: Integrating Models of Trust	35
<i>Sirkka L. Jarvenpaa and Thomas R. Shaw</i>	
The Importance of Trust and Business Relationships in the Formation of Virtual Organisations	53
<i>Christopher P. Holland</i>	
Workshop Papers	
Characteristics of Virtual Organizations	65
<i>Hans Jägers, Wendy Jansen and Wilchard Steenbakkers</i>	
Configuration of Virtual Enterprises based on a Framework for Global Virtual Business	77
<i>Walter Eversheim, Thomas Bauernhansl, Carlos Bremer, Arturo Molina, Sascha Schuth and Martin Walz</i>	
Organizational Virtualness in Business and Legal Reality	85
<i>Andreas Pletsch</i>	
A Framework for Virtual Organizing	93
<i>Roland Klüber</i>	
Organizational Virtualness - The Case of Small IT Companies	107
<i>Pascal Sieber</i>	

Contents

Managing Virtual Work: A Framework for Managerial Action	123
<i>Mary Beth Fritz and Marvin L. Manheim</i>	
Information Technology Tools to Support Virtual Organization Management: A Cognitive Informatics Approach	137
<i>Marvin L. Manheim and Mary Beth Fritz</i>	
A Cooperation Platform for Virtual Enterprises	155
<i>Benno Suter</i>	
The Management of Organisational Core Competencies	165
<i>Sue Balint and Athanassios Kourouklis</i>	
Shared Services in Accounting and Finance	173
<i>Dirk Swagerman and Jorn van Steenis</i>	
Electronic Software Distribution in a Virtual Software House	189
<i>Patrick Heartsch and Katarina Stanoevska-Slabeva</i>	
Panel Discussion	
Lessons From Managerial Theories for Improving Virtualness in Electronic Business	203
<i>Arjen Wassenaar, Rajesri Govindaraju, Elisa Moreno Bragado, Ariane von Raesfeld Meijer, Pieter Ribbers and Dirk Swagerman</i>	
Author Index	225

Preface

VoNet the Newsletter @ <http://www.virtual-organization.net> and the newslist VoTalk are celebrating their first year in existence. During this time they have attracted a lot of attention from researchers and from managers. VoTalk has now 824 passive and 688 active subscribers from more than 30 countries. In the moderated newslist they exchange about 5 messages a week. 17 articles have been published in the Newsletter and the number of submissions is increasing.

To concentrate on the topic of organizational virtualness we organized a workshop in April 1998 to present and discuss research in progress. Virtualness - as we know from the contributions to VoNet and VoTalk as well as from other relevant literature - not only consists of computer mediated communication but also needs face-to-face meetings to intensify social connectivity and awareness among groups of people concerned with the same activities. Therefore a two day workshop was held in Bern. The topic was not too narrowly defined: it included organizational virtualness and all the research activities and practical experiences that focus on organizational structure, behavioral patterns and technological support of virtual organizations, as well as virtual organizations in a global operation and the management of virtual global organizations. The program committee has selected 12 papers that not only represent all kinds of different aspects, but are also outlines of interesting research projects or practical experiences in themselves.

Our thanks go to the program committee:

- Kevin Crowston, Syracuse University,
- Judith Gebauer, Berkeley University of California,
- Hans Georg Gemuenden, University of Karlsruhe,
- Joachim Gries, University of Bern,
- Christopher Holland, University of Manchester,
- Bernhard Katzy, University of St. Gallen, Erasmus University Rotterdam,
- Stefan Klein, Westfälische Wilhelms-Universität Münster,
- Pascal Sieber, University of Bern,
- Jörg Sydow, Freie Universität Berlin, and
- Udo Winand, University of Kassel - GhK,

who made it possible to have high quality reviews within a very short time. We also want to thank Thomas Fux and Yves Grossenbacher for their administrative support, the Simowa Verlag for the fast and uncomplicated way in which they published these proceedings and the Unic Internet Consulting as well as 21st Century Net for the Web hosting and development support. Of course, this book would not exist without the contributions of the authors. Thank you for your time and ideas.

Bern, April 1998, Pascal Sieber and Joachim Gries

Call for Papers

Dear researchers and managers

VoNet the Newsletter @ <http://www.virtual-organization.net> as well as the newslist VoTalk celebrate their one year existence. In this time it has gained a lot of attention by researchers and also by managers. To concentrate on the topic of organizational virtualness we will organize a workshop for presentation and discussion of research in progress in April 1998. Virtualness - as we know from your contributions to VoNet and VoTalk - not only consists of computer mediated communication but also needs face-to-face meetings to intensify social connectivity and awareness among groups of people concerned with the same activities. Therefore we would be pleased to meet you for a two day workshop in Berne, Switzerland. The topic of the workshop will be organizational virtualness including all the research activities and practical experiences that focus on organizational structure, behavioral patterns and technological support of virtual organizations as well as virtual organizations in a global operation, the management of virtual global organizations, etc.

Submissions

Papers submitted to the program committee should be focused either on grounded descriptions of practical experiences, case studies, frameworks, theoretical foundations, or panels of topics belonging to the areas of organizational virtualness.

Contributions should be about 2'000 words in length for research in progress and about 600 words for panel proposals, contain an abstract, and a separate page with authors affiliation.

Please send your contribution by email or ftp, formatted in HTML, RTF or Winword to Pascal Sieber (sieber@im.iwi.unibe.ch) or contact Pascal Sieber for alternative submission procedures.

Important dates

Deadline for submission:	March 2, 1998
Notification of acceptance:	March 23, 1998
Pre-Publication of accepted papers:	April 14, 1998 (on http://www.virtual-organization.net)
VoNet Workshop:	April 27-28, 1998 in Berne Switzerland

Reviews

All papers will be blind reviewed by the program committee. Accepted papers will be discussed in advance of the workshop between April 14 and April 26, 1998. The platform for discussion will be VoTalk.

Program committee:

- Kevin Crowston, Syracuse University,
- Judith Gebauer, Berkeley University of California,
- Hans Georg Gemuenden, University of Karlsruhe,
- Joachim Griese, University of Bern,
- Christopher Holland, University of Manchester,
- Bernhard Katzy, University of St. Gallen, Erasmus University Rotterdam,
- Stefan Klein, Westfälische Wilhelms-Universität Münster,
- Pascal Sieber, University of Bern,
- Jörg Sydow, Freie Universität Berlin, and
- Udo Winand, University of Kassel - GhK,

Participation

All contributors will be invited to the workshop, whether their paper is accepted or not. Besides this group of people the program committee will invite researchers and managers with an interesting research or practical background.

The participation is free, participants are only requested to cover their travel expenses and accommodation.

Publication

Accepted papers will be published in the conference proceedings, distributed on the Internet and as paper back booklet. Participants are further invited to publish their revised papers in VoNet Vol. 2, No. 2 (due to June 1, 1998) or No. 3 (due to September 1, 1998).

High quality papers will be considered for further review and possible publication in the Journal of Global Information Management (JGIM). Please visit JGIM's website at <http://www.idea-group.com/jgim.htm> for details about the Journal's emphasis and submission guidelines.

Resumée of VoTalk

Nicole Strausak

The following summary of VoTalk concentrates on the most important opinions on 12 topics that have been discussed in the VoTalk Newslist from September 1997 to March 1998. It is, of course, a selective summary. Please contact me (strausak@im.iwi.unibe.ch) if you feel misrepresented or if you would like to add something.

To take part in the VoTalk discussion, access <http://www.virtual-organization.net> and follow the link "Mailing List". The email addresses of the contributors mentioned in the following summary are published under the same URL.

1 Definition and Delineation

1.1 Definition of Virtual Organizations

Maarit Ivalo sums up the discussion about the definition of a Virtual Organization as follows. There were two interesting definitions put forward: A Virtual Organization is a temporary network of independent institutions, enterprises of specialized individuals that through the use of Information and Communication Technology, spontaneously unite to utilize an apparent competitive advantage. They integrate vertically, bring their core competencies and act to all appearances as a single organizational unit. The other definition states that a Virtual Organization is an identifiable group of people or organizations that makes substantially more use of Information and Communication Technologies than physical presence to interact, conduct business and operate together, in order to achieve their objectives.

The aim of the Virtual Organization is to achieve market differentiation by performing better. The corporation obtains all non-critical competencies (activities) from outside, i.e. from other corporations with which it forms a Virtual Organization. Furthermore it aims to improve competitiveness and productivity, to enhance efficiency and responsiveness and decrease overheads.

Key factors mentioned are: emphasis on a more egalitarian approach to management, the entities involved are in(ter)dependent and yet tied together in a loose network with some pre-defined procedures or protocol to guide any collaborative arrangement entered into, the key to creating a Virtual Organization is „human“ and not technology, a Virtual Organization must touch on (an) issue(s) that have a direct, immediate impact on the group involved, legislation on the Virtual Organization might differ from country to country, commitment from each participant to the Network Organization (spontaneous Network Organization) or to

reaching the (short term) goal of the Network Organization (forced Network Organization), all comments should be public and shared with the entire group, learning how to think in the Information Age is the single most critical „technology skill“ which you must acquire as an associated partner.

Maarit comes up with the following points of discussion: Temporary - Virtual Organizations can be very intentionally planned for the long term. Spontaneous - not necessarily and where is the border between spontaneous and forced? Independent - we talk about interdependent, because the common goals can not be reached by each individual autonomously. A way to efficiently retain the benefits of autonomy while reaping the benefits of collaboration. Vertical integration - flat and non-hierarchical or horizontal or diagonal. Core competencies - is becoming a buzzword, we prefer core activities. Unite - semi-stable relationships. Information and communication technologies - not in the definition, but as a pre-condition.

Raymond E. Rogers adds that „spontaneously unite“ should probably be relegated to „self organizing systems“. Real organizations take on their own forms virtually independent of the intent of the individuals. Pressure to force the form typically just distorts and is counterproductive. In the opinion of Forrest L. Horn both structure and culture are affected by the personalities of the original founders and to a lesser degree by the personalities of the people at the top during the lifetime of the organization. Form does follow function to a significant extent, but he believes that refers more to structure. It is true that the organization's culture can be manipulated more easily than can its structure, but even structure can be altered given adequate motivation, such as organizational survival.

Eva Fuehrer brings her definition to the discussion: A Virtual Organization is a temporary network of independent institutions, enterprises or specialized individuals that through the use of information and communication technologies, spontaneously unite to utilize an apparent competitive advantage. They integrate vertically, bring their core competencies and act to all appearances as a single organizational unit. Eva is aware that her definition of a Virtual Organization is an ideal type definition which needs explanation and also awareness of its limitations. She continues with an interpretation of some of the terms. Temporary: the Virtual Organization is formed for a limited period of time (this can be short-term or long-term) to achieve a specified objective. The conditions under which it arises may change and because of this the Virtual Organization may alter its form or may dissolve. Spontaneously: Unlike a strategic alliance or a joint venture, a Virtual Organization does not have detailed negotiations on contracts defining and regulating the partnership/takeover. Vertical integration: Vertical integration does not imply that there is a hierarchical structure to a Virtual Organization but rather refers to the way the Virtual Organizations form to optimize the value chain. They form vertically across industries to create a „best of everything“ or-

ganization in order to meet new requirements and demands of the business environment.

Two reactions to the definition of Eva: Louis Moussy replies that it is a problem for a Virtual Organization to quickly find the necessary, and reliable organizations to cope with a new project. Gary L. Fetgatter says that if there is a definition of temporary there must also be a definition of permanent.

To Eva, a Virtual Organization cannot be classed as permanent. One of the characteristics of a Virtual Organization is its dynamic nature, the entire setup of the Virtual Organization may change in response to the market place. Virtual Organizations are temporary in that they have the ability to react quickly as regards membership, structure, objectives, etc.

Steve Hill then raises the question, does this mean that permanent organizations can't have temporary structures? If we have stable, co-operative or even contractual arrangements between otherwise independent firms that depend mainly on information and communication technologies for their operation, does that mean that we do not have a Virtual Organization? If it is not a Virtual Organization, what is it then? He argues that formal/informal, tight/loose, hierarchy/flat etc. can all be features of enduring as well as temporary organizations. In reality, Virtual Organizations can be every bit as structured as their „real“ counterparts, just as real organizations can be loosely structured. If any organization was slow to adapt to changing market conditions it would soon be out of business. Permanent commercial organizations must be dynamic if they want to stay permanent. He ends by saying that if we have learned anything from the rigor of our debate about definition, surely it is that we should not limit the potential of Virtual Organizations by imposing too limited a definition on what they can be.

Paul C. van Fenema picks up the argument put forward by Steve Hill. If inter-organizational temporary cooperation is considered to be one of the essential features of a Virtual Organization, how does this differ from projects between organizations? Projects, by their nature, also involve temporary cooperation of people within and/or between organizations. An organization is perhaps virtual if it emphasizes projects instead of permanent organizational structures. Thus, Virtual Organizations might be minimally structured organizations in which multiple projects comprise the core activity. Naturally, these projects may also cross organizational boundaries.

Eva answers that when she was discussing the features of a temporary Virtual Organization she did not imply that a permanent organization can't have temporary structures or can't react swiftly to changing market conditions. However, she does think that Virtual Organizations have the ability to react faster than highly bureaucratic or traditional organizations. And this is their advantage. She goes on to say that temporary cooperation is not the only characteristic of a Virtual Organization. Thus one cannot generalize from one characteristic of one concept to

one characteristic of another concept. Projects as well as Virtual Organizations, do involve temporary cooperation of people within and/or between organizations, but a Virtual Organization is more than that. What about the notion of core competencies or value adding partnerships. That is what she sees as the difference between a project and a Virtual Organization.

Steve Hill goes on to state that the logic is that the temporary nature of a Virtual Organization is one potential (observable) characteristic, but not necessarily a defining one - unless of course it is chosen to be!

Guy Morisset then comes up with another definition from Lipnack, J.; Stamps, J.: Virtual Teams, Reaching Across Space, Time, and Organizations with Technology, New York et al. 1997: A virtual team, like every team, is a group of people who interact through interdependent tasks guided by common purpose. Unlike conventional teams, a virtual team works across space, time, and organizational boundaries with links strengthened by webs of communication technologies. For the purpose of this discussion the word „team“ could be changed into „organization“ in the definition.

The discussion about terms and definitions continues. Christiana Weber is searching for an official definition of Virtual Organization. Pascal Sieber quotes Arnold, O.; Faisst, W.; Härtling, M.; Sieber, P.: Virtuelle Unternehmen als Unternehmenstyp der Zukunft?, Handbuch der modernen Datenverarbeitung 32 (1995) 185, p. 8-23.

“A Virtual Organization is a form of cooperation involving legally autonomous companies, institutions and/or individuals delivering a product or service on the basis of a common business understanding. The cooperating units participate in the collaboration primarily with their core competencies and present themselves to third parties as a unified organization, when delivering the product or service. In so doing, they largely dispense with the institutionalization of central management functions for shaping, managing and developing the Virtual Organization, through the use of appropriate information and communication technologies.” (Translated from German by the author).

And Venkatraman, N.; Henderson, C.: The Architecture of Virtual Organizing: Leveraging Three Interdependent Vectors, Discussion Paper, Systems Research Center, Boston University School of Management, Boston 1996.

“Virtualness is the ability of an organization to consistently obtain and coordinate critical competencies through its design of value-adding business processes and governance mechanisms involving external and internal constituencies to deliver differential, superior value in the market place.”

Andrew Burnett thinks that possibly the most useful way to approach the “virtual organization problem” is to evaluate organizations against an ideal-type. Such an ideal-type - as a modified version of an exploratory ideal-type first formulated by

Nohria, N. and Berkley, J. "The Virtual Organization", in: Hechscher, C.; Donnelon, A. (Eds.), *The Post-Bureaucratic Organization* (1994) - is:

1. Transformation - by means of information technology - of paper into electronic records.
2. Computer-mediated communication replacing human communications as a means of conducting the primary activities of the organization and maintaining organizational coherence.
3. The implosion of bureaucracy with the eradication of specialized tasks replaced by cross-functionality.
4. The networking of individuals from technically separate firms (such as suppliers, customers, and even competitors) to the extent that clear external boundaries of the organization become difficult to establish in practice.

Hector Ponce thinks that the situation is more complex. What is the "ideal-type" that allows us to differentiate organizations which are virtual from others which are not? What are the unique properties of this "ideal-type"? And finally, if a conclusive definition of Virtual Organization has been found, how will this definition support actions? He doesn't see clearly how the ideal type proposed by Andrew can help us with Virtual Organization.

Jennifer Gristock expresses similar feelings about this issue. Such a structure-driven definition of virtuality in organizations fails in many different ways; it fails to provide any insight into the processes that must be put in place to support any one organizational form; it fails to provide insight into the differences between the processes that support one organizational form as compared to another and it fails to provide an aesthetic from which services and products which support virtuality in organizations can be created or exploited.

Most discussions in the literature gloss over these failures with the statement the Virtual Organization is enabled by the use of new information and communication technologies. Yet such statements are clearly lacking: the mere possession of a particular set of technologies does not guarantee their efficient or effective use, nor indeed, does it determine that they are put to the right use for a particular purpose. She puts forward a new framework - organizational virtuality - which describes the many ways in which the possibilities for organizing activities across space, time and organizational communities have been extended. Using the framework, the virtualness of different organizational forms- the extent to which their members are separated by geographical, temporal and communal barriers can be compared relative to one another.

Martin Garrecht adds to the question raised by Hector, that defining an ideal Virtual Organization offers two possibilities: first, we can examine the model itself, checking if all the presumptions and the subsequent arguments built on these presumptions are logically consistent. Second, if the model works (in the-

ory) we can compare our own (real, non-ideal) Virtual Organization to that model. By considering which difficulties the ideal Virtual Organization must face (e.g. how to generate or keep trust) we can think about the difficulties our own real Virtual Organization must face. So, it's not trying to push any organization towards an ideal, which MUST fail (nothing can get close to an ideal), it's the thinking and mental playing with the (ideal) model that helps us understand how the real thing is working.

Satpal Singh Plaha asks if the community agrees with the following definition of the Virtual Organization:

„A Virtual Company has been defined as one where complementary resources existing in a number of co-operating companies are left in place, but are integrated to support a particular product effort for as long as it is viable to do so. Resources are selectively allocated to the virtual company if they are underutilized or they can be profitably utilized there more than in the home company.“

(OLeary, Daniel and Plant. AI and Virtual Organizations, Communications of the ACM January 1997.)

Yan Yuhong finds that the definition does not emphasize the distinguishing features of Virtual Organizations, for example, the temporal relationship, the benefits from the cooperation, the local goals of different companies. Also a „virtual company“ is not the same as a Virtual Organization. For example, a university can be virtual, but it is not a company. A company is in business, and its aim is to make profit.

1.2 Hierarchies in Virtual Organizations

Nicholas Young wonders if one of the most significant features of the organization, the almost totally egalitarian structure of the Virtual Organization, is an incidental characteristic, or a necessary condition. He argues that because the primary value of the Virtual mode of organization is to enhance efficiency and responsiveness, and decrease overheads, the egalitarian structure may be a necessary condition. The agility and responsiveness and adaptability that characterizes the Virtual Organization would be greatly hindered by a hierarchical structure in which decisions could not be made quickly and competently by any given member of the network. Guy Morisset replies that the Virtual Organization, like any other business organization structure, must also have some kind of hierarchy. Some decisions must be made at some kind of a top hierarchy, even if this hierarchy is informal. If not, you find yourself in a „no decision“ process.

An answer to the question put by Nicholas Young is provided by Steve Hill: Initial thoughts are that an egalitarian structure is a potential success factor, dependent on the strength of human resources factors such as the personality and organization preferences of those people likely to be involved in a Virtual Organization. Certainly that seems to be the case with many of the consultants currently oper-

ating via the Internet. However, the proposition can be tested by the reverse: Are we really saying that hierarchical organizations cannot be responsive and agile? That doesn't seem right to him. Any number of people could be empowered to decide for the organization. One justification for hierarchy is the efficiency of pre-determined points of decision-making power. However, he also thinks that it is clear that the technology does lend itself to very flat structures.

1.3 Network, Virtual and other forms of Organizations

Mar Criado Fernandez asks about the differences between the Virtual Organization and the Network Organization. Bob Travica responds by raising the two generic models of the Network Organization: inter-organizational and intra-organizational. The first one is very similar to the Virtual Organization, the second one could be understood as a new organizational form. In his view, the network in the most generic sense (a set of nodes and links between them) is a large part of the notion of Virtual Organization, since Virtual Organization implies distant parts (nodes) that must interact (link to each other) in order to complete tasks, projects etc. David Rosman's opinion is that there are two distinct organizations that in fact overlap. The Virtual Organization is any group brought together for the purpose of completing a project. This includes temporary or provisional workers, outsourcing, or involving individuals or groups at multiple locations through any source of communication, including the Internet. A Network Organization is a group of any number of individuals or organizations that is tapped to find specific information, not to complete a project. One is to complete a project, the other is to locate information.

Maarit Ivalo sums up that a Virtual Organization is any group brought together for the purpose of completing a project. A Network Organization is a group of any number of individuals or organizations that is tapped to find specific information, not to complete a project. All Virtual Organizations are Network Organizations, but not all Network Organizations are Virtual Organizations. She has defined Network Organization as follows: A set of INTERdependent actors, with their own values and interests, which they try to accomplish by steering other actors. Essential pre-conditions: Participation of more than two parties, own interest in the Network Organization is related to the striving for continuity, presence of (a) common goal(s), that cannot be achieved autonomously by each individual, maintenance of each actor's own autonomy, set-up of common activities.

Maarit Ivalo still wonders why a Network Organization has advantages over strategic alliances, joint ventures or other forms of collaboration, with the exception of loose groupings? So at what point do critical success factors differ for Network Organizations and other forms of collaboration? And is managing a Network Organization truly so different from managing an alliance? Is a Network Organization finished the moment participants decide to establish contracts? Thus, where are the borders and how relevant is it to define those borders?

Heather Newell thinks that the difference is the technology. Network surely means an electronic network where people are wired together and therefore they have access to information on-line. A joint venture or any other form of collaboration may simply be a group of people getting together face-to-face.

Guy Morisset clarifies that he has a different perception of a Network Organization. From his standpoint, a Virtual Organization is a kind of Network Organization. It's the same thing with strategic alliances, joint ventures or other forms of collaboration. He goes even further: most important organizations that apply his kind of philosophy of Network Organization are, in some parts, very self centered. At the same time, they could also have other parts that are very open. Network Organization means using any means - within certain limits of course - that are available to gain a margin between perceived value and cost.

He continues that most organizations see the world in three dimensions: suppliers, clients and competitors. They tend to forget that there is a fourth dimension, which is „complementators“ - a word invented by Brandenburger and Nalebuff in „co-opetition“, a book they wrote (Currency Doubleday, ISBN 0-385-47949-2). Complementators are organizations that will gain if you gain (bakeries and toaster makers, car builders and tire producers, house builders and loan companies, Intel and Microsoft, and the critical mass of four different popular restaurants on a street intersection known as the best corner in town).

A lot of organizations also tend to forget that some of the things they do could be done by someone else in a more effective way: that is for the same perceived value, they could do it for less. They might also forget that an outside organization could add up to 1\$ of perceived value on their product/service while adding 0.50\$ to the cost. All these people - suppliers, clients, actual competitors and complementators - could be interested in doing business together if the deal is good. Network Organizations are organizations who know:

- what a complementator is,
- who know what are their strengths and weaknesses,
- who think cost vs perceived value,
- who put their main efforts into what they do best, and who intend to use the following four strategies to be in the best possible position: « *not doing* », « *doing* », « *ask others to do for you* » or « *do together* ».

An organization built that way, in his opinion, is a Network Organization. It's a matter of values and vision.

Ulrich Franke confirms to Maarit there are not many differences between a Virtual Organization, in particular, virtual corporations and other forms of collaborations. Based on a case study he has conducted about a virtual corporation of small and medium companies he concluded that the main advantage of this new form of organization is that, on the one hand, all virtual corporation partners contribute only their core competencies to the partnership while at the same time the

small and medium companies keep their high flexibility and entrepreneurial independence. For some small and medium companies this kind of collaboration is the only way to compete against multinational companies and to survive in the global market place.

The other main advantage is that independent companies can come together very quickly without any lengthy negotiations to produce a product or service as long as the market demands it. Then the partnership disbands without any problems. Furthermore a company can be a partner of several virtual corporations at the same time.

Conclusion: the main differences between virtual corporations and other forms of co-operation are:

- contribution of core competencies only,
- entrepreneurial independence,
- high flexibility,
- partners unite quickly, no lengthy negotiations,
- partnership disbands without any problems,
- company can be a partner of several virtual corporations.

1.4 Vertical Integration vs Virtual Organization

Vertical integration and Virtual Organizations are two different ways of completing the value chain by several more or less independent firms, says Bernhard Zengerle. Different firms are working closely together in production and/or distribution. This is done to achieve economies of scale and scope, is based on long-term contracts (normally) and often goes hand in hand with a merger or the take-over of firms. In this sense vertical integration is often mentioned in connection with the danger of market concentration. His investigations indicate that Virtual Organizations diminish market concentration, while vertical integration supports it. Therefore it can't be said that a Virtual Organization, which is formed vertically along the value chain is the same as vertical integration. The latter always implies a hierarchical structure because coordination is centralized and the formation is not based on a dynamic network, which contains several loosely connected firms. Vertical integration means that a stable and well defined network is created among the enterprises involved. So vertical integration and Virtual Organizations should be clearly differentiated. When both terms are used to express the habits and strategy of Virtual Organizations, this only leads to greater confusion when trying to define Virtual Organizations. Then it is hardly possible to distinguish between joint ventures, strategic alliances, vertical integration or other forms of vertical cooperation.

Eva Fuehrer adds that Virtual Organizations unlike mergers, joint ventures, strategic alliances, etc. are an organizational/cooperative form which dispenses with a (formal) hierarchy. However, there are two different types of hierarchies.

One is the formal hierarchy established in a (traditional) organization according to the different hierarchical positions of the members. The other, informal, hierarchy is created by group interaction, is a normal phenomenon in group behavior and will occur in both traditional and Virtual Organizations.

2 Specific Aspects

2.1 Virtual Organization success factors

Steve Hill has simplified and qualified the definition with a list of possible success factors, mostly drawn from experience to date. The Virtual Organization is an identifiable group of people or organizations who make substantial use of information and communication technologies in order to work together to achieve their objectives. Virtual Organizations need some degree of common purpose, leadership and agreed way of working, but do not tend to rely on formal organizational structures, legal identity, and commonly owned central premises. For that reason, success is more likely where:

- The Virtual Organization sustains member interest through short-term projects for mutual advantage or by focusing on broad-based, longer-term themes which appeal to all sectional interests.
- The technology is reliable, easy to use and facilitates significant gains in members' productive efficiency, effectiveness and / or value.
- Operational rules are minimal, voluntarily agreed, and capable of broad interpretation and enforcement by each member.
- Structures are egalitarian and flat, but allow for efficient decision-making at an appropriate level.
- General leadership is low-key, chairman-like and enabling, it relies on consensus and democratic self-regulation.
- Specific „topical“ leadership can be dynamic and based on authoritative expertise.

Communication is a key attribute. Brief observations (drawn mostly from personal experience of shortcomings) include:

- Good email newsgroup communication is brief and succinct.
- Failure to respond, silence and non-compliance between members, while indicating general lack of interest are also far more effective sanctions than direct criticism.
- Written communication is not the ideal medium for an extended argument, this is better done verbally by phone or in person.

Satpal Singh Plaha asks in which ways the Virtual Organization gives a competitive advantage. Is the organizational form more effective in certain sectors, i.e. manufacturing?

Yan Yuhong replies that the Virtual Organization combines the core competencies of all its members. It is assumed that, if all core competencies are collected, the maximum competitive capacity is obtained. The other advantage of a Virtual Organization is the flexible organization. The team members can be adjusted according to the change in the market. For a research project, the research task can be divided into different labs in different universities or enterprises. He mentions that the Virtual Organization also suffers from limitations. The efficiency of management is a big problem. A lot of management tasks are implemented locally. During co-operation work, the team members spend a lot of time communicating and negotiating. Also the organization can not tolerate cheating and therefore should have some mechanism to check the credentials of a new team member.

2.2 Culture in Virtual Organizations

According to the Fit-approach of strategic management, corporate culture is one of the potential success factors for enterprises, states Matthias Henrichs who raises this subject. Corporate culture could take over important functions, particularly in virtual enterprises showing characteristics like dematerialization, de-localisation and detemporalization. In its classical interpretation, however, corporate culture features a need for development over the course of time as a central characteristic. Thus the temporary character of virtual enterprises and the need for development of cultures are contrasting elements, and the utilization of corporate culture as a factor of success seems to be denied to virtual enterprises.

In reply to Matthias's culture problem Nicholas Young thinks that this is a problem only if the Virtual Organization is in fact completely temporary. That is to say that if, as is the case with his organization, there is a permanent networked grouping of business entities that form temporary teams on a project-by-project basis, there will potentially be enough temporal stability for a culture to develop. Personally he doesn't believe that it is possible for any group of people to interact without a culture because it is culture that forms the fabric of human interaction. This is why it is often pointed out that the apparent absence of a culture is in fact a culture in itself. He thinks that when an organization has so little contact that it is not possible to form shared perceptions as a function of belonging to that group, those people necessarily fall back on lower levels of cultural perception - i.e. national cultures or professional cultures.

Matthias Henrichs agrees that the problem of Culture in Virtual Organizations exists especially in temporary Virtual Organizations. He thinks that it also depends on how the Virtual Organization is founded. If it is founded by quasi-externalization there will be fewer problems than if it is founded by quasi-internalization, because there is already a culture that can be adapted to the needs of the Virtual Organization. But there are also further problems that do not exist in other cooperations. Delocalisation and dematerialisation. Physical contact is

the most important lubricant for virtualization. Paradoxically, the more virtual the organization, the more its people need to travel. So the positive effects of culture-identification, motivation, representation, integration can not develop in a 100% Virtual Organization.

2.3 Leadership in Virtual Teams

Angela Maria Sugliano raises a question concerning leadership in virtual Groups. She wants to know the opinion of the community on whether the leader (boss) of a virtual group is more or less “feared” than the leader of a face-to-face team. The origin of this question is the lack of social clues like the tone of voice, the facial expression, the way someone is dressed in a virtual team, which can affect communication between the boss and the employee.

John Gundry believes that working in virtual teams is a very different experience from working face-to-face. The principal issues are lack of face-to-face contact, difficulties of disambiguating communication, feelings of isolation, and difficulties in trusting other team members. Skills and competencies, including leadership, gained in the face-to-face environment do not necessarily transfer to the virtual environment.

One particular issue for team leaders is what communication tool they use for what type of communication. Too many virtual team leaders think that email is the only tool needed. In fact email is good for some leadership communications, but by no means all.

He agrees with the earlier comment that fear is an inappropriate factor in virtual teaming. If it exists, a leader had better work to eliminate it, or face the fragmentation of his/her team.

Heather Newell introduces another aspect to Angela’s question. There is an important additional benefit of virtual teams, if they are working asynchronously. It allows people more time to think (and respond) coherently. People who have become leaders are often skilled verbally and can think quickly. Others like more time to ponder and work through the argument. Rules and protocols for electronic meetings though are very important.

Larry Cardo questions the parameter „feared“ as used in the above question. Why would a leader in the 90’s want to be feared. Why would an employee „fear“ the boss? Fear as a motivator is not an effective management tool. The above notwithstanding, what is missing in a Virtual Organization is the effectiveness of communication - for a number of reasons:

- 1) There is less communication. I am reluctant to type to the same degree I can verbalize.
- 2) In verbal communication there is immediate feedback. I know by looking at a person if that person is comprehending the message.

3) Communication is 85 percent non-verbal. Thus much is lost by shifting communication to voice only or email.

In summary, he believes, fear plays a very small role in business communication. But when it is involved, it is much less effectively communicated because the communication is significantly less effective.

Rahmat Samik-Ibrahim explains that he is currently working on an idea named „Reengineering Democracy“: How can we get a virtual group to agree? He guesses that the answer will be: „you can not, you never can, and you had better be prepared!“. Alliances will come and go, as fast as the speed of the computing itself.

Another opinion is contributed by HRZ Consulting Services. From their experience in a group called “The Virtual Company” in Switzerland, they believe that communication gets easier and emotions are kept out. The whole issue becomes more professional.

Larsen Kai wonders what will happen when the use of Virtual Organizations keeps emotions out? Will it change people? Will people find other places to “use” their emotions? Finally (and most importantly), is an emotion-less organization a better organization?

3 Aspects to be discussed

3.1 Intelligent Agents

Talking about hierarchies in Virtual Organizations, Eva Fuehrer wonders what the others think about information brokers, intelligent agents, integrators, coordinators, whatever they are called, and their role in Virtual Organizations.

3.2 New technologies and industry structures

Judith Gebauer shares some thoughts on changing industry structures in the context of emerging technologies. In the research she is doing, one interesting phenomenon seems to recur pretty frequently: companies tend to offer very specialized products or services compared to what was the case in the past, but with the help of the Internet and related technologies they are able to offer their products or services to a much larger community than before. This gives them the chance to reach the critical mass of customers, necessary to reach breakeven point. At the same time, information technology helps these companies to team up with their organizational units (could be companies, individuals, governmental institutions etc.) providing products or services which complement their own offerings. The resulting „network“ of collaborating organizations is then able to offer full-fledged services and solutions - on a national or even global basis. She supposes that there are many areas where we don't really see a move towards what is called

„perfect markets“, where market participants who don't know and don't want to know each other conduct business on a one-off basis. Instead companies try to form (and tighten) alliances with partners they know and trust in order to cope with today's rapidly changing market requirements, uncertainty and complexity.

3.3 Techniques

Techniques such as Teleconferencing are used within the Virtual Organization. Satpal Singh Plaha asks if there are other techniques which are effective in the Virtual Organization?

Yan Yuhong says that all multimedia, simulating tools, mechanisms for data sharing are effective. For research, the topics of group decision making, co-ordination theory, negotiation support system are interesting.

Hartmut Feucht adds that relevant techniques in this area are groupware and efficient sharing of information and especially sharing of databases. Irrespective of the particular location of each member of the Virtual Organization, everybody must share the same amount of information (e.g. discussion database, information sharing, email). Workflow Management tools, software for timetable planning in order to be able to co-ordinate virtual teams. Ultimately this leads to the integration of complete work processes over the Internet (purchasing over the Web, automatic information transfer to production, information and confirmation to the customer via email and so on).

3.4 Virtualness and social constructivism

Søren Dejgaard Sørensen has been working with Virtual Organizations seen from the point of view of social constructivism and he injects his view of what constitutes Virtual Organizations, into the debate.

Seen from the point of view of social constructivism, the old neo-classical axioms of firms and markets are only one interpretation of many; therefore, constructivism can be seen as a methodological point of view that can explain the shortcomings of the old concepts and give hints as to how to redefine these within a social reality. The social construction of a firm or a market implies consensus about the contents of the concept; i.e. the neo-classical firm or market symbolises the way these are normally established. This gives a guideline as to how to analyse and understand the reconceptualisation of firms and markets. In terms of social constructivism the neo-classical firm and market definition represents a closure situation that has been reinforced by economic research ever since Jevons, Walras, and Marshall, who conceptualized the marginal theorem in economics at the turn of the century. The closure situation illustrates how the creation of knowledge is conditioned upon being social acceptable and hence constructed in the sense that if it was not accepted as knowledge it would be non-existent. Therefore an interesting question in relation to the virtual corporation has its ori-

gin in what is the social acceptable use of information and communications technology within firms and markets as we conceive of them today. This moves the question in the direction of asking „what“ constitutes the virtual corporation and „how“ is it legitimized more than searching for the discovery of „why“ virtual corporations exist. Another interesting question to pose is whether the concept of the virtual corporation is yet another reinforcement of the neo-classical position or whether it constitutes a reopening; i.e. initiating a discussion about the concepts of the firm and market perhaps ending up with consensus about new concepts that describe these entities. Social constructivism may be used for anticipating a reopening of the discourse of what constitutes firms and markets - but not to explain what will replace the known. However, constructivism claims that the way towards a replacement will be characterized by a variety situation where one explanation is as good as another, implying that there is no best explanation ex-ante, the closure situation is typically the result of a negotiation process, however, when closure has taken place a best explanation is socially constructed by means of rationalization or ex-post rationality. This implies that rationality is a reduction of irrationality - or scientific explanations reduce reality to rationality.

3.5 Development process

Lars Krohn and Kenneth Olesen would like to make an inductive study on the implementation of the Virtual Organizations into an existing organization, or parts of one. Which focus areas (i.e. tools, theories, and/or methods) enable the organization to control the transformation from an ordinary/traditional organization to a Virtual Organization? This implies a focus on existing organizations wishing to transform all or parts of the organization into a virtual one. They see the following three areas as essential for the success of the transformation process: 1) core competencies, 2) learning organization, and 3) technological enablers (i.e. Computer Supported Co-operative Work).

4 Editors Conclusions

Pascal Sieber and Joachim Griese

The discussion in VoTalk, though it is not of the same nature as a research paper, raises some very important questions:

- What is the organizational background of Virtual Organizations? A Business Network, shared cultural backgrounds, commitments to shared or partly shared objectives, trust, etc.
- What are the technical preconditions? Internet Access, Teleconferencing Systems, Groupware, Workflow Management Systems, etc.
- What are the benefits of Virtual Organizations? Access to external knowledge, location independence, flexibility and agility, etc.

In our opinion the discussion does not lack interesting questions. But it does lack integrated concepts. The following papers deal with the same questions, giving, each of them, one or more guidelines for conceptualization and generalization of the most valuable ideas discussed in VoTalk.

The Realities of Virtuality

David J. Skyrme, David Skyrme Associates Limited

David Skyrme has been a researcher, product manager and marketing manager in a long career at Digital Equipment. He has practiced virtual working for many years, first in market intelligence systems and later as UK Strategic Planning Manager at DEC. He is now an independent consultant, and a business affiliate of ENTOVATION International, a global research and consulting network that specializes in Knowledge InnovationSM, guiding senior managers and policy makers towards successful strategies for the networked knowledge economy.

Abstract

This presentation considers practical aspects of working virtually. It positions different types of virtuality - virtual products and services, telework, virtual teaming, virtual organizations and virtual communities - outlining their rationale and benefits. A framework for developing a virtual infrastructure is then described. The presentation concludes with guidelines for working effectively in a virtual environment. Throughout the presenter draws on his own experience of working virtually in both corporate and virtual network environments, using case examples for illustration.

1 Megatrends that drive Virtualization

Several megatrends are behind the drive towards increased virtualization:

- products and services are becoming more information and knowledge based - they can therefore be marketed and even delivered virtually.
- the Internet revolution - this network of computer systems is fundamentally redefining the way that business is conducted, and allows work and services to be carried out over a distance.
- networking and interdependence - new ways of organising and collaborating which give access to resources, combined with flexibility and responsiveness.
- globalization of markets and resources; companies can more easily sell their products world-wide and draw on 'world-class' expertise, irrespective of their base of operations.

Together these give rise to virtualization, where physical presence is substituted with virtual presence. This allows organizations overcome the limitations of geographic separation.

Virtualization offers organizations of all types significant benefits in the new knowledge economy. They can source intellectual resources globally; they can gain flexibility through dynamic structures and contractual arrangements; they can tackle projects or problems which might otherwise have been beyond their capabilities; they can reach global markets without a local presence and they can significantly reduce costs over conventional ways of working. All are reasons to explore the different ways of operating virtually.

2 Three Dimensions of Virtuality

'Smart' organizations will exploit three dimensions of virtuality - space, time and structure - to reconfigure their operations for strategic advantage.

Virtuality creates the opportunity to disperse organizational activities. Information and communications technology (ICT), especially the Internet, makes it economically viable to separate operations and people that were previously together. Conversely it also allows organizations to aggregate operations that were previously dispersed, such as customer service through back-office call centres. Other ways of reconfiguring organizations through the dimension of space include dispersed teams, and individuals who telework from a remote location.

In the time dimension organizations can shift operations according to time zones. For example, engineering companies pass work in progress from one location to another around the world to do 24 hours a day design. Another use of time is the flexibility of time used by teleworkers to mesh their business duties with their lifestyle and domestic needs.

Finally, organizations can have more flexible structures, such as networks, that bring together different people and competencies to perform specific tasks. People may be in temporary teams or virtual organizations, that exist for as long as they are needed. Sometimes these virtual teams and organizations have a degree of permanence. In other cases they may exist only for the duration of a project, or a problem to solve.

2.1 Types of Virtuality

In practice, one sees several types of virtuality in operation on a daily basis, ranging from mobile sales forces to overseas outsourcing (e.g. software development in India) to workers simply communicating globally via phone or email. It sometimes becomes difficult to draw the line between a natural evolution of working practice and more fundamental changes in the nature of organizations. The difference is often just of degree or pervasiveness. The types of virtuality we have identified include:

Virtual products and services. The cost of an electronic transaction is typically a tenth of that of the corresponding traditional transaction. Companies like Dell

now do over \$3million a day via the Internet, while Amazon.com sells exclusively this way. Electronic markets that match buyers and sellers are now emerging in everything from Dutch flowers to second-hand cars.

Telework. Several million people in Europe now telework for some or part of their working week. They may work from home, from telecottages or from client premises, or indeed anywhere that has telephone access, which with cellular phones is now virtually everywhere! With the ubiquitous notebook computer, it has been said that “my office is where I hang my modem”.

Virtual Offices. A related type of virtualness is the virtual office, where physical office is replaced by office services. Companies like Digital and IBM have adopted ‘hot-desking’ at several locations, where personal workspace is shared on a first-come, first-served basis. One of my suppliers, Loud-n-Bow, closed its office and went completely virtual, with significant savings in office overheads.

Virtual Teams. To give flexibility and to avoid relocation, many companies imply create virtual teams, where employees work at locations more convenient to them. Other examples are where several teams working in conventional office settings at different locations cooperate virtually, as do engineering teams at Ford in locations across Europe and the US.

Virtual Organizations. The virtual organization has many forms, it can be a stable supply network that works as a single organization, or it can be a loose federation of independent firms that come together for specific contracts or to exchange information. Thus OMNI connects 186 global relocation firms to share information and match removal needs with truck availability. My own firm is part of the European ETD consortium working together with seven partners and over 30 subcontractors on the same project [1].

Virtual Communities. Instead of a local community a virtual community is one of shared interests, whatever the location. They are found on newsgroups and discussion lists, with some e.g. the WELL, having a greater sense of community than others. Paradoxically, local communities have been strengthened by working virtually. Remote villages in Lapland, for example, have gained a greater sense of local community by developing both regional and world markets for their services through the Internet.

As well as these explicit forms, there are many specific examples of virtualness. There are virtual research laboratories, which also allow dispersed users access to scarce, expensive or remote resources. There are virtual factories (where manufacturing processes are prototyped through simulation before the machinery is installed). Sales, marketing, advisory services and a host of other routine operations are also going virtual.

The common characteristics of all these types of virtual operations are:

- Use of information and communications technology to allow dispersed operations
- Reduced importance (even collapse) of time and space
- New kinds of networking organizational structures, often dynamic in nature
- Changing ways of interfacing with customers and markets
- New ways of working for employees and associates (business partners, suppliers, customers etc.).

2.2 A Virtual Infrastructure

In our work with organizations, we have found that to operate virtually successfully requires the development of a knowledge collaboration infrastructure [2]. This blends both the ‘hard’ infrastructure - information and communications technologies, and the ‘soft’ infrastructure - all those human and organizational factors that are the ultimate determinants of success of any such operation.

Effective virtual working requires seamless interoperability and knowledge flows between people, processes and information repositories, wherever they are located. Such an infrastructure should connect people-to-people, people-to-computer, and even (for automated operations) computer to computer.

	Passive (information)	Active (knowledge)
Person to Person	Computer conferencing Expert networks	Meeting support Video-conferencing
Person to Computer	Document Mgmt Info Retrieval Knowledge bases	Expert Systems Decision Support
Computer-Computer	Data Mining	Neural Networks Intelligent Agents

Table 1: Knowledge Transfer Technologies

The infrastructure itself has several levels as indicated, each one building on the one below (see Figure 1).

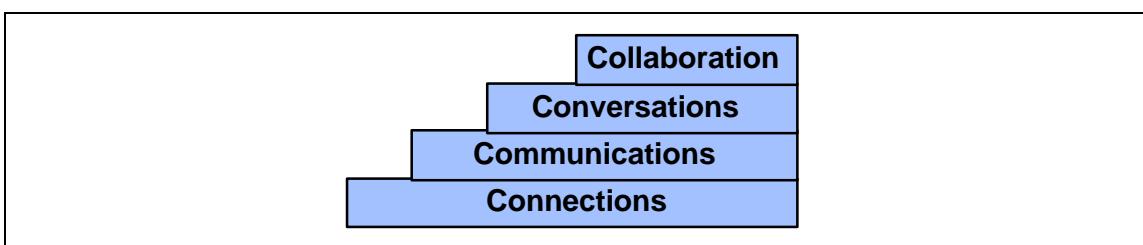


Figure 1: Levels of an Virtual Infrastructure

Connections. At the base level is the requirement that people should be able to connect into the infrastructure whenever and wherever they are (in the office, at remote sites, on the move etc.). Surprisingly some companies are still in 1997 grappling with 17 incompatible email systems, that delay messages between different sites. Mobile data connectivity is still relatively slow.

Communications. The next level is provision of basic communications of several types - voice, data, text messages etc. Even sophisticated users of groupware maintain that it is email that has totally revolutionized the way they work, is still the daily workhorse, and has stimulated a change of behaviour and culture.

Conversations. The next level starts to add meaning to the communications. Mail systems that thread messages is a start but true conversation comes only with meaning. This may need richer communications such as videoconferencing. It can also benefit from knowledge editing, where a large volume of informal conversation is refined into meaningful information that is stored on a structured database, alongside ways of allowing conversations to continue e.g. via a ‘click to contact’ button that invokes email, a telephone connection or a video link.

Collaboration. This is the highest level of virtual infrastructure, where shared documents, evolving knowledge bases and in-depth relationship building take place. Groupware is one underlying technology, but collaboration overall has a more human dimension. It is one of mutual understanding, reciprocity and trust.

As you move up through each architectural layer, more of the challenges are people and organizational, rather than technology, related. In my experience, most large organizations, taking their position overall, are still between the bottom two levels. Technology however, provides the important enabling layers.

2.3 Collaborative Technologies

In our ongoing monitoring of knowledge technologies - and we have identified 33 different categories of ‘mind tools’, we have found that so-called collaborative technologies have the most impact on improving knowledge flows between individual, teams or organizations working virtually. The commonly used technologies in this category are:

Internet, Intranet. Installing an Intranet is the critical enabler in many collaborative activities. Databases like Booz Allen & Hamilton’s Knowledge Online connect their consultants virtually to global best practice. In ETD we use the Internet as a repository of documents and databases. We also have, in effect an Intranet, that connects the project partners across Europe and holds work in progress that can be annotated and updated by other partners.

Groupware/Lotus notes. Groupware products like Lotus Notes offer several features over and above Intranets, although the two are converging. They provide discussion databases, different levels of security (especially useful for remote

access by mobile workers). Users such as Thomas Miller, a London based manager of insurance mutual companies, allow remote agents to access their 'organizational memory' (proposal documents, news, risk assessments) through multiple 'views' e.g. by industry, company or geography.

Videoconferencing. The development of desk-top videoconferencing makes it practicable for teleworkers or virtual team members to have a face-to-face conversation over a telecommunications link, while at the same time viewing and even manipulating computer held information. At BP, desktop videoconferencing has been the underpinning of their 'virtual teaming' programme. It allows them to achieve better communication and higher levels of trust e.g. with oil field subcontractors. Many problems at off-shore oil fields have been solved without resorting to jumping into the helicopter as was formerly the case.

The benefits of these technologies are well known e.g. asynchronous as well as synchronous communications, access to the most current information, recording of information, access to expertise, even when the existence of the expert is not previously known etc. However, our work with clients shows that organizations frequently do not get the benefits they anticipate from collaborative technologies. They fail to give due attention to people and processes.

2.4 The Human Dimension

Working virtually is not comfortable for many people, although with training and coaching most people can adapt to new ways of working. Although various research suggests that social isolation is a problem, this is often a perception of those who do not yet work virtually. Those who do rarely cite it as an insurmountable problem. What does concern them the lack of the extra richness of communication through face-to-face contact with colleagues. Therefore work needs to be optimised around types of task and types of interaction. Several aspects need attention:

- restructuring of tasks and work e.g. dividing virtual and physical components; matching the type of work to the skills and situation - which is best done individually and which best done as a team.
- personal skills - developing cyberskills, especially the ability to communicate effectively by email; this is sadly lacking in most organizations. Also, many knowledge workers do not take sufficient precautions to manage the integrity of their personal computer systems and recovery in case of accident.
- remote management - making traditionally trained managers comfortable with managing remotely. Management by outputs and outcome not inputs (i.e. presence of people at their workplace) is a significant shift for many.
- interaction skills - develop mutual respect and trust for other's knowledge and contribution.
- information and knowledge management - organizing, collating and making accessible information that has been generated online.

- reward systems - bringing these into line for the networked and collaborative organization; recognizing the value of roles such as knowledge navigator and organizational ‘connector’ (a person who makes links through their ‘know-who’); rewarding knowledge sharing and team building behaviour.

It is the bringing of these into harmonious alignment with the tasks and technology that determines the degree of success in the outcome of virtualization.

2.5 Putting Virtual Working into Practice

During my career, I have been a teleworker, managed teleworkers, been in virtual teams (one with people in Geneva, Sydney, Reading and Boston), and am now part of several virtual organizations. From these experiences I first compiled in 1988 a set of operating principles for virtual teams and organizations, that I recently updated [3].

25 Principles of Proven Practice

Prerequisites (Individual Attitudes and Behaviour)

1. Every individual must have a sense of self-value and must value every other team member for their contribution - these should become explicit and expressed as the team's 'core competencies'. Individuals should learn from each other, from the results of their own actions, and from collective experience.
2. There must be a high level of trust - this may take time to build up. The starting point is to trust every other person until they abuse this trust.
3. Individuals must be mutually supportive; commitments made should be met - where circumstances prevent this, other team members must be informed as soon as possible.
4. Reciprocity must reign - give as much as you get, in terms of support, transfer of information and knowledge. Lack of reciprocity leads to unbalanced relationships and ultimately to hierarchy, withdrawal or team collapse.
5. Individual feelings must be recognized and expressed.

Sharing these is a good way to start and end team meetings.

Teams and Teaming (Composition)

6. Teams are the organization units that create focus and allow work to proceed. Work in a team, and individually if you want to continue to develop your knowledge and success.
7. The most productive teams for knowledge work are small multi-disciplinary groups. e.g. 5-8 people with a variety of backgrounds and personality traits.
8. Teams of large numbers are not productive for knowledge work - they are assemblies, gatherings, committees which may be used to pass information (often ineffectively), motivate (or demotivate), provide a sense of importance. Their most valuable use is creating and maintaining a sense of belonging, cohesion and reinforcing values - and of course, networking opportunities (but many people who organize meetings, conferences and such gatherings do not provide enough 'white space' for this to happen effectively).

9. Every knowledge worker should belong to at least two separate teams. This helps the organization achieve cross functional co-operation; it helps the individuals gain a broader perspective.

10. An individual can have several roles in the team. These roles can change and be exchanged (for example during holiday periods, to balance workloads, or to broaden individual experience). Distinguish the role from the person.

Team Norms and Relationships (Mission, Purpose and Culture)

11. Every team must have a purpose if it is to act as a team and not as a collection of individuals. Its must have its own vision, mission and goals which reinforce those of a higher level.

12. Every team should develop a strong set of cultural norms and values. Hence regular team meetings should take place. A set of working principles should be developed (print them on a laminated card!).

13. Each team should identify other teams carrying out related or dependent activities. It should draw a network diagram with:

- itself (and its mission) at the centre
- an inner ring of teams (nodes) where interdependencies are high (formal relationships)
- an outer ring of collaborative teams (mostly info sharing)

Where possible major activity sequencing and interdependencies should be shown (who provides what to whom)

14. Individual members of teams should be encouraged to maintain their personal networks, even beyond the identifiable needs of the current project or team. Professional and external networks are particularly important.

15. Some 'slack' should be built into the network. A certain amount of duplication/overlap should not be viewed as bad. This slackness permits a higher quality of output, plus a resilience to cope with the unexpected.

Communications

16. Just as in electronic networks a set of protocols needs to be defined and agreed. These may be implicit (common standards set by cultural values or 'like minded people'). Often it needs to be made explicit what the various signals mean eg trial balloon, idea, request for action, demand, vote, decision etc.

MISCOMMUNICATION is probably the worst obstacle to effectiveness in any organization.

17. Frequent communication throughout the network (including outer ring) must be encouraged. This is particularly valuable for half-baked ideas, tentative positions. A small group developing its own 'final communiqué' does not foster the network spirit.

18. Also as in electronic communication 'NODE NOT RESPONDING' is an important signal. If something has not registered, or some work is falling behind, then a signal to ripple round the network so that the repercussions can be analysed.

19. Formal relationships (eg inner ring) are best cemented by having agreed written processes (hand-offs) and/or common members on both teams. Critical linkages need higher trust and openness rather than higher formality. In a sequenced set of tasks this can be provided by cascading teams (i.e. shared members)
20. Recognise the unpredictability and fuzziness of the process for making decisions. Who makes decision will often be ambiguous. An action taken might imply a decision taken. In general, decisions should be made when and where they need to be made, by whoever is appropriate. Be guided by the mission, values and principles.

Types of decision which are fundamental should be agreed up front, and simple formal processes developed for these. Otherwise formality should be kept to a minimum.

Technology and Working over a Distance

Enabling technology is the most effective means of enhancing the quality of network communication. Electronic mail, distribution lists, groupware products such as Lotus Notes and videoconferencing all contribute, but they must be used effectively. Here are some principles to apply in virtual team communications. They apply mostly to the lowest common denominator - email - since that is how many virtual teams start and is still the daily bread-and-butter of most.

21. In your emails, select the TO and CC addresses appropriately. Use explicit titles - in particular avoid simple relies that generate Re: Re: titles when the subject matter has moved on. Be explicit in what action you want the reader to take - is it for information or action, or is a request for help? Similar principles apply to threads in a computer conference - use appropriate titles.
22. Use one email per topic, especially when multiple recipients with different roles and interests are involved. This allows each to be filed and actioned separately. Keep emails short - give some opening context, repeat portions of incoming mail selectively and close with requested actions (if any).
23. If a face-to-face conversation is important, capture the essence in a follow-up email. It also acts as a point of reference for the parties involved. It may throw up different interpretations of the same meeting, and highlight ambiguities that need to be resolved. It also acts as part of the 'team' memory.
24. Build on knowledge that exists or has been expressed. Recognise the contributions of others. Ideally appoint a knowledge editor who takes the best from transitory information and compile it into a more structured document or Web page.
25. Above all - be human and informal. Emails and discussion lists are conversations, and if you are not face to face, you need to insert a level of informality and smileys where appropriate :-)

2.6 Conclusions

There are many benefits in virtual operations. As well as lower costs, operations can be configured in many novel ways to exploit different configurations of space, time and structure. This allows access to new markets, the sourcing of knowledge and skills on a global basis and putting together teams that would otherwise not be practicable.

A key challenge is to balance the use of technology with face-to-face interaction. The latter may be costly to arrange and difficult to schedule, while virtual exchanges can engage more people and occur at times and places of their convenience.

Improvements in technology, such as virtual reality meeting rooms, are diminishing the disadvantages of different time-different place interaction. However, whatever the technology and work environment, the management challenge remains unchanged - that of providing effective leadership where teams and individuals can flourish and play their part in global networks.

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Global Virtual Teams: Integrating Models of Trust

Sirkka L. Jarvenpaa and Thomas R. Shaw

1 Introduction

The basic building block of virtual organizations is a virtual team¹. A virtual organization strives to dynamically change its capacity to perform its competencies (Mowshowitz, 1997). It must be able to deliver these competencies in the amount and location required by the marketplace. To do so a virtual organization must rely on a set of temporary project collaborations between individuals from several organizations (Lipnack and Stamps, 1997).

Kristof et al (1995) define a virtual team “as a self-managed knowledge work team, with distributed expertise, that forms and disbands to address a specific organizational goal” (p. 230). Because the team is self-managed, the members are not governed by an authority that controls the fate of the team or its members. Members’ affiliations cut across functions, geography, and organizations. Members are often part of multiple teams at the same time, and report to different individuals in their “home” organizations (Kristof et al, 1995). The teams are autonomous and have broad range of authority and responsibility for their goals, means, and deliverables.

In such self-managing teams, trust is the means of social control and coordination. Davidow and Malone (1992), in their book of The Virtual Corporation, state, "trust, as we will show, is the defining feature of a virtual corporation" (p. 9). Trust refers to the "willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party" (Mayer, Davis, and Schoorman, 1995, p. 712). Trust allows members to take part in activities that they cannot control or monitor, where they may be disappointed and put at risk by the actions of others in the team (Deutch, 1958; Luhmann, 1988; Lewis and Weigert, 1985; Bradach and Eccles, 1989; Gambetta, 1988). Trust is necessary in the presence of uncertainty or risk (Deutch, 1958).

The uncertainty and risk facing a virtual team can be multiplied when a virtual organization expands its operations internationally. In this situation the virtual team becomes a global virtual team, with team members who represent diversity

¹ Kristof et al (1995) note, “A virtual team does not necessarily need to exist in a virtual organization” (p. 248). Many existing organizations are using virtual teams to complement their traditional organizational structures to increase their flexibility (Lipnack and Stamps, 1997; Jarvenpaa and Ives, 1994).

in cultures and countries and where virtual interaction replaces all or much of the face-to-face interaction. The existence of trust is critical in a global virtual team where members do not have formal control or authority over others and where they face many uncertainties. Yet, the virtual context eliminates much of the social context that underlies the traditional conceptualizations of trust (Bradach and Eccles, 1989; Powell, 1990). Several factors tend to evoke trust: (1) personal relationships with frequent face to face interactions, (2) shared social or demographic characteristics or affiliations (serving as a proxy for personal interactions), (3) expected future association, and (4) cooperative behavior (Sitkin and Roth, 1993). The global and virtual nature of global virtual teams result in the absence of the first three of these factors. O'Hara-Devereaux and Johansen (1994) recognized this when they asked "How do global managers build trust among team members scattered from Montreal to Tokyo to San Francisco to Paris who are never likely to meet face-to-face?"

Because global virtual teams do not present an environment where interpersonal factors can lead to trust, we need to understand other bases of trust for this new and important type of work unit. This paper will therefore address the nature of trust among members who are strangers to each other in the context of global virtual teams. The objectives of this paper are to explore the alternative forms of trust described in the literature and examine the factors that might evoke them in global virtual teams. In this paper, we first review alternative forms of trust, map the different forms of trust to trust-generating processes, and then examine factors that might invoke trust in the virtual team context. We also explore the interrelationships between the different forms of trust. This paper advances propositions for future research. The paper concludes by exploring the implications for virtual organizations.

2 Forms of Trust

Trust is a multifaceted, multilevel, and dynamic concept (Lewicki and Bunker, 1996; Butler, 1991). Trust as a behavior is typically conceptualized as cooperation; low trust is considered competition (Sitkin and Roth, 1993). Trust can take on cognitive, affective, or behavioral dimensions with the strength of the particular dimension being dependent upon the type of relationship involved between the trustor and trustee (Scott, 1980; Butler, 1991; Cummings and Bromiley, 1996). For example, McAllister (1995) found that in peer-based organizational relationships, individuals rated the cognitive aspects of trust higher than affective aspects. At least some level of cognitive aspect appeared to be required for affective trust.

Although trust is often considered in an interpersonal context where the trustee is a peer, subordinate, superior, or salesperson, trust can also be directed toward a collective group of people such as a work team, selling group, department, or-

ganization, or society. Cummings and Bromiley (1996) suggest both the trustee and trustor can be individuals or collectives, and they define trust the same way for both levels of analysis.

Trust in a relationship is ever changing. Shapiro, Sheppard, and Charaskin (1992) proposed three time-dependent forms of trust between two parties in a business context that had no prior relationship: (1) deterrence-based trust, (2) knowledge-based trust, and (3) identification-based trust. Deterrence-based trust means that individuals do what they say they will do because they fear punishment. Knowledge-based trust is grounded on the knowledge of the other person (i.e., the trustee) that allows the trustor to understand and predict the behavior of the trustee. Identification-based trust is based on shared goals, empathy, and common values, to the point that one person is able to act as an agent for the other. Lewicki, Stevenson, and Bunker (1997) found different levels of calculus-, knowledge-, and identification-based trust across relationships that varied in their nature, longevity, and recency of violations of trust.

The literature also acknowledges the existence of impersonal or institutional forms of trust in addition to interpersonal forms. According to Luhmann (1979), impersonal trust is based on the appearance of “everything ... in proper order,” rather than on an emotional bond, knowledge, or past history of interactions. Impersonal trust is tied to institutional norms and beliefs, and so remains unexamined until the norms are violated (Zucker, 1977). For example, impersonal trust allows people to enter into commercial contracts with strangers as long as the parties have faith in the country’s legal system (Sitkin and Roth, 1993). Impersonal and interpersonal trust reinforce each other. Trust in work groups is based on the expectations of behavior of members in that group but also on the collective norms of the institutions the work group is part of.

Both impersonal and interpersonal trust assume the relationship between trustor and trustee has some longevity. The benefits of trust tend to be long-term, whereas benefits of acting untrustfully tend to be short-term. Meyerson et al (1996) developed the concept of swift trust to explain how temporary teams can enjoy high levels of trust, even though members do not share any past affiliation and cannot necessarily expect to have any future association. Meyerson et al (1996) describe temporary groups as analogous to a “one night stand” and define the group as having “a finite time span, forming around a shared and relatively clear goal or purpose, and depending on a tight and coordinated coupling of activity to achieve success” (p. 167). Other characteristics of temporary groups include: (1) members with diverse skills, (2) highly complex tasks, (3) few formal structures for coordination, and (4) extreme time pressure. The time pressure makes it difficult to devote time to finding out who knows about what, and there is little time for any type of socialization activities. Both the history of the team members as well as the requirements and constraints of the temporary team work preclude the existence of impersonal or interpersonal trust.

The concept of swift trust (Meyerson et al, 1996) maintains that “unless one trusts quickly, one may never trust at all” (p. 192). Because there is not sufficient time to develop trust through interpersonal means, members in project teams with tight deadlines engage in category-driven information processing that allows members to import expectations of trust based on their local organizational environment, industry recipe, or role based stereotypes. Positive expectations of trust will motivate members to take proactive action, which can serve to strengthen trust among team members in a self-fulfilling fashion. The final premise of swift trust contends if action is reciprocated by others, the member’s trust in the team is reinforced.

Meyerson et al (1996) described swift trust as a depersonalized action form. Action, rather than personal relationships, will maintain members’ confidence that the team is able to manage the uncertainty, risk, and vulnerability that the team will encounter. Iacono and Weisband (1997) found that high performing virtual teams exhibited higher levels of action (they used the term “initiations”) over the life of the project than did low-performing teams. Swift trust de-emphasizes the interpersonal dimensions of trust; the development of relationships among team members is a distraction and potential source of trouble for keeping the team focused and united on task goals (Meyerson et al, 1996).

3 Processes of Trust

A plethora of alternative forms of trust exist in the literature spanning multiple fields such as psychology, sociology, economics, organization science, and marketing. Doney and Cannon (1997) reviewed this broad literature and revealed five generic processes that appeared to invoke trust across a wide range of relationships: (1) calculative, (2) prediction, (3) capability, (4) intentionality, and (5) transference. Beyond describing the processes, we extend the work of Doney and Cannon by mapping the forms of trust to their five processes.

First, in a calculative process, an individual engages in an ongoing calculation of the cost and rewards of opportunistic behavior (i.e., untrusting behavior). As long as the rewards of opportunism do not exceed the costs of being caught, a member will comply and can be trusted. The calculus process is related to the deterrence-based trust that suggests that individuals will do what they say because they fear punishment. This punishment may involve a member’s reputation or future opportunities. A study of self-managing teams that met face-to-face found that teams developed strong normative rules and enforced them in a concerted fashion (Barker, 1993), which is evidence of this calculative process.

There are several factors that evoke or increase deterrence-based trust. The costs of being caught for opportunistic behavior are higher the more the trustor has committed resources to the relationship with the trustee (Doney and Cannon, 1996). The amount of resources committed to a relationship is in turn directly

related to the length of the relationship. The costs of being caught for opportunistic behavior are also higher when the trustor values his or her reputation, and when the professional network of the trustor is small and tight-knit (Doney and Cannon, 1996).

In the second trust process, prediction, one party uses the information about the other's past behavior to forecast his or her future behavior. Repeated and broad-based interactions increase the amount and variety of shared experiences and the ability to make accurate predictions of other's behavior under uncertainty. According to Lewicki and Bunker (1995, 1996), knowledge-based trust requires a courtship type of socialization where members make an attempt to learn about the other and establish an interpersonal relationship.

Closely related to the prediction process is the third process, capability, that determines the other party's capabilities to perform. The prediction process helps to predict what the other party might do and the capability process produces information on the likelihood of the party succeeding in those activities. The prediction and capability process appear to be related to knowledge-based trust. Both the predictability and capability process require repeated personal interaction which suggest that trust among strangers early on is unlikely to be based on these processes. The factors that evoke predictability and capability processes are the length of relationship, frequency of social contact, and the perceived similarity in the backgrounds of the trustor and trustee. Capability processes are also evoked by explicit discussions of status, expertise, and power (Doney and Cannon, 1997).

The fourth process, intentionality, focuses on members' disclosing their intentions and aspirations and then the other party interpreting these intentions and reciprocating them. The recognition of similar goals and values will increase trust. The intentionality process is related to identification-based trust where two parties develop shared goals, norms, and values that allow one party to act as an agent for the other. Strub and Priest (1976) found that in the intentionality process there tends to be initially a search for a highly selected behavioral cues, then sharing of information, and if this information exchange is reciprocated, then validation of the goals or values. The factors that evoke intentionality processes are the members' explicit words and behavior that indicate that members have similar motivations and intentions. The more the members interact and the longer they have interacted, the more likely they are to disclose this information. Also, the more similar the member believes the others are in terms of appearance, common interests and backgrounds, the more likely they are to disclose their intentions (Doney and Cannon, 1997).

Finally, the transference process involves a transfer of trust that some trusted third party has in a potential trustee that the trustor has no prior experience with. That is, if the third party defines the potential trustee as trustworthy, then the trustor assumes that other is trustworthy. Hence, trust is transferred from one

trusted source to an unknown party. The factors that evoke the transference process are the perceived strength of the relationship between the trusted third party and the unknown party (e.g., similarity in appearance, mannerism, setting between the two), the reputation of the third party, and the level of trust in the third party (Doney and Cannon, 1997).

4 Trust in Global Virtual Teams

Global virtual teams have many important similarities with temporal teams studied by Meyerson et al (1996) when they put forward the notion of swift trust. Both global virtual and temporary teams: (1) rally around a knowledge task, (2) have a finite life span, (3) consist of members from diverse backgrounds and organizations, (2) have members with little or no working history together and little prospect of working together again, and (5) have no imposed work methods or structure. The two trust processes that appeared to operate primarily in swift trust were transference and intentionality. Because of intense task pressures, the temporary team members do not have time to engage in extensive social dialog to learn about each other. Consequently, members import stereotypical impressions of others based on their past team or organizational experiences. These stereotypes will be either reinforced or negated by the intentionality process once the members have begun to interact. Since all the interaction is around the task, the perception of common task goals and outcomes will unite the team members. Task interaction will reinforce the expectation that the members are all motivated and committed to the same task goals. According to Meyerson et al (1996), what is at stake in temporary teams are the professional reputations of members, the reputation of the person to which the team reports, impending threats from closely knit social and professional groups to which members belong, and the perceived interdependence among the team members.

Meyerson et al (1996) studied several types of temporary teams, including juries, construction and film crews, and election campaign committees. Global virtual teams share some characteristics with these teams, but they also differ in several important respects. Members in temporary teams have periodic face to face meetings, are selected based on their specialized skills or professional roles, and report to the same single individual or committee. In global virtual teams, members remain in different locations and often are accountable to different individuals. In such teams, there is less focus on individual specialties and more on general responsibilities and the range of skills needed to complete the task. Members are expected to be able to comment and provide input beyond any narrow role, putting constant pressure on members to broaden their skills and knowledge. This might blur or reduce the affinity of the member to a well-defined professional network.

4.1 Calculative Process / Deterrence-based trust

In a global virtual team, the calculative process and its outcome, deterrence-based trust, might be particularly weak because the factors that tend to increase the cost of deterrence are absent or reduced. By definition, virtual teams are temporary and often short-term. This means that the amount of invested resources by a member in the team are limited. Also, the social and professional networks are not well-defined and hence might reduce the reputational effects. In self-managing virtual teams where there is no one person or institution to which all team members are accountable, penalties would have to be imposed by the team members themselves or the members' broader network of associates (Lewicki and Bunker, 1996; Sheppard and Tuchinsky, 1996). But in the virtual context, it will be difficult to plan a punishment by the team members and then execute the plan. It takes considerably more time to reach consensus on norms, rules, and punishment in computer-mediated teams than in face-to-face teams (Sproull and Kiesler, 1991). Also, the effects of punishment on reputation might be weaker because the professional networks are more loosely defined and the team members tend to be on multiple virtual teams at the same time. Because virtual team members do not share a past nor a future, it will be a challenge to identify and contact the appropriate network of associates who have some influence of the member. The penalty from untrustworthy acts appears to be limited, so it is not surprising that frequent violations of norms and rules are reported in computer-mediated communication groups (Sproull and Kiesler, 1991, Siegel et al, 1986; Kiesler, 1986).

Prior case studies on global virtual teams (Jarvenpaa, Knoll, and Leidner, 1998; Jarvenpaa and Leidner, 1998) suggest teams that attempted to implement rigid team rules and engaged in negative posturing when members violated the rules reported low levels of trust in the team. Any member could blame their lack of contribution or progress on technological problems or personal problems that the other members could not verify. Complaints about non-complying team members to persons outside the team, such as the violating person's superior, created not just a lack of trust, but distrust and a desire to disassociate oneself from the harmful effects of the complaining person. Teams that focused on setting rules had a difficult time moving onto the task itself. Also, the teams that dwelled on rules did not seem to develop any mechanism to enforce the rules or even monitor the members' compliance in a systematic fashion. For example, a member of one team kept a log of the visitors to the WWW site the team was developing. This member made comment to his team after only one other member visited the site. Although these seemed to be a clear violation of a norm the group tried to set for itself, the members failed to reach a decision how to act on this information.

4.2 Predictability and Capability Processes / Knowledge-Based Trust

Regular and rich exchange of social information as well as explicit courtship, where one party attempts to learn about the other party, are necessary for knowledge-based trust (Lewicki and Bunker, 1996; Sheppard and Tuchinsky, 1996). In virtual teams, teams are limited to computer-based communication. Computer-based communication media has been labeled as lean because the media available is perceived to be incapable of handling rich information with ambiguity and uncertainty (e.g., Daft, Lengel, and Trevino, 1987). Recent research has challenged this media richness theory and concluded that in situations where parties know each other well (i.e., have a shared interpretive context), even a lean electronic mail can convey a rich message (Zack, 1993; Markus, 1994). Still, if the parties are restricted to electronic communication for long periods of time, their relationships are expected to turn to "cold and impersonal" (Markus, 1994).

Many others have reported that the computer-supported communication inhibits social information exchange and courtship because of impersonalization, extreme task orientation, and flaming (Lea and Spears, 1992; Steinfeld, 1986; Parks and Floyd, 1996, Siegel et al, 1996; Lea et al, 1992). Nohria and Eccles (1992) suggest individuals receive information rich enough to allow them to begin building trust only via: (1) copresence, (2) broad bandwidth that handles multiple senses, and (3) interactive communication that allows interruptability and instant feedback. Others (e.g., Walther, 1995) argue the contrary, contending that social information may be gleaned over time from the communication exchanges, despite their computer-mediation. With computer-based communications systems, there is an exchange of social information, but the rate at which it is exchanged is much slower than in the traditional face-to-face context.

For the capability process, members would have to engage in expertise, power and political discussions of who will do what, when, and with whom. According to McGrath (1991), such discussions require virtual team members to master both problem solving and conflict resolution processes which he considers as higher order group activities. Such are likely to be successfully accomplished virtually only if the members know each other very well and have a long-term relationship (McGrath and Hollingshead, 1994). Neither of these conditions exist in virtual teams. Similarly Nohria and Eccles (1992) argued that members have to be able to establish roles for themselves and others in the group because the roles would provide predictability in behavior in an uncertain and ambiguous virtual context.

Our studies on global virtual teams suggest that some teams do engage in social dialog and a few even in extensive social discussions. Under certain circumstances, teams that invest in social dialog and try to learn about each other have high levels of trust. The teams that exchanged information about their motivations, habits, and goals rated their teams higher on trustworthiness. Ratings of

team members' abilities did have an effect on the assessments of trust early on but not later (Jarvenpaa, Knoll, and Leidner, 1998). This suggests the capability process might operate only initially, while the predictability process is more ongoing. A qualitative analysis of a sample of teams' communication suggested that some teams engaged in little socialization beyond the initial team building exercise, even though the teams reported high trust at the end of the project (Jarvenpaa, Knoll, and Leidner, 1998). When those that started high on trust were contrasted with those starting low on trust, the high-trust teams engaged in socialization early while the low-trust teams did not. However, some teams that socialized extensively early on had low trust at the end. In this last set of teams, socialization appeared to occur at the expense of progress on the task (Jarvenpaa and Leidner, 1998). These results are consistent with other research on computer-mediated communication which has found that greater task orientation coupled with greater social discussion can have beneficial effects on the team (Walther, 1996; Chidambaram, 1996).

Contrary to McGrath and Hollingshead (1994), some virtual teams appeared to be skilled in establishing roles and maintaining them fluidly throughout the project. However, roles were not assigned and they were not fixed. Rather, they emerged after the member had produced something or exhibited skills, ability or interest critical for the role, even leadership roles (Jarvenpaa and Leidner, 1998; Jarvenpaa et al, 1998).

4.3 Intentionality Process / Identification-Based Trust

Barriers to predictability and capability processes are consistent with barriers to the intentionality process and therefore, identification-based trust. Nohria and Eccles (1992) maintain that electronic communication cannot provide the context for developing kinship, intimacy, and feelings like that the others "think alike" and "feel alike." Identification-based trust assumes that there is a strong and salient group membership between trustor and trustee (Lewicki and Bunker, 1996). Nohria and Eccles (1992) argue that the virtual context eliminates critical team dynamics that would promote identification with a group.

Others, however, disagree that groups built on electronic networks cannot build strong group identity. Rheingold (1993) describes highly intimate, even romantic, relationships among electronically-interacting individuals. Walther (1992, 1994, 1995, 1996, 1997) has developed a hyperpersonalization theory for groups limited to computer-supported communication. The theory argues that because individualizing information (e.g., cues that help others understand if they are similar or different) is so scarce in the virtual context, members form a group identity on the basis of very limited interpersonal information that inherently emphasizes similarity among the members. Individuals in the virtual context tend to only reveal factors that reciprocate and reinforce the cues they have received. This increases

the likelihood of further overattribution of similarities, which results in members' idealizing the other members and feeling that a member knows his or her teammates very well.

Recent research compared geographically-dispersed, culturally-diverse partners who relied totally on computer-mediated communication with those who worked face-to-face (Walther, 1997). The computer-mediated partners communicated more affection and reported higher levels of intimacy and attraction than the face-to-face partners. Others have found that computer-mediated communication groups tend to communicate about commonalities among the members rather than differences (Hightower and Sayeed, 1996). In short, while some authors' positions would question whether identification-based trust can be attained in a virtual context, other researchers' work, particularly that of Walther, supports the notion that identification-based trust can exist in an entirely electronic context. Case studies on virtual teams describe how some teams appeared to be able to develop a strong sense of identity ("my virtual family") through intense rallying around the task even though they never had a chance for a face-to-face meeting (Jarvenpaa et al, 1998; Jarvenpaa and Leidner, 1998). But, the study also found it was important for the team members to explicitly express their commitment and clarify the task goals and have this reciprocated over and over again by the team members. The expression of enthusiasm and commitment was particularly essential in the very first electronic messages.

4.4 Transference Process / Swift Trust

Both Walther (1996) and Lea and Spears (1992) suggest that in the computer-mediated communication context where total strangers might be meeting for the first time, members rely initially on stereotypical impressions of others. This is similar to the transference process in trust literature, where members import positive expectations of trust from other settings they are familiar with and impose them categorically on the team members. Members might fall back on their past team experiences, organizational or cultural experiences and values to form views about their team's trustworthiness. The theory of anticipatory socialization (Jablin, 1987) supports this notion that individuals carry expectations and beliefs from their past work experiences and even from their early adulthood acculturation to new situations and contexts.

The major premise of swift trust is that the short-term time pressure of the team's project will hinder the ability of team members to socialize and learn about each others' behavior, abilities, and goals. Because of this the members import trust from past experiences. In some global virtual teams studied (Jarvenpaa and Shaw, 1998), members could not even be sure of the nationalities, functional backgrounds, gender, or age of their team members at the beginning of their projects, so stereotyping appeared to be based on members' own past experiences with

teams or their own general propensity to trust people . However, the transference process might be replaced by the predictability, capability, and intentionality process after the team begins to interact on a regular basis. Jarvenpaa and Shaw (1998a) found that as more time passed, the effect of anticipated expectations on trust in the team was reduced. Also the effects of hyperpersonalization appeared to decrease over time. Over time, the teams were adversely impacted by the diversity in their membership (Jarvenpaa and Shaw, 1998b). Walther (1997) predicts that the effects from hyperpersonalization would decrease over time in the face of explicit or inferred information about individual differences in a team with diverse membership.

5 Interdependencies between Processes / Forms of Trust

Lewicki and Bunker (1995, 1996, 1997) maintain that the development of trust in traditional contexts that allow face-to-face contact occurs in interdependent stages with deterrence-based being the first stage, knowledge-based second, and identification-based the final, highest stage. The first level of trust enables the development of the second level, and so on. Others have been highly critical of unitary sequence stage models of group development suggesting that the various team processes affecting the team and its development are highly complex and often unpredictable (e.g., Poole and Roth, 1989).

The swift trust theory developed by Meyerson et al (1996) suggests that trust in a temporary team appears to operate initially by the transference process, through the importation of broad socially-based stereotypes. As soon as the team begins to interact around the task goals, the transference process might become weaker and the intentionality process might begin to operate.

In virtual teams, processes are overlapping and reinforcing, but perhaps there is some level of shift over time. The initial expectations of trust may be based on transference of members' own past experiences in face to face or virtual teams followed by intentionality process driven by hyperpersonalization. Over time information gleaned from virtual interactions will evoke predictability and capability processes. For most of the team's life, all these processes except the calculative process are likely to operate in concert in developing and maintaining trust. Table 1 summarizes the challenges and the opportunities that the virtual team context presents for the factors that are traditionally associated with the different forms of trust.

Trust Process	Form of Trust	Factors Evoking Trust in Traditional Face to Face Settings	Challenges to Trust in Virtual Teams	Opportunities for Trust in Virtual Teams
Calculative	Deterrence-based trust	<ul style="list-style-type: none"> - Amount of invested resources - Reputation - Small tight knit network - Length of relationship 	<ul style="list-style-type: none"> - Temporal and short-lived teams - Membership in multiple teams - Nonoverlapping social and professional networks - Lack of access or knowledge of these networks - Team members' inability to agree on a punishment and the lack of power to execute the punishment 	No or very limited opportunity for deterrence-based trust
Prediction	Knowledge-based trust	<ul style="list-style-type: none"> - Length of relationship - Frequency of task based interaction - Amount of social dialog 	<ul style="list-style-type: none"> - Temporal and short-lived tenure in a team - Slow rate of task and social information exchange 	High levels of virtual team interaction allows members to glean predictive information over time
Capability	Knowledge-based trust	<ul style="list-style-type: none"> - Disclosure and resolution on status, power, expertise of members 	<ul style="list-style-type: none"> - Inability to engage in higher order group functions such as conflict resolution 	Emergent roles suggest that members are not "sized" to capabilities rather capabilities are seen as dynamic and evolving team attributes
Intentionality	Identification-based trust	<ul style="list-style-type: none"> - Explicit words and behavior illustrating motives and values - Length of relationship - Similarity in perceived backgrounds - Amount of social dialog 	<ul style="list-style-type: none"> - The lack of individuating information identifying motives and values - Short-term relationship - Diversity in team membership across functions, geography, organizations - Social discussion is seen as a distraction in the team 	Hyper-personalization
Transference	Swift trust	<ul style="list-style-type: none"> - Role-based stereotypes 	<ul style="list-style-type: none"> - Less emphasis on well defined roles within the team - More focus on broad based knowledge and skills - Lack of individuating information of any kind to suggest what type of stereotypes might apply 	Stereotyping based on a member's own past team experiences in virtual and face to face settings

Table 1: Trust Processes and Forms of Trust in Virtual Teams

6 Implications to Virtual Organizations

A virtual organization is inherently dynamic in terms of goals, structure, control, resource deployment, etc. The dynamism is driven by a project structure. The work is accomplished in self-managing, temporary project teams. The concept of virtual implies continuously changing interfaces and boundaries. Virtual forms are used when an organization faces unanticipated needs that must be fulfilled in short cycles. In this context there is no time to bring people physically together.

Many scholars who study virtual organizations treat them as a panacea for problems of traditional organizational forms. However, the virtual form has as many problems if not more as the traditional organization forms. Regardless of how committed and well-meaning people are initially, they tend to lose their commitment, suffer from role overload and role ambiguity over time which in turn increases free loading, absenteeism, and other negative behaviors, all of which translates to lowered project performance.

The virtual organization idea promises flexibility and fast response, but working in such a form is far from socially rewarding, particularly if it is not supplemented with face-to-face interaction. Organizations are social systems and the organization's core capabilities are largely embedded in the social networks that it harnesses. Research on global virtual teams suggest that a small number of unique individuals can create strong social networks via virtual interactions, but it is indeed a selective group. Virtual teams tend to be so cognitively overloaded by just trying to accomplish their tasks that they find it very difficult to maintain any social dialog and engage in socializing activities.

Unless a project is very short term (perhaps a one week or a few weeks), virtual teams require more explicit attention to such activities as member-support (ensuring member participation, loyalty, commitment) and group well-being (continuous clarification of member roles, power structures, management of politics, etc.) than teams that have face-to-face contact. In the virtual context, the media (including video conferencing) cannot truly convey cues that help people extract the necessary information for their teams on these matters. In many traditional teams, these matters are a natural by-product of problem solving and task-performance activities. What is also challenging is that in some virtual teams member support and group well-being activities are seen as a waste of time and distracting the team from its primary task purpose.

In a virtual organization, trust is the heartbeat. Only trust can prevent geographical and organizational distances of team members from turning to unmanageable psychological distances. Only through trust can members be assured of others' willingness and ability to deliver on their obligations. Trust appeared to be built initially on the basis of transference and intentionality processes. However, as the team communicates over time, social information is gleaned from the communi-

cation exchanges and the team members will rely more and more on predictability and capability processes.

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The Importance of Trust and Business Relationships in the Formation of Virtual Organisations

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Abstract

Organisations are operating in a complex and unstable business environment. Novel strategies are being implemented across all types of industries to exploit the capabilities of information technology. One important outcome is the emergence of ‘virtual’ organisations that are defined with respect to their product-market strategy, network structure, information systems and business communication patterns. Virtual organisations are composed of different legal entities and are often geographically dispersed and international in their outlook. In the business and academic literature the focus tends to be on transient forms of virtual organisation. In this paper the emphasis is on the importance of trust and stability in business relationships to support emerging forms of virtual organisations in manufacturing and banking. The empirical evidence and the broader theoretical implications of the importance of trust and stable business are discussed.

1 Introduction

The importance of trust has grown over the last decade because of the prevalent use of business strategies that depend on the co-operative behaviour of groups of economic partners. Such strategies are, in general, a response to the increased complexity of the business environment and the associated pressures that this places on organisations (Moss Kanter 1989). In this new business environment there is a need for flexible strategies which can respond quickly to changes in product-markets, competitors’ behaviour, global pressures and de-regulation (Lorenzoni and Baden-Fuller 1993). Companies have therefore developed different methods of working with customers, suppliers, competitors, banks and other economic partners which rely much more on the development of trust and long-term business relationships (Naude and Holland 1996). It is argued in this paper that most virtual organisations will be based on stable business relationships that support co-operative strategies rather than transient virtual organisations that only exist temporarily. Examples of stable virtual organisations include integrated supply chain structures, strategic alliances and strategic webs.

2 Definitions

The term virtual organisation is used to denote the difference between legally defined corporations and the virtual organisation that is composed of different legal entities that choose to work together in a co-operative manner. To develop the concepts of virtual organisation and trust, working definitions will be derived from the literature.

2.1 Trust

There are multiple definitions of trust and a single, simple definition is insufficient to capture the essence of the concept. Trust will therefore be defined as a multi-dimensional variable that defines it with reference to the context in which it is applied. However it is instructive to provide some simple definitions to start with, before developing a more comprehensive one. In the context of business relationships Ring and Van de Ven (1994) define trust as „the confidence that another organisation will behave according to its expectations and that it will exhibit goodwill“. Hart and Saunders (1997) expands on this definition to state that: „Trust is based on ‘fair dealing’ and a sense of reciprocity, but does not imply that outcomes be divided equally between parties..“.

The notions of expected behaviour and goodwill provide a basic definition but can be expanded on by attempting to define the components of trust more precisely. The earliest work on trust focused on individuals and was done from a psychological perspective (Worchel 1979, Lewis and Weigert 1985). From this research, it is possible to identify two (related) types of trust: dispositional; and subjective. Dispositional trust is the natural tendency of an individual to trust other people, and is considered to be a function of their attitudes, personality and previous experience. It is independent of a specific situation and is a measure of an individual's tendency to trust or distrust. It is essentially a measure of whether an individual tends to trust other agents or not. Dispositional trust varies between individuals and may change over time but is not related to a particular situation or context.

When a specific situation is analysed, the question of what constitutes trust changes from the general question to a specific situational context. Dispositional trust is a simple measure of general trust - do you trust other individuals, organisations and economic agents? The subjective trust concept depends on a particular set of circumstances and a specific economic partner - do you trust X to behave in a particular way in this situation? It can be seen that structural and situational factors such as the nature of the task, the knowledge of the economic partner, the power relationships and the incentives affect the level of subjective trust. Subjective trust is therefore a function of dispositional trust and structural/situational factors and will vary depending on the identity of the other part-

ner and the particular context and nature of the transaction (Kee and Knox 1970, Luhman 1979).

It is important to distinguish between trust, both dispositional and subjective, from actual behaviour. Both forms of trust can be measured without reference to actual behaviour. Subjective trust influences the behaviour of an individual but this is mediated by the specific nature of the transaction. Behaviour towards an economic partner is a function of subjective trust, risk and the importance of the outcome. It can be seen that even if the level of subjective trust is low and the risk is high, if the importance of the outcome is extremely low, an agent may choose, quite rationally, to display ‘trusting behaviour’ towards an economic partner because the outcome is unimportant. Behaviour and trust are therefore independent concepts. The perceived risk of the situation and the importance of the outcome mediate the influence of trust on actual behaviour (Lewis and Weigert 1985).

2.2 Trust and business frameworks

Two frameworks of business relationships and organisational trust deserve particular attention because of their attempts to integrate the diverse literature on these subjects. These are Ring and Van de Ven (1994) and Mayer et al (1995). Ring and Van De Ven’s work is chosen because it attempts to explain the formation and development of co-operative business relationships with trust as an important variable in their model. Mayer et al (1995) focus on trust as a subject in its own right and model the different facets of trust before explaining its role in various social phenomena, including trust and co-operation between organisations. These models are discussed separately before relating the notion of trust to the virtual organisation and presenting a synthesis of the different approaches.

In both business frameworks of trust, there is no mention of information systems and their influence and impacts on the trust models. However this may be due to the long time-scales involved in academic publications. The similarities of the two models are clear and their differences are in emphasis and focus, rather than conceptual. In the next section an overview and discussion of the virtual organisation is presented before bringing the separate discussions together in an integrated model of trust and the virtual organisation.

3 Virtual Organisations

There is a plethora of different terms to describe the phenomenon of novel forms of economic organisation, for example virtual organisation (Lockett and Holland 1996), strategic web (Lorenzoni and Baden-Fuller 1993), network organisation (Powell 1990) and strategic/co-operative alliances (Holm et al 1996). This lack of an agreed nomenclature is common in new and rapidly developing subject areas, but it is necessary to define what the authors mean by the term ‘virtual organisa-

tion' in relation to other commonly used terms. Williamson (1991) identified two distinct economic forms of governance, hierarchy and market. Hierarchy denotes common ownership of successive stages of the supply chain whereas market represents the transactions between atomistic organisational units. Recent attention has focused on intermediate forms of economic organisation which lie somewhere between a market and a hierarchy. Williamson (1991) refers to these as hybrid organisations, whereas other authors use the terms already mentioned above (network, virtual etc.). What is interesting here is that most businesses can be said to be somewhere in the middle, that is, neither market nor hierarchy, and theoreticians have attempted to explain this 'swollen middle' (Hennart 1996). The term virtual has been used by many authors, often without a recognised IT component.

A simple definition based on the authors' previous work in this area is proposed before developing the idea into a more comprehensive taxonomy. A virtual organisation is defined as: a group of separately owned organisations that for specific group(s) of activities behave as if they were a single organisational entity and co-ordinate their behaviour through relationships based on trust and shared information systems. The motivation for this type of behaviour is to achieve competitive advantage by allocating resources and matching different capabilities, or core competencies, together in a more effective manner than through the traditional market/hierarchy dichotomy. An important characteristic of most virtual organisations is their high information intensity because of the high degree of co-ordination that is required, and therefore shared information systems are needed to create and maintain the necessary communication between the separate partners.

The existence of inter-organisational relationships based on co-operative strategies and trust is clearly documented (e.g. Grandori and Soda 1995, Hinterhuber and Levin 1994, Holland 1995). However in strategic alliances the extent and scope of the relationship in terms of the degree of co-operation and the range of business processes included are often limited and typically vary across relationships (Hart and Estrin 1991). In a virtual organisation the web of co-operative relationships forms a greater whole and the extent to which the separate organisations belong to a common identity based on shared objectives and strategies is much greater in a virtual organisation than in a market network. Based on the management and IS literature the following variables will be used to develop a taxonomy of the virtual organisation: product market strategy; network structure of the inter-connected organisations; information systems and business communication patters (Holland and Lockett 1998). Each of these terms is discussed briefly before relating trust to the virtual organisation.

3.1 Product-Market Strategy

The product-market strategy of developing co-operative relationships with economic partners and ultimately developing virtual organisations is common across enterprises, industries and national economies (Hinterhuber and Levin 1994, Holm et al 1996, Moss Kanter 1989). The combined pressures of globalisation, deregulation, time-based strategies and the need for extremely high quality forces businesses to re-think the way that they organise their economic activities in order to compete effectively and achieve high returns on their investments (Dicken 1992, March 1996 and Vesey 1991). The strategic intent of the virtual organisation is to create a new organisational entity based on close co-operation amongst a group of separate organisations to achieve a common marketing strategy and identity (Verity 1995). The existence of an explicit marketing identity distinguishes the virtual organisation from other types of groupings based on co-operative relationships.

3.2 Network structure

The network structure is the arrangement of the separate organisational units. This is an important dimension of the virtual organisation because it distinguishes vertical value-adding partnerships (Konsynski and McFarlan 1990) and horizontal alliances such as KLM and North-West Airlines. For example, Benetton is an example of a virtual organisation with the network structure of a typical value-chain from raw materials to final customer (Lorenzoni 1996). The brand name of Benetton defines the virtual entity from a marketing perspective, and the operational activities are organised to optimise the value-chain as a whole. The Barclays virtual global bank concept has a very different structure with Barclays and its worldwide correspondence banking network at the centre which is then connected to small and medium sized customer banks (Lockett and Holland 1996). Network structure can be defined in several ways: with reference to membership of an organisation-set; with reference to a particular activity (action-sets); and more generally as a network of inter-connected organisations (Aldrich and Whetten 1981). All of these types of network structure can be visualised and for complex structures techniques exist for analysing the structure of market networks to explore the role of connections, information exchange and influence.

3.3 Information Systems and Business Communication Patterns

Within organisational boundaries, there has been an enormous shift towards the choice of package software in preference to alternatives such as writing software in-house or developing legacy systems further (Price Waterhouse 1996). The dominant type of software to manage all aspects of an organisation's management activities is termed enterprise resource planning (ERP) system, and the top commercial examples are SAP R/3, MOVEX and Baan (SAP 1996, Butler Group

1996). It is difficult to overestimate the impact that such systems are having on organisational design and the same is true for virtual organisations. In the same way that organisations can be modelled as information processors (Naude and Holland 1996), virtual organisations are not only bound together by shared access to data and systems, they can actually be described in terms of information flows which represent business communication patterns.

4 Trust and the Virtual Organisation

From the discussion of the virtual organisation, it is clear that the interactions between the separate organisational units cannot be regulated completely by contracts which characterise market style transactions and similarly are not governed by common ownership as is the case with hierarchies (Williamson 1991). The high level of investments inherent in the creation of a virtual organisation, whether from an existing set of relationships, or one created from scratch, mean that there is a significant level of risk associated with the outcome - the outcome matters to the participants. Based on contemporary examples of virtual organisations, businesses are obviously willing to take such risks, and organisational trust has been hypothesised to be an explanatory variable for the development of such co-operative behaviour. The proposed model that synthesises and extends the earlier models of organisational trust (Ring and Van de Ven 1994 and Mayer et al 1995) to include information systems and the virtual organisation concept. Each of the variables and their inter-relationships are discussed in turn. There are four groups of variables in the model: (a) trust antecedents (b) behavioural elements (c) virtual organisation outcomes and (d) monitoring of performance. Trust antecedents are composed of dispositional trust and the situational context which together combine to give the level of subjective trust for a particular situation. The behavioural elements group consists of subjective trust, the risk of failure, and the importance of the outcome which together influence the virtual organisation outcome. The performance of the virtual organisation is monitored and the results feed back into the trust antecedents variable which makes it a dynamic model capable of change over time. The model has been used to analyse two case vignettes in manufacturing and banking. A summary of the case data is presented in table 1.

	Case 1. The Virtual Factory	Case 2. The International Virtual Bank
Market Information	The virtual factory is comprised of "Consumer Products" and its Suppliers. The strategic focus is on quality and time-based competition throughout the organisation. Suppliers are	The International Virtual Bank is an alliance of national European and US banks that have developed a common information system to support all types of bank-

	Case 1. The Virtual Factory	Case 2. The International Virtual Bank
	considered to be an extension of its own business and are linked electronically for sharing production information.	ing transactions between bank members. The market strategy is to develop a common image for the virtual bank and to compete directly against 'typical' global banks defined by common ownership.
Trust Antecedents	Relationships are characterised by a long-term outlook that includes strategic potential in addition to current performance. The overall trend is to move towards fewer suppliers and develop joint strategies. The open sharing of all production data with suppliers is designed for mutual responsibility and benefits.	There were existing relationships between all the members of the virtual bank (12 in total) based on traditional SWIFT banking technology. Personal relationships between senior managers of several of these organisations were a catalyst to form a virtual bank connecting the back-office systems together and to create a common marketing image.
Behavioural Elements	Move away from adversarial approach to one of partnership to develop improved supplier performance. The outcome of suppliers' manufacturing and administrative systems is extremely important because it determines the quality of the final product.	Initially there was an exclusive group of banks that were willing to work together and to create an international cash management service for their clients. As the network of economic partners grew, expansion became more difficult because new members needed to trust, and be trusted, by the existing members. Trust is a limiting factor in the growth of the virtual bank, and a new venture has started to exploit the technology in separate bank networks.
Virtual Organisation Outcome	The virtual factory is starting to behave as a single strategic en-	There is a peer-to-peer relationship between all the na-

	Case 1. The Virtual Factory	Case 2. The International Virtual Bank
	tity. Order cycles have been reduced from months to a couple of weeks - this includes international shipments of commodities. There has been a reduction in the supplier base and there is now only single or dual supply for most products. Quality levels are approaching near-perfection for some services and business processes and all suppliers are striving towards this objective.	tional partners based on co-operative relationships and a common information system that enables almost instantaneous exchange of information, including confirmation of deals. International payments, foreign exchange and instructions for setting up new accounts can all be done very easily and quickly.
Monitoring of Performance	Performance is monitored using statistical process control techniques. The difference between trusted relationships and adversarial ones is where there is a shortfall in performance, Consumer Products works with its suppliers to improve the situation - trust is about future behaviour.	The performance of the virtual bank is monitored electronically. Individual transactions are confirmed almost immediately, thereby reducing the risk of the outcome - this is only possible with other members of the virtual bank. Using SWIFT, confirmation could take hours or even days. Strategic development still relies on personal relationships and regular meetings take place to support this process.

Table 1: Summary of Case Data

5 Case Discussion

The two cases illustrate the theoretical business model of trust and the virtual organisation with examples from manufacturing and banking. Both case examples are of virtual organisations that have developed out of existing relationships but have utilised the power of IT to create much closer ties based on information exchanges and joint strategies. The result in both cases is a network of economic partners that together create a virtual organisation that is greater than the sum of the individual organisational components. Both case examples are successful organisations and competitors appear to be pursuing similar approaches - the find-

ings are therefore probably representative of a broader set of changes occurring in all types of industries world-wide(e.g. see Short and Venkatraman 1992, Rayport and Sviokla 1995 and Sieber and Giese 1997). Although the virtual factory does not consider itself to be a virtual organisation, implicitly it behaves as one. The virtual international bank actively encourages and promotes its image as a virtual bank and uses shared information systems to support the novel organisational arrangements. Both cases are characterised by stability and a long-term outlook - there is no intention for the arrangements to be transient. This does not mean that the relationships are static but that the emphasis is on gradual shifts over time based on mutual benefits and outcomes. The business model of trust between organisations encompasses the role and impact of information systems. In both case examples it is clear that the trust development process has been speeded up by the use of shared information systems because they enable detailed knowledge of economic partners' operational performances to be gained.

The strategies of the two organisations outlined are very similar in principle to other leading organisations such as Sun, Hewlett Packard and Chrysler Corporation. Using the examples of Sun and other international organisations, Lorenzoni and Baden-Fuller (1993) identified the concept of a strategic web in which a dominant organisation - the hub, managed a spoke of relationships with external economic partners. The emphasis for Sun was on new product development and exchanging ideas. Similarly Hewlett Packard are moving towards what Lew Platt, their chief executive, calls 'global virtual manufacturing operations'. "Instead of having a manufacturing facility which is dedicated to a specific geography, the manufacturing resource is really fungible. This provides a wide range of benefits including flexibility and load balancing" (Lee and Billington 1995 and Taylor 1997). Hewlett Packard have changed the way that they view manufacturing from a factory perspective within the company to a much more international and external view of the supply chain to include trading partners. Similarly Chrysler Corporation achieved annual savings of over \$220M. from the evolution of its EDI system with first tier suppliers (Mukhopadhyay et al 1995). This equates to a saving of over \$100 per vehicle which can be critical in a market where margins are extremely tight.

Several mega-trends emerge from the cases and comparisons with other companies cited in the paper. These are the globalisation of markets, a re-organisation of supply chains and horizontal market networks into tight groupings that behave as single or virtual organisations, an emphasis on quality and continuous improvement, and time-based strategies. All of these mega-trends rely totally upon shared information systems. As vertically integrated supply chains fragment into separately owned companies, the need for co-ordination and control increases (Holland et al 1992). It is clear that technology mediated communication patterns and trusted business relationships are the glue that binds together the separately owned companies into dynamic, global and responsive organisations.

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Characteristics of Virtual Organizations

Hans Jägers, Wendy Jansen and Wilchard Steenbakkers

Abstract

Virtual organizations are on the rise. Much has been published regarding this form of organization. Nevertheless, there is a lack of practical research to shed light on the forms that this type of organization can take, what its characteristics are and under which conditions virtual organizations can come into existence and be operational, etc. One of the primary causes for the lack of empirical studies regarding new forms of organization is the fact that a concrete theoretical framework has not yet been developed. Authors employ disparate definitions, describe organizations as 'more or less' virtual and recognize differing definitions. The objective of this article is to offer a clearly defined framework with which to conduct empirical research. The primary characteristics that typify virtual organizations are outlined here. The article concludes with a workable definition of the virtual organization.

1 Introduction

"It weighs a bit more, is that OK?" Starting next year, the consumer no longer need listen to this type of rhetorical question at the butcher's shop. At that time, the first fully automated meat-robot will be introduced in Zwolle (Netherlands), the Freshopper.

Using this machine, the consumer selects the type of sandwich meat desired whereupon it is automatically sliced, weighed and packaged. Everything is taken care of, even the price sticker. The human touch is no longer required. Fokker produced this machine in collaboration with four other companies one of which was Prolion. Prolion took on a special role during the course of the operation. This engineering bureau co-ordinated the development and contracted the assembly out to Fokker. It took on the role of lead contractor (De Stem, October 13, 1997).

Prolion is an example of a virtual organization. These types of organizations are multiplying. Virtual is 'in'. It is becoming common practise to use terms such as virtual organization, virtual reality and virtual office. However, precisely what is meant when speaking of the virtual organization is yet to be clarified.

In this article we will attempt to spell out a number of the essential characteristics inherent to the virtual organization.

In paragraph 2, we will examine a few of the prevalent definitions, in order to give body to the concept of virtual organization. In paragraph 3, we will sketch a network organization continuum, which places virtual organizations in a broader conceptual model. We will also use this continuum to enable us to better convey the characteristics of virtual organizations (par. 4). In paragraph 5 we conclude by offering "appropriate" definitions for virtual organizations, based on the characteristics that we recognize from the perspective of organizational expertise.

2 Definitions

There is much discussion regarding the definition of virtual organizations. At this moment, Internet users can take part in an extremely lively discussion (Votalk, a type of news group) on this topic (<http://www.virtual-organization.net>). The most interesting definitions are as follows:

"A virtual organization is a temporary network of independent institutions, businesses or specialized individuals, who work together in a spontaneous fashion by way of information and communication technology, in order to gain an extant competitive edge." They integrate vertically, unify their core-competencies and function as one organization (or organizational unit)." (Fuehrer, Votalk, 1997)

"An identifiable group of people or organizations whose use of ICT is substantially greater, thereby reducing the necessity of their physical presence for the transaction of business or for doing work collaboratively in order to realize common objectives". (Hill, votalk, 1997)

"VO's (virtual organizations), refers to a new organizational form characterized by a temporary or permanent collection of geographically dispersed individuals, groups or organization departments not belonging to the same organization - or entire organizations, that are dependent on electronic communication for carrying out their production process." (Travica, 1997)

"The virtual organization is a dynamic alliance between organizations that bring in complementary competencies and resources and that are collectively available to each other, with the objective of delivering a product or service to the market as a collective." (Ten Have amongst others., 1997)

All these definitions point to a number of characteristics that seem to be common to virtual organizations. We will specifically examine this in paragraph 4. First we will present a conceptual model in which virtual organizations will be dealt with as network organizations.

3 A conceptual model of network organizations

Every virtual organization is a network organization, but not every network organization is a virtual organization. In the case of network organizations, one al-

ways speaks of a collaborative of people or organizations (crossing boundaries). This characteristic holds true for all virtual organizations. We are of the opinion that the virtual organization is a network organization in an extreme and far-reaching form, with a specific combination of characteristics, which can also occur individually in other varieties of networks. The following network organization model illustrates that virtual organizations are a progressive step in a continuum of network forms:

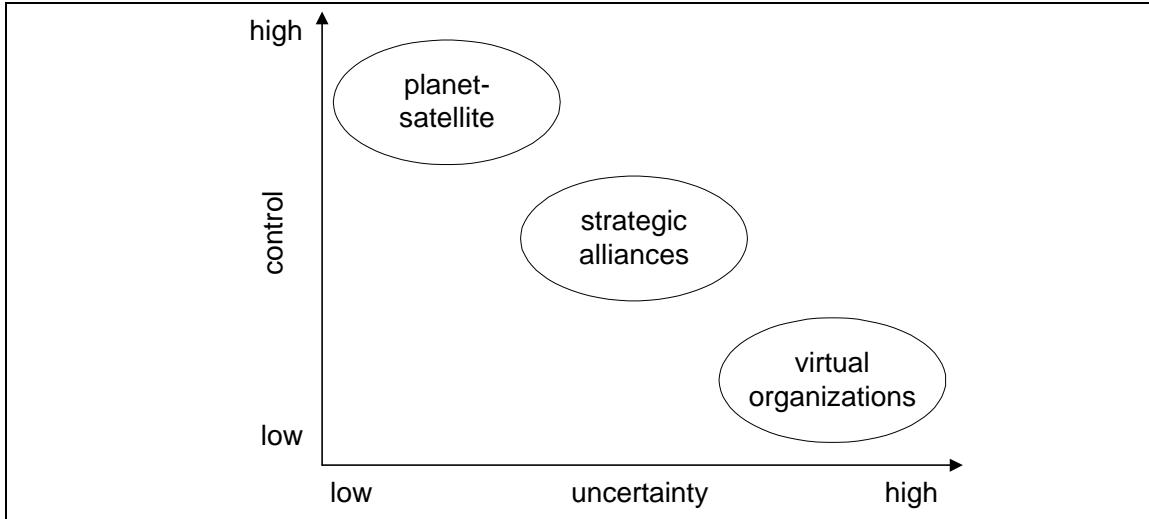


Figure 1: Continuum of network organizations

The network organizations presented in figure 1 occur on a continuum. One of the two factors which determines the form accorded a network organization, is the level of control (the vertical axis) in the network.

3.1 Control

Participants in network organizations try to reduce risks by placing the collaboration under control through regulations. We call the type of network that occurs in situations of high control (from the dominant parties viewpoint) the planet-satellite organization. The planet, which is dominant within the network, is surrounded as it were, by a number of satellites. A good example of this can be found in Japanese production companies that work with subcontractors. Here, the large production companies determine the specifications, amount, form and so forth for the services/partial fabricators, that are offered by delivering parties. The control structure in this type of network is such that it would seem as though there were departments or units of one organization, that are "bound" to the dominant central party in the network, whereas there is actually a multiplicity of organizations.

The planet does not necessarily depend on its satellites, because the satellites are interchangeable. Satellite cooperation, allowing them to form a power block, is almost impossible because they all have very specialized products (and produc-

tion processes). Integration of the satellites into the planet's organization is often undesirable because the planet, through its cooperation with those satellites, is able to produce cheaply and is able to optimize its processes and to reduce its risks.

In the case of the planet-satellite organization and to a lesser extent in that of the strategic alliance, the control is higher in that clear contracts have been entered into. The strategic alliance depends on a reciprocal relationship. The partners become dependent upon one another as a consequence of limited and pre-arranged activities. A high level of mutual dependency between network partners is inherent to the virtual organization. The end-product or service cannot be realized without the skills and methods offered through this partnership. A strategic alliance stands for the combined concerns of participating parties; the organizations have a vested interest in each others success (Lucas, 1996: 9). One example of this is the strategic alliance between KLM and NorthWest Airlines. This strategic alliance enhanced the competitive position of the alliance participants in that (amongst other things), the occupation level of the fleet increased due to combined flights and due to one of the participants being awarded landing rights as a license holder.

We come across virtual organizations in situations with a low level of control. In contrast to the two other forms of network, the virtual organization participants do not try to heighten this control through regulation or forms of control (using contracts for example), but rather through the pooling of knowledge and information. An example of this is the collaboration between KPN multimedia and employment agency START, the only employment agency that was daring enough to share information through the creation of a virtual employment market (known as Jobbing Mall) (Computable, 1997).

In the event of high control by one dominant party in the network, as in the planet-satellite organization, an organization usually possesses traditional sources, such as financial muscles and/or technological excellence.

3.2 Uncertainty

The second of the two factors which determine the continuum position is the degree of uncertainty (the horizontal axis). As a result of uncertainty, the amount of risk which the participants run when entering into a relationship plays an important role in determining the shape of a network. The amount of uncertainty is especially high with new or difficult projects. Examples of this uncertainty are questions like whether or not a market will be found for the new product or service, whether or not the technology will work and whether or not the collaborative partnership will function. Within the planet-satellite model and, to a lesser degree, within a strategic alliance clear and unambiguous contracts are a means to try and decrease the amount of uncertainty. Lack of control and uncertainty are,

however, mainly caused by the absence of information. That is why sharing information and knowledge is such an essential factor in a virtual organization. Situations involving great risks and a great deal of uncertainty during their initial and later phases require a flexible network form like the virtual organization in which sharing knowledge is a normal way of working. This means that informal and personal relations play a crucial role in shaping and in the functioning of a virtual organization because only the existence of these types of relationships in a collaborative partnership will lead to the readiness to share explicit and implicit knowledge. (Ring and Van de Ven, 1992:492 and Jansen et al 1995).

Within the planet-satellite model the central party usually runs low risks. During the negotiations with subcontractors the risks - using the power base of the central organization - are diverted to the other participants. Generally, with strategic alliances between organizations that need each other, the risks are not too great either. This can also be built into the relationship on purpose when a strategic alliance is forged. An international example of a successful strategic alliance is SWIFT, the international electronic system for the exchange of financial messages and transactions. SWIFT operates in a closed market in which all participants determine the rules and in doing so keep the risks to a minimum (Brousseau and Quélin, 1992: 239). When dealing with a situation of high risks you need a more flexible network than the strategic alliance. In these situations the virtual organization is a good solution.

This description of network organizations is necessary in order to clearly distinguish the virtual organization from the other organization forms. This description has listed a few characteristics of virtual organizations. In the following paragraph we will examine these in a more systematic fashion.

4 Characteristics of the virtual organization

Virtual organizations have the following characteristics:

- boundary crossing
- complementary core competencies/the pooling of resources
- geographical dispersion
- changing participants
- participant equality
- electronic communication

In this paragraph, we will discuss the above mentioned characteristics which in our opinion, are inherent to all virtual organizations. This paragraph closes with a discussion regarding "temporariness"; a feature regarded by a number of authors as being integral to a virtual organization. We do not share this opinion.

4.1 Boundary crossing

The growing uncertainty due to changes in the business environment has lead to a greater need for flexibility. Currently, independent organizations are often no longer in a state of being able to provide the desired products or quality. This need for flexibility can only be guaranteed by small flexible organizations which can react promptly to the customer's demands or wishes. The customer desires individualized products (mass-customization). These products can only be produced through the co-operation of multiple specialists. Small organizations must (eventually) realize that only through co-operation does the possibility exist of living up to this market demand. Large organizations shall split up, seeing as the formal regulations often generally adhered to, are not conducive to flexibility. Co-operation between independent branches of the organization shall take place in the form of a network type of virtual organization. This collaboration can take place through the pooling of core competencies and/or the combination of working methods utilized by the participating parties. Those participating in a virtual organization are entirely dependent upon each other during this collaboration.

4.2 Complementary core competencies / the sharing of resources

The primary characteristic of a virtual organization is the pooling of the participant's core competencies or core processes/activities (core businesses). The market difficulties and demands which confront individual organizations, can no longer be solved or met by the solitary organization. The participants in a virtual organization complement each other, making it possible to deliver a product or complete a project collaboratively. The example of Prolion given in the introduction, clearly illustrates the manner in which virtual organization participants complement each other. Prolion itself is not occupied with the production or sale of the Freshopper. The production is a Fokker core competency and sales are dealt with by the participating sales organizations. A flexible, efficient form of organization has risen out of this collaboration, delivering products and services which would otherwise be unattainable for the individual participants. The objective from the individual participant's standpoint, is to procure non critical core competencies or activities (from the other participants) with which to achieve greater results than would be possible for the solitary party.

There is much discussion in the existing literature regarding whether the combination of core competencies typifies the virtual organization, or the combination of core activities. We find this issue of minor importance. The choice for core activities usually stems from and is intrinsic to the organization's core competencies.

One of the virtual organization's great advantages, is that the participating organizations can take on additional and larger projects in a more flexible and swift fashion than would be the case for an individual.

In strategic alliances, the combination of methods to attain greater achievement also counts as an advantage. And yet here, by definition, swiftness and flexibility are of a lesser degree than in the virtual organization, as collaboration is regulated in a more formal manner (via fixed contracts). The pooling of resources takes place because participants realize their strong dependence on one another and that continued participation in the network necessitates this sharing (Ten Have , 1997). The origination of Fun United illustrates the pooling of methods in a virtual organization.

New Fun United pools Dutch amusement expertise.

In March 1997, an article appeared in the Financial Telegraph regarding the setting up of a private company "Fun United Netherlands", abbreviated to Fun.

In Fun, twenty companies collaborate to come up with attractions and develop and produce them for the amusement market both at home and abroad. Amusement and vacation parks as well as shopping malls looking for special children's attractions are part of their target group.

Fun is an initiative of the Innovation Centre Rijnport (IC) in Rotterdam. According to project supervisor Karin Bakker, this is the first time in the Netherlands that such a sweeping joint collaboration has taken place in this field. The participating companies are active in (amongst other things) industrial design, steel construction, hydro engineering and child psychology.

Fun derives from the IC project Vlechtwerken (braid works). Here, IC brought companies from various branches together in order to collectively avail of market opportunities. Each company made a deposit of f2500,- (approx. 1250 US\$) into the Fun account, a modest starting capital. As well, the amount of working hours that participants invest in the new company compensate for outstanding loans to Fun. The intention is for IC to eventually break with Fun.

The Telegraph, March 22, 1997

4.3 Geographic dispersion

Another characteristic of a virtual organization (as well as of many other network forms) is the geographic dispersion of activities. Because communication between participants is taken care of by ICT, the work location is no longer of significance. It is possible to communicate within seconds on a world-wide scale. This causes a breakdown of traditional organization form characteristics. Until just a few years ago, to develop and bring software to the market was a time consuming activity. With the current information technology methods, software can be market ready much more swiftly. Software giant Microsoft makes use of this in a very handy way. In daytime U.S.A., the development of software proceeds

and when night falls, the software is sent to India aided by ICT, where a new day is just dawning. In this way the business hours of Microsoft are doubled and the "time to market" is halved.

4.4 Changing participants

The virtual organization can be composed differently each day. On one day a certain organization may be part of the network, forming the virtual organization along with other networks. The following day the virtual organization could be composed of other organizations. The geographical dispersion and the boundary crossing character of virtual organizations both lead to questions regarding the system limits of organizations. What comprises a virtual organization and what does not? Does the virtual organization exist in terms of a specific fixed "core" and are incidental network participants not part of the virtual organization? Is the virtual organization formed by the largest collection of potential organizations that participate?

In trying to answer these questions we run up against the traditional definition of organizations. This is often worded as "a collaboration of people and methods in order to attain specific objectives".

When speaking of the virtual organization, these objectives are often temporary and one could argue that in having reached its objective the virtual organization would thus cease to exist. In actual fact, the virtual organization (as a composite of relations between people and/or organizations) can directly redevelop activities (often in a different compilation) for a new project. One could thus also argue that the virtual organization is inherently dormant in quality. Here, virtual takes on the definition of "being potentially present". Aside from this definition of virtual, this concept is often used to indicate "not present in reality". The client assumes that business procedures are carried out by a single organization, whereas the rendering of service takes place through a network of organizations.

4.5 Partner equality

Increased dependence in virtual organizations leads to a greater equality in participant relations. Each partner in this collaborative effort plays his own role, contributes to the improvement of the end product and forms a link, regardless of location, in the functional process of the virtual organization. In this way, a culture based on the desire to share skills and information replaces the older control based culture. To want and to be able to take risks is an absolute prerequisite.

John Naisbitt (1994) sums it up by saying: "High tech has to be balanced by high touch to build high-trust organizations". These 'trust-based (virtual) organizations' seldom need to be managed in the classical sense. Each participant can offer leadership based on a specific specialism, during the process of product or service development. It is a temporary leadership lacking hierarchy as it is based on par-

ticipant equality and focused on reaching the shared objective. Often however, one of the organizations will assign itself a position as 'enterprise head' and functions as a low-profile project leader. In most cases, this is the person or organization to whom/which a project has been awarded, or was the source of the idea or initiator.

Trust plays a role in both the strategic alliance and the virtual organization, but differs substantially for each of these organization forms. Trust in terms of the strategic alliance is in the context of the presumed reliability of the participating organizations in their entirety. Moreover, in strategic alliances this trust is safeguarded through procedures and contracts. Trust in the virtual organization rests primarily on trust between people. This element does not take a dominant position in the planet-satellite organization. Here, relations are of a business-like nature which is largely spelled out in formal contracts between the central party and its members. On the one hand trust and shared dream (which has a common organizational culture as its basis) make it possible to react flexibly to changing circumstances because it is possible to rapidly bring various specialism together. On the other hand the director of the project (in a virtual organization) will remain more or less responsible for putting together the network or the virtual organization. Sometimes the requirements which partners will have to meet make it difficult to quickly form the desired network.

4.6 Electronic communication

The essence of the virtual organization is to break up the unity of time, location and trade. The often changing and geographically dispersed collaborations that have come into existence are based on information and communication technology applications. This is an essential prerequisite for the proper functioning of virtual organizations and is largely recognized as being a 'conditio sine qua non'. The possibilities of the virtual organization grow ever larger as a direct result of ICT.

The current (and certainly the future) information and communication technologies offer a flood of possibilities for face-to-face communication in a virtual organization. E-mail, voice mail and especially video conferencing provide enough scope for the swift creation of contact in which the personal dimension can also be addressed. Research has shown that E-mail in particular, has partly taken over the function of the direct and personal discussion (including gossip). Groupware offers the possibility of effective teamwork and communication, crossing the boundaries of time and place if necessary.

The course of a process is aided by expert systems which make it possible to have access to expertise and experience built up within organizations by experts. We have been able to confirm that all authors underline the role of ICT as being a necessary prerequisite, characteristic and catalyst for a virtual organization, whilst

opinions remain divided regarding other characteristics of virtual organizations (see Lucas, 1996; Travica, 1997).

4.7 Temporariness

Opinions are divided regarding whether a temporary nature is a specific characteristic of the virtual organization. Some authors postulate the temporary nature of the virtual organization (Travica, Fuehrer, Hill, amongst others). We on the other hand, are of the meaning that virtual organizations can be of a temporary nature but can also be functional without the perspective of being finite (disregarding for a moment the fact that all organization forms are ultimately finite). A project organization is an example of an organization form that is preponderantly considered to be finite (defined temporary). Also, an organization can be considered temporary as a result of a shift in customer demands or in competitor relations. This is a development that occurs over time, rather than a definite intention planned during the set up of the organization. One example in which one can speak of the temporariness of the virtual organization, is in the event of project completion. The virtual organization could also have an undetermined duration; the organization will remain functional for as long as customer demand exists and/or the participants find their collaboration to be beneficial.

5 The virtual organization considered from the perspective of design

This article has been written from the point of view of organizational expertise, with specific regard for the design of organizations. We are especially interested in the characteristics of the network organization in general and primarily in virtual organizations that play a role in the allocation and co-ordination of tasks within these organizational forms. Therefore, we have focused on those characteristics which bear a relation to this. The boundary crossing nature of the virtual organization and its complementary core activities and resources, determine how the allocation of tasks is regulated within this form. Also, the characteristic geographical dispersion of core activities and/or methods (which nevertheless can be regarded and treated as though all in one place) is an aspect of how tasks are allocated within the virtual organization. The lack of hierarchy characteristic (participant equality) and the underlying ICT structure indicate the manner in which the attunement of activities is regulated. The definition that we propose - from the perspective of design - reads as follows:

A virtual organization is a combination of multiple - geographically dispersed - parties (persons and/or organizations), that by uniting complementary core activities and methods endeavour to attain a common objective. This virtual organization accords an equal division of power amongst its participants and is dependent on electronic communication (an ICT infrastructure) for the co-ordination of these activities.

6 Conclusion

When we consider the foregoing definition, the question arises of whether the virtual organization can be seen as a new form of organization. The literature often suggests that the pertinent concept of 'virtuality' is to be understood to define not a special form but rather a dimension, by which every organization can be typified to a greater or lesser degree. After all, almost every organization includes shared tasks or projects which include other participants, which literally and figuratively take place outside the organization. These partnerships are increasingly maintained by way of electronic communication. This concept of virtuality is certainly valid from the point of view of individual organizations (Ten have, amongst others 1997).

However, when we examine virtual organizations from the perspective of a network of organizations and its internal patterns, then we can certainly conclude that the virtual organization is a new type of network. The novelty lies in the essential role that ICT plays in the virtual organization. On the one hand, the use of ICT applications can create the illusion of an actual organization for the customer. This was not, or was almost impossible before the option of ICT applications existed. On the other hand, the use of electronic communication such as E-mail and Internet, makes it possible to maintain and if necessary, mobilize a network of potential participants in a new project. In this way a network is created that is infinitely more flexible and effective than was previously possible.

7 Empirical research

In this paper we focused on the characteristics of network organizations in general and that of virtual organizations in particular. This is the first step in our research. Further steps will be taken on the basis of the following hypotheses:

- As uncertainty increases so does mutual interdependence.
- Increasing mutual interdependence leads to an increasing need for sharing knowledge.
- The more knowledge is shared the more mutual trust will increase.
- Sharing knowledge of limited, predetermined areas, results in an increase in trust between organizations.
- Unformalized/Spontaneous sharing of knowledge leads to trust at the level of individuals.
- In case of low mutual interdependence standardised ICT can be used.
- In case of high mutual interdependence ICT is used to encourage free communication.
- In case of increasing interdependence explicit coordination mechanisms will be replaced/augmented by implicit coordination mechanisms.
- In case of increasing complexity mutual interdependence will increase.

- In case of increasing interdependence the need/necessity for coordination grows.

At this moment we are carefully evaluating and augmenting these hypotheses. To test them we have drafted a questionnaire which we will send to hundreds of organizations. For this we will use the Internet, but the respondents will be informed beforehand via telephone or e-mail. Besides the questionnaire, we will interview people in organizations which show some of the characteristics of a virtual organization. The first interview, with the general manager of Prolion, has already taken place.

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Configuration of Virtual Enterprises based on a Framework for Global Virtual Business

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Abstract

To start Virtual Enterprises running efficiently it is proposed to follow the Framework for Global Virtual Business. The framework in principle consists of three entities: Virtual Industry Cluster, Virtual Enterprise Broker and Virtual Enterprise. Each entity has its core products, core processes and most important of all their core competencies. This information is used as an input for the configuration of Virtual Enterprises.

1 Introduction

The new global economy is an area of great opportunity for what has been called Virtual Global Businesses (Hagel III and Armstrong 1997, Schuh 97). Agility has been identified as a necessity for maintaining global competitiveness using business webs (Goldman et al. 1994). In this new business climate concepts like Virtual Communities, Virtual Corporations and Virtual Enterprises have been proposed to be key elements in the development of agile organizations in a global environment (Bremer et al. 1995). The framework for conducting global business in a virtual form consists of three entities: Virtual Industry Clusters, Virtual Enterprise Broker and Virtual Enterprises. Each entity has its core products, core processes and most important of all their core competencies. By using this framework Virtual Enterprises can be configured efficiently.

2 Framework for Global Virtual Business

Concepts like Virtual Communities, Virtual Enterprises and Industrial Clusters have been around for some time. However there are few documented cases of companies which have been successful at creating Virtual Enterprises in a systematic way (Katzy 1997, Kiesel 1997, Linden 1997). Most of these companies created long term cooperations, but did not reach the point where they create and dissolve enterprises according to market demands. The Framework for Global Virtual Business (GVB) has the following objectives:

- Identification of processes and competencies necessary for the configuration of a Virtual Enterprise.

- Combination of competencies and processes, assigning them to well defined roles inside the Virtual Enterprise.

By following that idea enterprises can exploit specific market opportunities dynamically. A Global Virtual Business environment should be composed by the following business entities: Virtual Industry Cluster (VIC), Virtual Enterprise Broker (VEB) and Virtual Enterprise (VE) (fig. 1).

2.1 Virtual Industry Clusters

Industry Clusters are regional networks of industries with common product chains. Accordingly Virtual Industry Clusters are created by the aggregation of enterprises around the world with complementary competencies, supported by information technology infrastructure. The use of information technology overcomes the restriction of geographic proximity of nowadays Industry Clusters. Therefore Industry Clusters based on a global network of best of its class companies can become feasible.

Core Product of the Virtual Industry Clusters is Information about their members Core Competencies'. Therefore an important research issue is what information about the members is needed, how to collect and structure this information, and how to develop an information model to define members' competencies and hence the core competencies of the VIC. The commercial success of VIC depends on how well defined and focused the cluster is. Hence the Core Competence information has to be structured in a way that can be used to search and select partners in order to configure Virtual Enterprises. Furthermore, this information should be used to support strategic decision making in managing the VIC's Core Competencies. Core Competencies information can be represented in terms of Product Value Chains, Business Processes and Technologies. The results of research carried out in this issue can be found in Molina et al. (1997).

The Virtual Industry Cluster Core Competencies are the aggregation of the competencies of its members. This aggregation should have a clear focus. The competencies of a VIC can be the capacity of the cluster to make certain types of products, offer a group of business processes or provide specific technological capabilities.

The VIC has two Core Processes: Cluster Management and Core Competence Management. The first process is related to the organization, formation and marketing of the VIC, which includes searching, selecting and qualifying enterprises. The latter involves identification, building, deployment and protection of the VIC's core competencies. The Virtual Industry Cluster success relies on the effective management of its own Core Competencies and the marketing of the competence aggregation of the members.

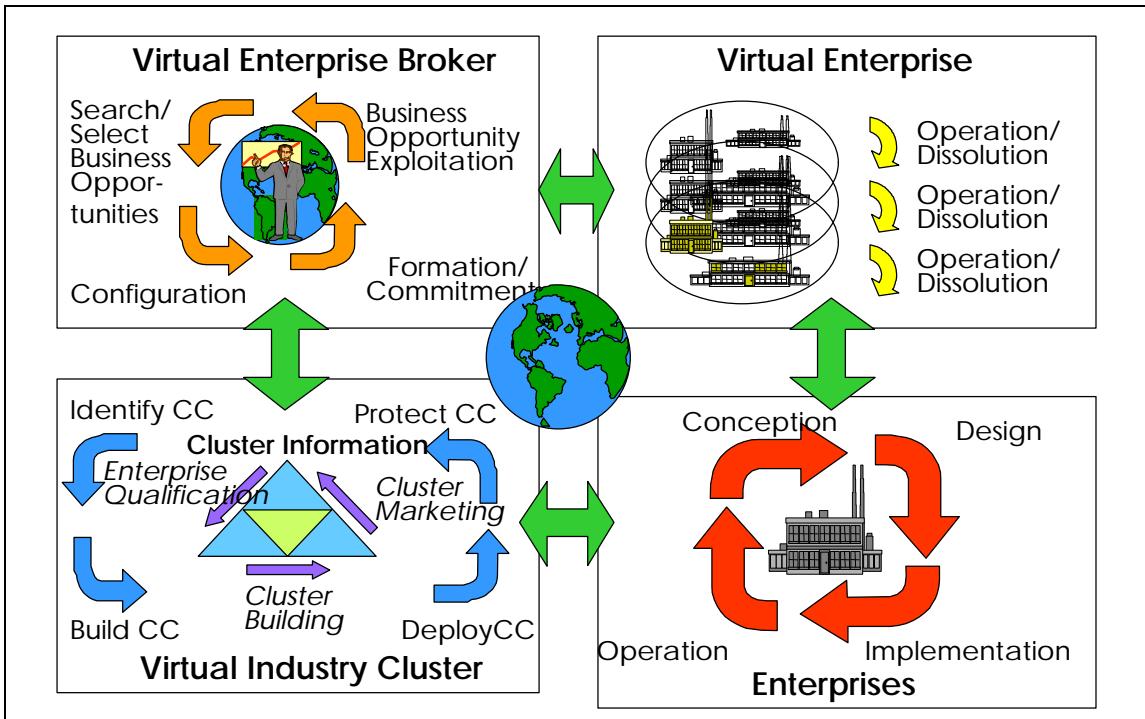


Figure 1: Framework for Global Virtual Business

2.2 Virtual Enterprise Broker

The Virtual Enterprise Broker exploits business opportunities through the creation of Virtual Enterprises. To achieve this objective the VEB uses the competence information provided by Virtual Industry Clusters. Based on this information a VEB is able to search and select partners with the correct competencies for the formation of VEs.

The Core Products of a Virtual Enterprise Broker are Virtual Enterprises. Core Processes of a VEB are related to the organization and deployment of competencies of members of VICs in order to integrate partners into a VE. Therefore key business processes are: opportunity search, partner search and VE formation/commitment. The VEB has also the responsibility of configuring the adequate infrastructure for the successful operation and dissolution of VEs, i.e. physical, information, legal, and social/cultural infrastructure.

The most important core competence that a VEB should possess is the ability to integrate the competencies of partners into successful VEs that meet customers requirements. In order to be successful in the global business environment, the VEB has to build its own competencies concerning competitive advantages, strategic focus or technological capabilities. The VEB should decide how a VE will differentiate from its competitors, for example by providing complete product chain processes, taking geographical advantage from suppliers, procuring best business practices or specialized technology.

2.3 Virtual Enterprises

The successful development of Virtual Enterprises (VEs) relies on finding suitable core competencies in Virtual Industry Clusters and the right fit and integration of these competencies to meet the customer requirements by the Virtual Enterprise Broker.

Core Products of Virtual Enterprises are end-products. VEs compete for global market opportunities, as any other enterprise, especially in products with short life cycles. The life cycle of the Virtual Enterprise is closely related to the life cycle of the products it produces. Therefore it is important that both life cycles (Enterprise and Product) are integrated in such a way as to ensure that the VE will satisfy the complete product life cycle. This is an important issue because problems may occur if the VE life cycle is shorter than the one of its products, e.g. in cases when the VE is not prepared to manage post-manufacturing activities to support the maintenance of its product.

The core processes of a Virtual Enterprise are not that different from those of a traditional enterprise. These processes can include the following: Product Development, Supply Chain Management and Production Management. However, these processes should take into consideration key characteristics of VE, for example global distribution. Therefore, in all processes mechanisms for cooperation and coordination in this special environment have to be implemented. New practices have to be incorporated in the Virtual Enterprise. Examples of such practices could be Global Concurrent Engineering, Distributed Supply Management and Global Product Service.

In order to be competitive VEs should be a low cost supplier as well as a mass customization procurer and a product/service innovator. Therefore the core competencies of the VEs are the aggregation and integration of partners' competencies. This aggregation is in itself a core competence. The core competence represents the collective of learning capabilities that the partners have to make products, perform business processes and exploit technological capabilities. Furthermore, the focus of the Virtual Enterprise will be the business-, product- and technological knowledge of its partners.

3 Configuration of Virtual Enterprises

When an opportunity for business can be exploited by the Virtual Enterprise Broker a Virtual Enterprise is created through the selection of the appropriate competencies from members of a Virtual Industry Cluster.

A VEB will look for business opportunities around the world, or will receive requests for specific products/services. In order to satisfy a demand the VEB will configure a VE by combining suitable competencies to a Virtual Competence Chain (VCC), that as a whole will connect the requirements of the customers

with a product or service. The success of the VE depends on the abilities of the VEB to ensure the integration of competencies and cooperation among partners. Moreover the VEB has to ensure the fit of the infrastructure (physical, information, legal and social/cultural) among the partner enterprises to support the whole life cycle of the VE (fig. 2).

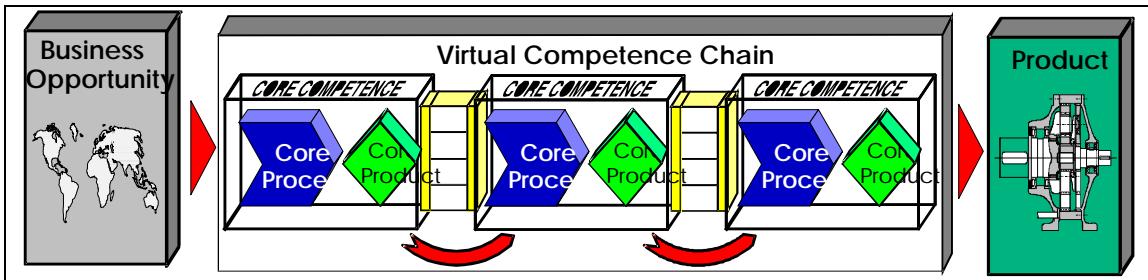


Figure 2: Virtual Competence Chain (VCC)

Due to the description the configuration of VEs is divided in five steps. In the first step the VEB creates a VCC according to the requirements of his clients. Using the links of the VCC as required partner profiles, the VEB searches in the next step suitable partners in the VIC database. In the third step the enterprises, which fit best, have to be selected among the identified partners. Afterwards the selected partners, which normally do not completely satisfy all the defined requirements, have to be well adapted to the postulated capabilities. In the last step the VIC has to identify gaps in the VCC in order to close them by modifying the competence requirements. The Configuration of Virtual Enterprises could be regarded as a configuration cycle performed by the described activities of the VEB. During the life-cycle of VE the configuration process has to be repeated whenever conditions concerning the operation of the VE change (fig 3).

The creation of the VCC is supported by the core competence description used in the Global Virtual Business Framework. According to the framework core competence consists of a combination of core products, core processes and core technologies. This description is based on results of the project MOTION (ESPRIT Project No. 8446), in which the competence has been defined as the capability to connect required tasks with existing skills. The definition of MOTION has been conveyed on the GVB Framework, where the VEB defines tasks which have to be fulfilled by the skills of the VIC members. For the creation of the VCC the VEB uses a "competence kit" containing competence links. These links can be combined into a complete VCC. In order to allow the specific structure of the competence links the GVB competence description has to be extended. According to this the competence is the capability to effectuate an end event by performing a process which has been started by a start event. The process applies resources and each event is connected with Information and/ or Material. Each end event of a process is always a start event of another process, whereby a process could be started by one or several start events. The entities of the competence

links own different attributes which allow the connection of the various links to a complete VCC.

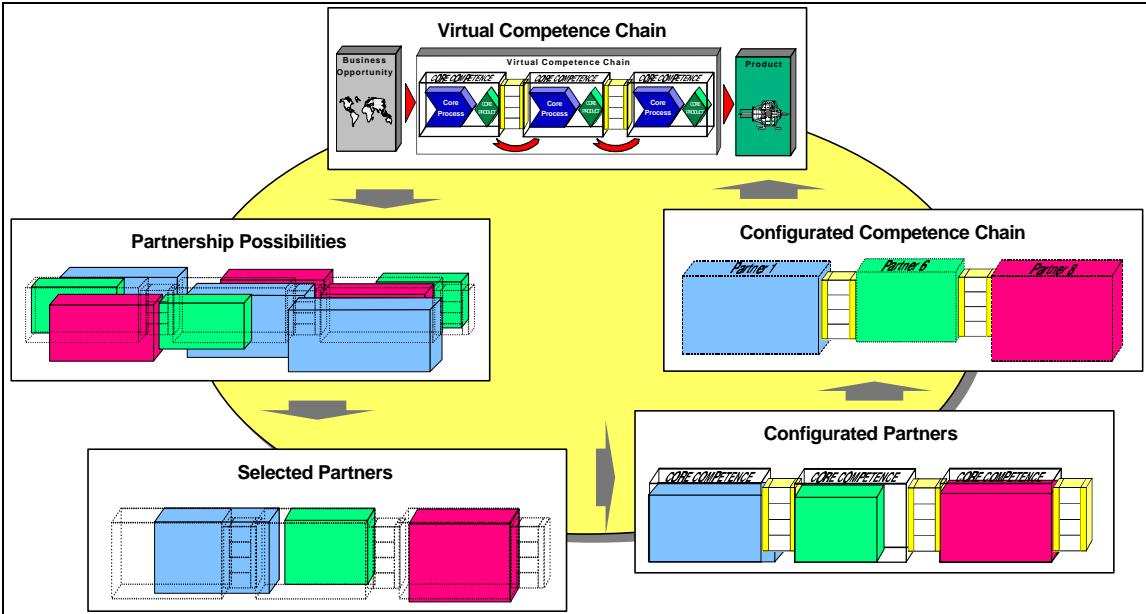


Figure 3: Configuration Cycle

After the creation of the VCC the different competence links could be used to search partners in the VIC database. Main entities of the competence links are information/material, processes and resources. It is possible to follow three strategies for partner search: event-oriented, function-oriented and resource-oriented. Depending on the main focus defined by the type of the VE which has to be configured, the VEB selects a strategy and identifies suitable partners.

The following selection of the partners could be done by benchmarking, simulation of business processes performed by different combinations of possible partners or by auditing.

The selected partners have to be adapted to the requirements defined by the several competence links. Therefore a specific qualification period could be performed by the VEB together with the selected partners in order to achieve the best fit. If there are any gaps in the VCC, which can not be closed by adapting the selected partners, the VCC must be modified by the VEB. Depending on the reasons of the occurred gaps the VEB has different possibilities to recreate the VCC, e.g. to change boundary conditions or to redesign process chains.

4 Conclusions

The framework for Global Virtual Business and the method for partner search and qualification are only first steps towards the methodologies and technologies, which are necessary to establish fully operational Virtual Enterprises. Even if

nowadays Virtual Enterprises already have a competitive advantage compared to traditional organizations, a much more sophisticated IT-support, for example in the area of Product Data Management systems and Workflow Management systems, is necessary to exploit the full potential of Virtual Enterprises.

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Organizational Virtualness in Business and Legal Reality

Andreas Pletsch

1 Introduction

The concept of virtual enterprises has been widely discussed during the recent past. It is regarded as an enterprise concept of the future in order to

- create new markets,
- offer new products (value added) and
- assure flexibility in responding to new market requirements.

Especially the required resources are missing within small and medium sized enterprises (SME) to deal with all three challenges by themselves. Organizational concepts are necessary in order to achieve the (virtual) size needed to enlarge the accessible resources without being subject to the inflexibility which is usually associated with big enterprises. A promising approach to meet this requirement is the cooperation between enterprises.

The companies of the EC project SERVICE set themselves up for this challenge. On the way to a virtual consultancy (VC) several phases will be run through:

- As-is-analysis of the participating companies in the fields of business processes, ICT environment, human resources and products ("do we harmonize"),
- pilot design for processes, resources, environments and products of the virtual consultancy,
- clarification of the legal and financial aspects of the pilot design,
- implementation of the new business processes, and
- development of a virtual consultancy quality management system in order to solidify or rather to continuously improve the new processes.

In the following text results are presented in the context of the first three phases. Due to the fact, that the project is not finished yet, the last two phases are still in progress and will be described after their completion.

2 As-is-analysis of the participating companies

The impulse to set up a virtual company can be customer driven (customer asks for service/product that cannot be provided by that single company) or is based on strategic considerations, i.e. to open new markets or to be more competitive, which was the idea for this project. After the generation of the idea starts the

process of finding the complementary partners. Nowadays that can be managed by searching in all types of information channels, i.e.:

- the pool of known companies,
- cooperation exchanges,
- chamber of commerce,
- yellow pages,
- Internet, etc.

We made the experience, that the pool of known companies is the most effective source to find partners. Even in the information age and in search of a virtual partner you want to have a personal impression of the behavior of that company, because a cooperation always starts with an investment of trust. All cooperation exchanges we visited are lacking a project history list and reference statements from former project partners, which could compensate a not existing personal impression. Therefore our experiences are in contrast to papers, that expect even temporary networks of unknown or rival companies (i.e. [1]).

If you have found some potential partners you have to check up their capabilities, ethics, country specific peculiarities and habits in order to confirm or to cancel the further cooperative work. After your selection you have to built up trust, which is most important, and a common understanding of the situation. The partner analysis was carried out extremely detailed in order to check in a bottom-up approach the level of information that would normally be needed or useful to set up a virtual company.

Before you can use synergies, cooperate and define common business objectives every partner in the virtual consultancy has to be well known in the area of product portfolio, business objectives, core competencies and capabilities, corporate and local culture, customer structure, business processes, ICT-infrastructure and Human factors.

That goal has been reached by a three step analysis scheme:

- questionnaire,
- mutual site visits and
- a joint workshop.

A questionnaire is a very good tool to collect a lot of structured data. This data can be used to reveal quickly basic shortcomings of participating companies. In addition it is stored in a profile database to build up a data warehouse (or skill database) of well-known partners and to collect some assessment information to check new partners.

In order to clarify some details of the questionnaire and to get to know each other, the second phase consisted of mutual site visits of representatives. During that visits all product manager presented their products and services and got informa-

tion about virtual cooperation. So in every company exists a peer-person, who knows the relevant people of the other companies and vice versa.

To start the cooperation, a joint workshop was carried out. Since all companies had an impression of the other ones, detailed discussion were made to clarify:

- the synergies of the different product portfolios,
- the different business objectives and
- to set up the project organisation.

As résumé can be said, that there is a trade off in the area of analysis deepness and gained information. There also was a security barrier in every company which could/should not be penetrated. Most efficient were the face to face interviews. In addition to an intense information exchange there also could be built up personal trust.

Based on this common understanding the potential goals and business pilots had been developed and discussed.

3 Framework design

After the completion of the analysis the generation of the framework starts on the background of the question:

„what will be the add-on for a potential customer choosing the VC?“

Comparing the advantages and the disadvantages of potential pilots, the consortium worked out three promising types of cooperation:

- Product pooling, in order to extend the product spectrum and client base,
- glocalisation (changing the local or global background of a product, i.e. language, and adapt it to the local habits), in order to exploit local market know-how,
- joint product development or work on services, with the intention to demonstrate the value from the accumulation of knowledge and the broader range and scope of the combined wisdom.

In looking at the add-on for customers, the glocalisation and the joint work/development is considered to be a case where a virtual consultancy offers a real advantage to customers:

- The virtual consultancy offers its service to global/multinational companies who wish to sell products/services in different national markets,
- the virtual consultancy can provide easy access to different local market know-how and
- the virtual consultancy can present a unified face to corporate buyers.

In order to satisfy all this requirements a structure was developed, that describes a business, organization and process framework as well as a modern ICT structure (see figure 1 and description below). Basically the structure corresponds to the

information-broker approach of [2] and was enhanced by recent technologies (Intranet, Extranet).

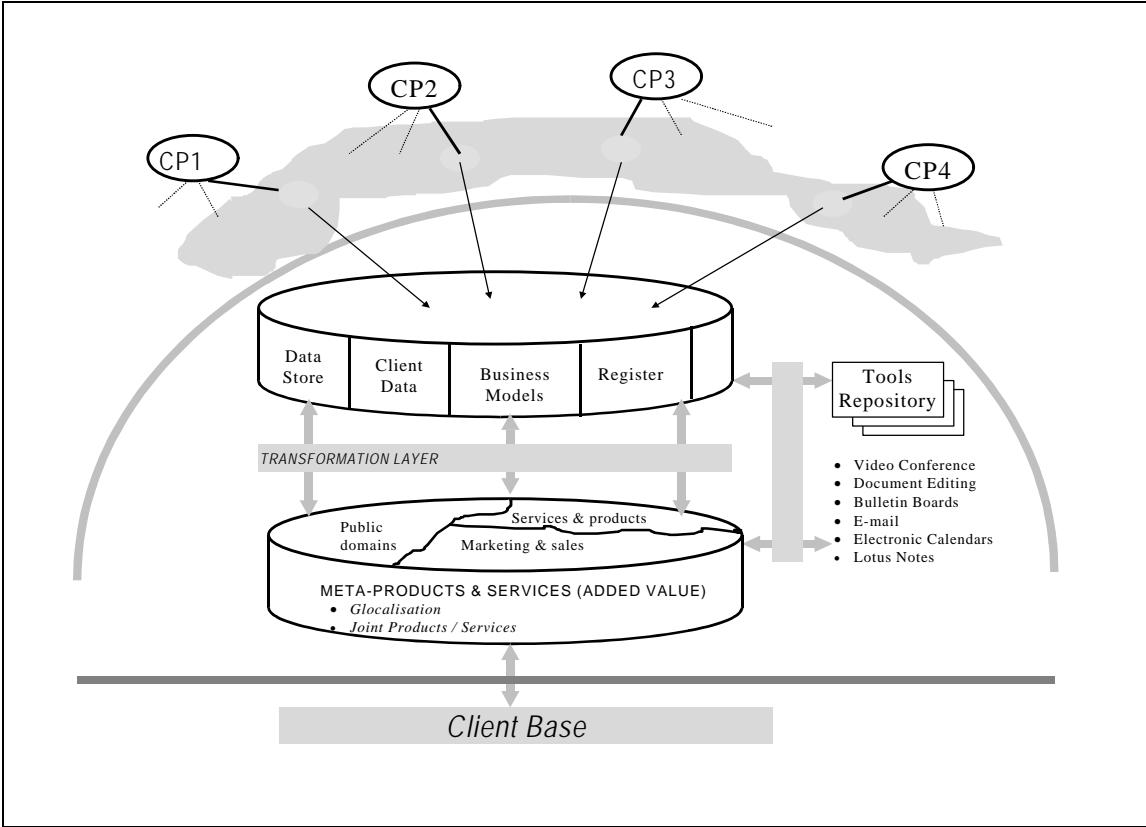


Figure 1: virtual consultancy framework

A characteristic for a VC is to be able to react flexible to customer demands. Working in the area of glocalisation, it is necessary to be open for other companies. A new partner must be integrated in the case when the current partners cannot satisfy a specific customer need; for instance, when a region is not covered by the current composition of the VC. Therefore the participating companies are basically independent of the VC and are coupled by specified interfaces, processes and contracts dynamically and long-term.

The connection point is the **internal information repository**. This Intranet consists of the areas *data store* (i.e. sources, product description, sales presentation), *client data* (e.g. financial and legal information, transaction history), *business models* (i.e. rules and workflows, forms), *register* (e.g. knowledge management) and represents the heart of the VC. For all data and all users the permission of access is corresponding to the involved projects and the status of the according company. The business models are fully available and shape the frictionless co-operation (compare [3]).

The **transformation layer** covers both ICT security (e.g. firewall) and a description, which data and information can penetrate that layer between Intranet and

Internet/Extranet, which transformations (i.e. conversion) have to be done and how it has to be handled (e.g. orders, financial data)

The **public information repository** is structured in three parts. A *Public domain* (Extranet) for data and information exchange between the virtual consultancy and the external world (e.g. clients), as well as an Internet presence, that provides *Service and product* descriptions to convey what the virtual consultancy can offer, *Marketing and sales* materials (i.e. case studies, white papers, electronic catalogues). The Internet is the central medium for the VC. As long as useful all communication will be done electronically.

The **clients** can interact with the virtual consultancy by all means of communication. Especially the interaction via e-mail, www forms and pages is expected in the area of customer information. All paper information material also refers to the website. Standard products and services can directly be ordered by means of electronic commerce.

The **tool repository** consists of a standard set of ICT enablers, that empowers and supports the cooperation of the companies.

That entire framework represents the virtual consultancy, regardless of the participating companies (and human beings). It provides the processes, standards of ICT and rules of cooperation and is therefore totally virtual.

4 Integration of legal and financial aspects

Compared with other business branches the Internet, Electronic Commerce and all kinds of virtual cooperation and business are very new, highly dynamic and extreme fast growing. They come along with the general trend of globalisation and enable even small companies to promote and sell their products world-wide. As a matter of principle that global presence corresponds very good to the principle of international free trade markets. The problem is, that due to historical and ethnic reasons, the legal situation is world-wide very inhomogeneous. Therefore the certainty about the legal situation is very problematic. If I publish information on my web-site, which can be accessed all over the world, the law of which country is applicable? Do I have to satisfy the law of all potential reader's countries?

Since the modern ICT and management methods perfectly fit in the context of virtual enterprises, teams, telework, etc., the real legal aspects become the limiting factor for the "realisation" of virtual cooperation (compare [4]). Therefore the business model was divided up in six focal points, which will be analysed according to financial and legal aspects.

4.1 Focus I: Legal Structure

Since there is no legal form "virtual company" the members of a virtual company have to think over their legal structure. Corresponding to the existing law there could be three potential forms of cooperation:

- Four independent companies,
- one main contractor combined with three sub contractors and
- a joint affiliated company, which subcontracts the parent companies.

Every form has its pros and cons in the area of customer perception (one face to the client), costs and flexibility. In reality only the last concept will be practicable. A customer won't make contracts with many companies, at least from different countries with different laws. Also the second possibility fails, because there is a large disequilibrium between the partners i.e. in the area of liability and the customer has problems to separate between the VC and the main contractor.

In the last concept the foundation companies set up an information broker (compare [2]). The VC is the brand that acts for the client as *one* company with all the capabilities and competencies. Dynamic changes are made by standard subcontracting of the needed partners.

4.2 Focus II: Internal Communication

The central task of the internal ICT environment is to compensate the geographic distance between the partners. Therefore all types of telecommunication and information technology will be used. For each of them the legal situation has to be clarified in the sectors of encryption, validity as proof, security, etc. In spite of many new laws, for example electronic signature law in Germany, a cooperation of European companies must always take the lowest level of legal certainty into consideration.

4.3 Focus III: Internal Information Repository

The internal information repository consists of different areas, for example the data store, client data, business models, register, etc. For each of those sectors different legal problems arise, e.g. intellectual property rights, customer data protection. Those problems are for example solved in the European software copyright guidelines.

4.4 Focus IV: Data Protection

The firewall must meet all requirements concerning the protection of the IPRs and the customer data. There also exist rules or guidelines, which kind of documents might be transferred from the Intranet to the Internet.

4.5 Focus V: Public Information Repository

The public information repository refers to all problems discussed in Focus III. In addition there are several laws concerned, i.e. brand-name and competition law. As described in the introduction an Internet presence, especially an English com-domain web site, is world wide available.

4.6 Focus VI: Client Interaction

The area of client interaction is concerning the applicable law the most complicated area. There are many different laws touched, i.e. contract law, trade law, teletrade guidelines, tax law and the respective bilateral agreements, united nation purchase law, electronic cash guidelines and common business terms. Therefore electronic contracting isn't that easy as demanded in [5].

The results of all that legal investigations are stored in the Internal Information Repository and are taken into consideration by the continuous evaluation of processes and structure.

5 Conclusion

The organisation form "virtual enterprise" fits very good in the context of dynamically changing global markets and helps SMEs to stay competitive. Theoretical approaches as "dynamically changing networks of independent companies" (see [1]) fail in reality both in the area of justice and sociology. Laws, since they are local by political reasons and often very inhomogeneous, are often in conflict with fast growing, changing and globalizing markets. As the technical innovation cycles are still getting shorter, the legislators are under hard pressure to keep up with the technical development. Maybe caused by the law uncertainty trust is a very important fact in the field of virtual cooperation. Even a virtual enterprise is a network of human beings, with fear, jealousy, egoism and other emotions. Lacking trust you cannot work together informal and with changing unknown partners. But if you have a pool of well known partners with synergetic competencies all technical and organisational means are available to built up a very competitive virtual cooperation.

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A Framework for Virtual Organizing

Roland Klüber

Abstract

The ‘Virtual Organization’ is a buzz-phrase with little sound theoretical foundation supported only by a variety of incomplete and unconnected perspectives. These ignore the importance of the integration of technological, management and human perspectives. This article tries to fill the gap between idealistic visions and distinctive steps taken towards virtual organizing. It proposes an analytical framework which structures the analysis of the status quo and helps to identify adequate actions towards reaping the potential benefit of virtual organizing.

A two step approach is chosen to achieve this goal. The ‘Wheel of Virtual Organizing’ is used to identify and assess possible areas for improvement on a general basis. Successive analysis based on the five dimensions of the ‘Holistic Model of Virtual Organizing’ is more case-specific and will be presented as an outlook to elaborate the results of the first model.

1 Introduction

The ideal Virtual Organization¹ is a complex multi-faceted phenomena which can be analysed from many different perspectives. What is new is the focus on an adequate non-hierarchical co-ordination structures [Klue97a], information-rich products [Pico97], [RaSv95] and the consideration of human factors in the context of an information society. All of these can be supported by information and communication systems (ICS), which can be a central aspect of Virtual Organizations. The integration of these areas under this ‘new organizing logic’ [HeVe96] is not yet completely understood.

However the ‘ideal’ may not be desirable. This is due to inherent contradictions in the design principles [Klue97b], but it may provide a useful model to guide the development of an organization. Rather than hypothesizing about idealistic visions and design principles, it may be more productive to build a framework that

¹ The ideal type of a Virtual Organisation can be characterized by properties such as non-hierarchical co-ordination, networking of heterogeneous and semi-autonomous units [Beer81], heterarchy [KIPrEb94], and diminishing horizontal and vertical boundaries [PiReWi96], [HeDa+97]. It is extremely flexible and open to re-structure itself according to new market demands and chances. The necessary supportive legal environment and institutions such as trusted third parties or promoters [Klue97a] will not be discussed here.

leads to the design of case-specific steps which help to move towards virtual organizing.

The concept of virtual organizing is seen in accordance with HENDERSON/VENKATRAMAN, who define it as an „...ability of an organization to consistently obtain and coordinate critical competencies through its design of value-adding business processes and governance mechanisms involving external and internal constituencies to deliver differential, superior value in the market place“ [HeVe96, 4]. The underlying understanding of organizing is extremely broad and contains strategy, processes, structures, and resources. The attribute ‘virtual’ is used to depict an organizing logic that is especially relevant when the boundaries of time, geographical space, organizational units, and information access are less important [Bosh97] while the use of ICS is considered as highly useful.

2 Analysing the Potential of Virtual Organizing

One of the major problems when looking at existing organizations² from the perspective of virtual organizing is how to identify the status quo. A problem could arise where some of the facets (such as the human side or the limitations of technology) are not taken into account when judging the potential. A further problem concerns choosing the most relevant aspects to focus on. Which possible steps and stages for a future transition to a virtual organizational form are to be chosen? When can it be considered a desirable and feasible option?

To answer these questions a framework is proposed which can be used for different objects of focus. These are:

- Decentralization of an integrated organization (top-down virtualization)
- Improvement of existing co-operations or co-operative arrangements
- Potential move towards a virtual organization (bottom-up virtualization)

The underlying premises are, that the steps of analysis are consistent and stable at a global level, while the operational measures and implementation steps taken may vary as they are dependent on situational and contextual factors.

Since the system in focus is rather indistinct and has a large number of variables, only two types of strategic fit seem to be feasible following a categorisation of VENKATRAMAN [Venk89, 425]. The first one, ‘criteria specific’, is described as ‘Fit as Profile Deviation’ and applies, when many criterias can be identified, grouped and measured. The second is ‘Fit as Gestalt’. It is ‘criteria free’ and implies an internal congruence of design principles of the whole system in focus. Generic models for both types will be presented in the following.

² The term organization is used to encompass profit and non-profit organizations as well as co-operative arrangements of those.

2.1 Wheel of Virtual Organizing

This criteria specific model is used to describe the current situation that the organization is in. It should also represent possible development paths along the dimensions which could be used to identify new objectives, strategies, and actions. If these already exist, then identifying any deviation from the profile can help to prioritize the necessary actions to reduce this. Furthermore, the model should provide some foundation for an analysis of the consistency of the current situation – or the future status – and to help better the understanding of interdependencies between the different dimensions.

The basic structure of analysis consists of four areas which are organized as quadrants of a circle. The sequence of analysis can vary according to the particular focus. Analysis can start where the initial need for improvement is identified:

- 1) If a proactive resource-oriented analysis is undertaken the starting point would be quadrant 1 and the direction would be counter-clockwise.
- 2) If a market imposed analysis is chosen quadrant 2 would be selected and a clockwise sequence is recommended.

The analysis can be conducted as a consistency check of the status quo and a desirable future state as well as a comparison between both. Figure 2-1 gives an overview of the ICS-view of the model:

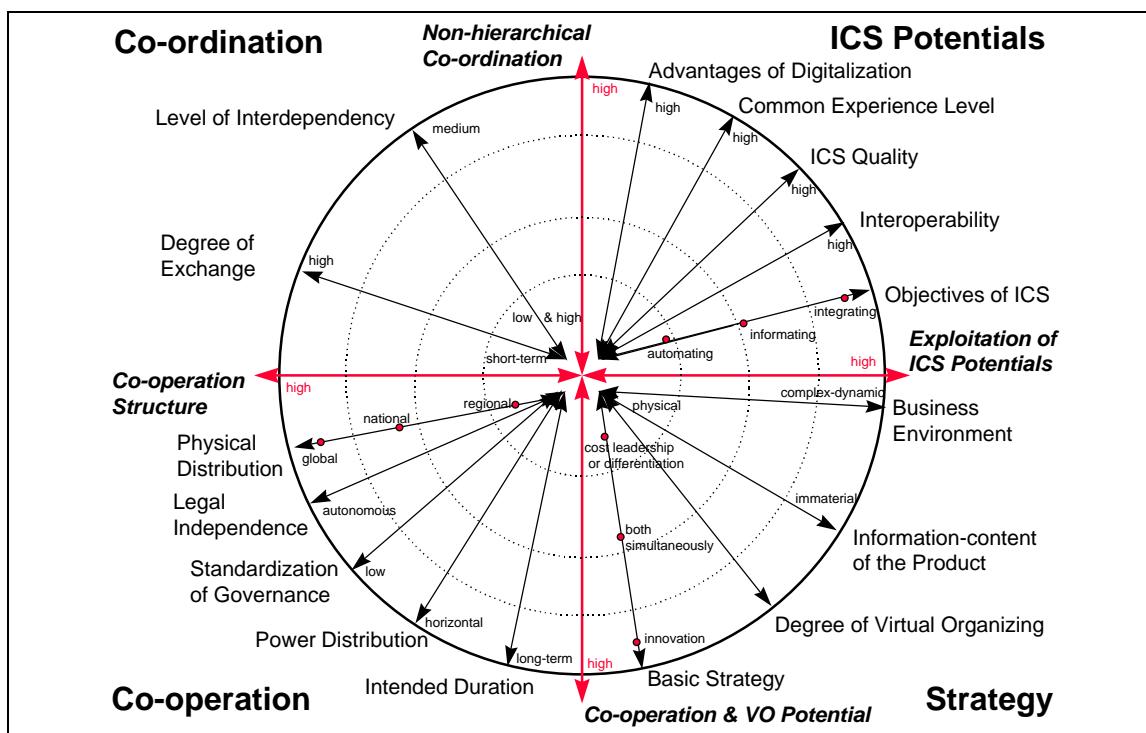


Fig. 2-1: The wheel of Virtual Organizing (ICS-view)

The Content of the four quadrants following the market-based sequence are :

2. Quadrant: Focus of Strategy

This quadrant contains four vectors. The first one is an aggregate vector that summarises the environment the organisation or co-operation is embedded in. Formal sub-categories are the number of relevant variables, interdependencies, number and intensity of changes as well as delay and time span [Scho97]. Values for these sub-categories can be obtained through a comprehensive analysis of the environment [Port85]. The next vector symbolizes the information-content of the products³ offered. This has major implications on the form of co-ordinating the market interaction, production process and delivery of the product.

The third dimension is the level of virtual organizing that is achieved from a strategic perspective. The ‘Degree of Virtual Organizing’ is based on the work of HENDERSON/VENKATRAMAN [HeVe96]. It can be supported by a resource-based analysis [HaPr94] for the virtual sourcing and virtual work dimensions. Figure 2-2 shows the three dimensions of virtual organizing with exemplary values of an analysis undertaken (see example presented in chapter 3). It has been supplemented by the degree of usage of ICS and the vector of the second quadrant of the wheel of virtual organizing to visualize the likely potential for virtual organizing so as to show a more complete picture:

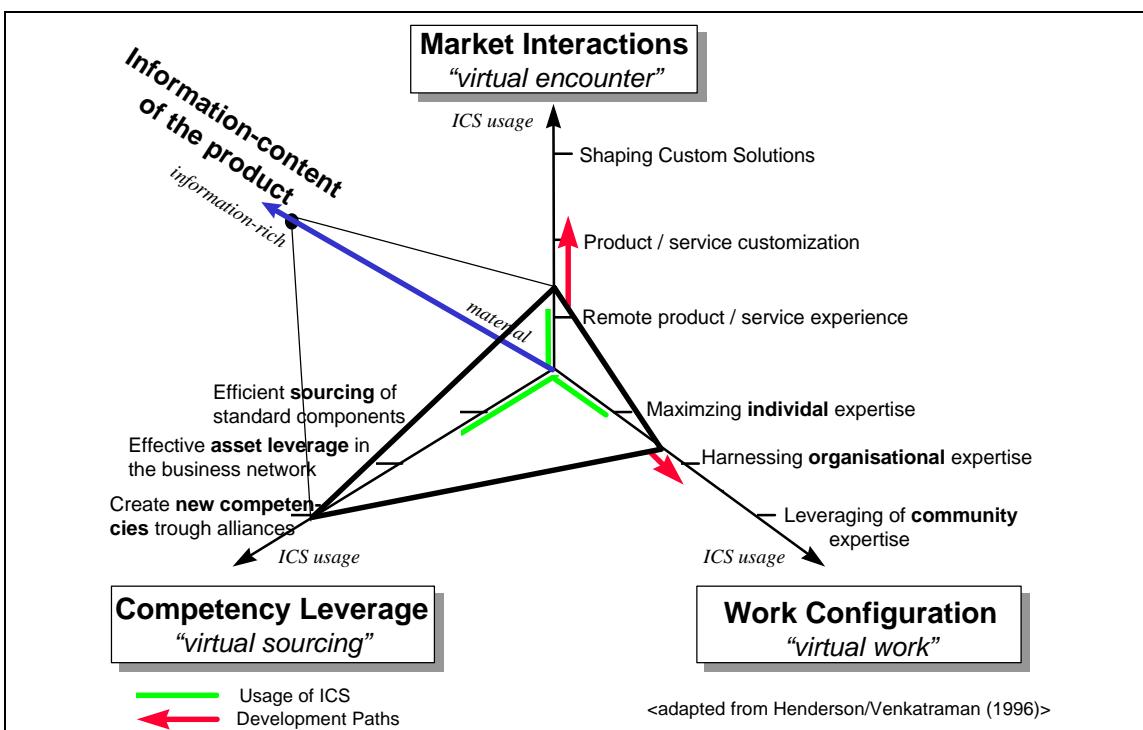


Fig. 2-2: Degree of Virtual Organizing

³ Product in this context encompasses physical products, immaterial (intellectual) products as well as services.

The last dimension in this quadrant is the basic strategy. It is subdivided into three global categories. The main focus can be cost-orientation or differentiation [Port84], doing both simultaneously [Beck93] or more innovation-oriented [Mint79].

The red first-level vector of Fig. 2-1 represents an aggregate of the second quadrant — the potential for virtual organizing and the need for cooperative structures and management principles.

Quadrant 3: Intensity of Co-operation

If the potential for virtual organizing is considered a feasible option (based on the results of quadrant 2), then a co-operation or transformation from an integrated company to more co-operative structures is possible and might be desirable. To describe the structure, five dimensions have been chosen (for more detail see [Sydo92]). These dimensions are:

- planned duration of the co-operation (short-term - long-term),
- distribution of power (equal - focal),
- standardization of the governance structure (low - high),
- legal independence (autonomous - dependent),
- physical distribution (global - local).

These dimensions are aggregated into the first-level co-operation intensity vector (red), which describes the kind of cooperation from a structural perspective.

Quadrant 4: Form of Co-ordination

The level two vectors of the more on behaviour and process aspects focussing quadrant 4 are determined by the the following sub-categories:

The first dimension consists of three sub-categories following the work of Semmlinger [Seml93] on the relationship of co-operating units:

- functional reciprocity
- heterogenous information exchange
- context steering

The second vector is composed of the four types of interdependence identified by Malone/Crowston [MaCr94] and supplemented by one from Frese [Fres93]:

- Consumer-Producer-Relationship
- Interdependence between tasks
- Degree of shared resources
- Overlapping decision areas
- Degree of concurrency

Depending on the values of each sub-category the position of the two vectors can be identified. In this case the aggregate level-one vector specifies the dominant type of co-ordination. In a more detailed analysis, an examination of the co-

ordination structure of the operative processes and a classification of different interdependence levels is possible.

Quadrant 1: ICS-Potentials and HR-Potentials

The final step of the market-induced sequence analyses the ICS and HR potentials separately. These were chosen as they are perceived as the most critical resources for virtual organizing [HeVe96]. For the ICS analysis the Wheel of Virtual Organizing is depicted in Figure 2-1 above.

The quadrant consists of five vectors to give a broad basis for measuring the potentials of ICS. The first describes the extent to which the possible advantages of digitalization are used to achieve competitive advantage [Trap96], [Schol97]. The second describes the common experience level of the co-operating partners with flexible ICS [UpMc96]. The third is an indicator for the quality of the ICS architecture in terms of functionality, robustness, reusability, adaptability, and cost of development and maintenance [FeSi+97]. The interoperability property is of high relevance for a supportive ICS architecture and is the fourth vector. The final vector describes the underlying motivation for the use of ICS [Appl94] with the design for integration as being the most supportive for virtual organizing.

The first-level vector in this quadrant summarizes the potential for exploiting ICS in a specific business environment. To integrate the human resource side another wheel can be drawn which deviates in the the first quadrant by showing specific human resource vectors. It is filled with exemplary values to illustrate the model (see Fig. 2-3).

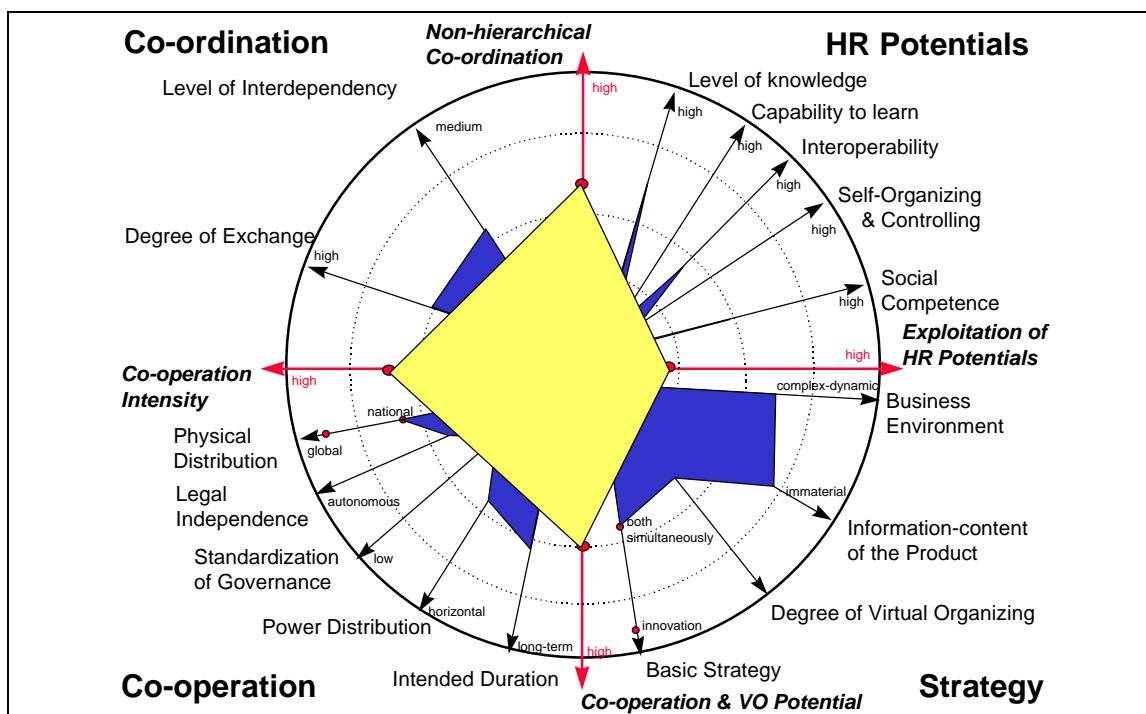


Fig. 2-3: The wheel of Virtual Organizing (HR-view)

‘Level of knowledge’ describes a static state whereas the vector ‘capability to learn’ focuses more on behavioural and dynamic aspects. These can be further enhanced by a high ‘interoperability’. This dimension consists of sub-categories like ‘openness’ and ‘systemic thinking’ [GoPr95]. The dimension of ‘social competence’ represents soft factors such as the ability to build trust and establish social ties. The dimension of ‘self-controlling and self-organizing’ [Pico97] describes a capability that is highly relevant in dynamic environments and applies to individuals as well as to whole organizations.

The first-level vector summarizes the potential human resources that are ‘owned’ in the co-operation under study and the extent to which these are exploited. The analysis of the status quo is complete when the current position in both wheels is determined. To aid the visualization of the results the area from the center to the positions of the second-level vectors is filled blue. Depending on the (weighted) average of the positions of the second level vectors, the position of the red first-level vector is determined and the four points of the red vectors are connected and filled with transparent yellow. A possible further step could be an analysis of any planned future development plans, inconsistencies and major deviations. This could lead to the identification and implementation of new action paths.

The inherent three levels of analysis are based on the following hypothesis:

Level 3 - Underlying Theory:

On this level the sub-categories that account for the points chosen on level-two vectors are defined. Reference to the underlying theory has been made above. Depending on the scope of analysis and on the available resources, the analysis can be expanded based on these theoretical foundations. The main underlying assumption here is that the theories chosen provide a good starting point for further analysis and are highly relevant for the object under examination.

Level 2 - Assumptions:

If the dimensions chosen are conducive to an adequate classification of the object in focus, the following assumption underlies the analysis: The greater the filled area and therefore the higher the position of the red vectors of each quadrant, the higher is the potential for virtual organizing. The geometrical ideal is 4 nearly round quadrants of a circle⁴.

Level 1 - Assumptions:

The bigger the yellow area the more the system tends to benefit from following principles of virtual organizing. The more symmetric the figure is, the higher the likelihood for success, because the dimensions seem to be more consistent.

⁴ Following the image of the squaring of the circle in four equal segments.

Therefore virtual organizing is likely to be more successful. The geometrical ideal is a Square.

The tool presented cannot provide an exact measurement based on hard (quantitative) data. It is more an attempt to quantify and compare subjective qualitative data and information in the manner that scoring models do [WeBe84]. It should help to identify, compare, evaluate and prioritize possible developments of an organization.

2.2 Holistic Model of Virtual Organizing

The following model concentrates on a description of views on organizations that should lead to a ‘Fit as Gestalt’ in terms of virtual organizing. It is used to further elaborate and synthesize the analytical results of the first model by trying to encompass all relevant elements and processes of virtual organizations. It emphasizes concepts and design principles that are highly relevant to virtual organizing. In doing so it aims to provide a basis for possible solutions and development paths that could lead to a consistent virtual organization which can (temporarily) maintain a separate existence and meets the needs of stakeholders. A further assumption is that it also facilitates the identification of interdependencies within and between the dimensions and helps to make them more manageable. It is only possible to present the fundamentals of this approach here, for a more detailed discussion see [Klue97b].

→ STRATEGY

The strategy dimension focuses on the objectives and the (core) competencies, that are required for virtual organizing. This includes the human and technological competencies including the capability to co-operate. It combines market-based and resource-based thinking as well as material and immaterial assets. The combination of strategic management and the potential that ICSs offer can be seen as central to the strategy dimension for virtual organizing [HeVe96]. Furthermore the focus on core competencies and the determination of an adequate degree of a collective strategy should be covered in the analysis and formation phases.

→ PROCESS

In this dimension the process of virtual organizing is analysed and possible organizational designs can be identified [Klue97b]. The life cycle of co-operations can be divided into a macro process and a micro process [Pamp93]. The macro process describes the initiation, bargaining and contracting phases of virtual organizations. It starts with the objectives derived from the strategy definition phase and includes the legal, organizational, management process and the ICS perspective. The micro process is about detailed operational processes between co-operating units. The process orientation of the co-operating entities themselves is

restricted to the interfaces and the exchange of information for the governance structure of the whole system. The management of the life cycle and its ICS support are vital elements of this dimension.

➔ STRUCTURE

The structural dimension of an organization practising virtual organizing can be seen through the cybernetic perspective of Beer's Viable Systems Model [Beer79]. This model complies with the principles of autonomy, recursion and viability. A deviation from Beers' model may be necessary on the principle of viability, since it is only relevant for each constituent operational unit. The system as a whole should be structured according to the principle of optimizing the capability to develop as a whole as well as on the level of individual operational units [KlPrEb94]. The cybernetic perspective focuses on a functional perspective of the governance structures and the information flow between different functional units. Other design principles are hierarchy [KlPrEb94, 88] and the use of the function of the promotor to facilitate horizontal co-ordination [Klue97a].

➔ KNOWLEDGE

Knowledge as part of immaterial assets is given separate attention due to the importance for business in the information age [Quin92], [Roos97], [KrVe95] as a salient source of innovation and competitive advantage. It is of much relevance to virtual organizing since there is a high potential to establishing positive feedback loops [Roos98] if 'properly' managed. Knowledge management does not only include ICS tools to capture and share organizational knowledge [WaUn91], [Fais96] but also an appropriate culture (see below) and the right amount of face-to-face meetings for fostering individual learning.

➔ CULTURE

If virtual organizing is considered as a central design and action principle, a supportive culture that binds and reduces the potential for conflict is needed. Before this kind of culture can develop, adequate human resources must be selected and guided through modern incentive and reward systems [Pico97]. Furthermore, the conditions that enable a high level of trust between the human actors must be put in place. Even in this dimension the selection of adequate ICS and a sensitive implementation can foster the level of trust and helps to build a functional level of shared values and culture. The cultural dimension can potentially support all other dimensions.

All of these dimensions can be supported by flexible ICS such as groupware, work-flow management systems and electronic markets supported by data warehouses and robust back-office operations. As infrastructure internet technologies and middleware standards are promising developments that could foster the acceptance and use of the virtual organizing logic. The challenge is to integrate all

these dimensions and different resources to build an efficient and effective whole without committing the planning fallacies [Mint94]. A fundamental cognitive frame that supports virtual organizing is the management of dialectical structures [Klei96], [Seml93, 317] or paradox [Hand94] in order to thrive in a complex and dynamic environment.

To summarise the argument it can be said that it is hardly possible to quantify the results of virtual organizing in terms of cost, time and quality. The implication is that an analysis using the two models can enhance the likelihood that organizational virtualness and virtual organizing can lead to improvements in these dimensions. Customized and balanced scorecards can help to measure and assess the process if the strategy is implemented [KaNo96].

3 Empirical Evidence

To illustrate the framework presented above a summary of the results of one interpretative case study are shown below. The case represents a vertical co-operation of an insurance network which has virtual properties. The analysis is based on the perspective of the MLP AG which functions as a broker institution. What makes it unique is the fact, that it has developed special relationships with both the insurers and the customers. This distinguishes it from traditional insurance brokers. Based on these relationships and the intense information and knowledge exchange, this network is capable of delivering, unique products to its customers.

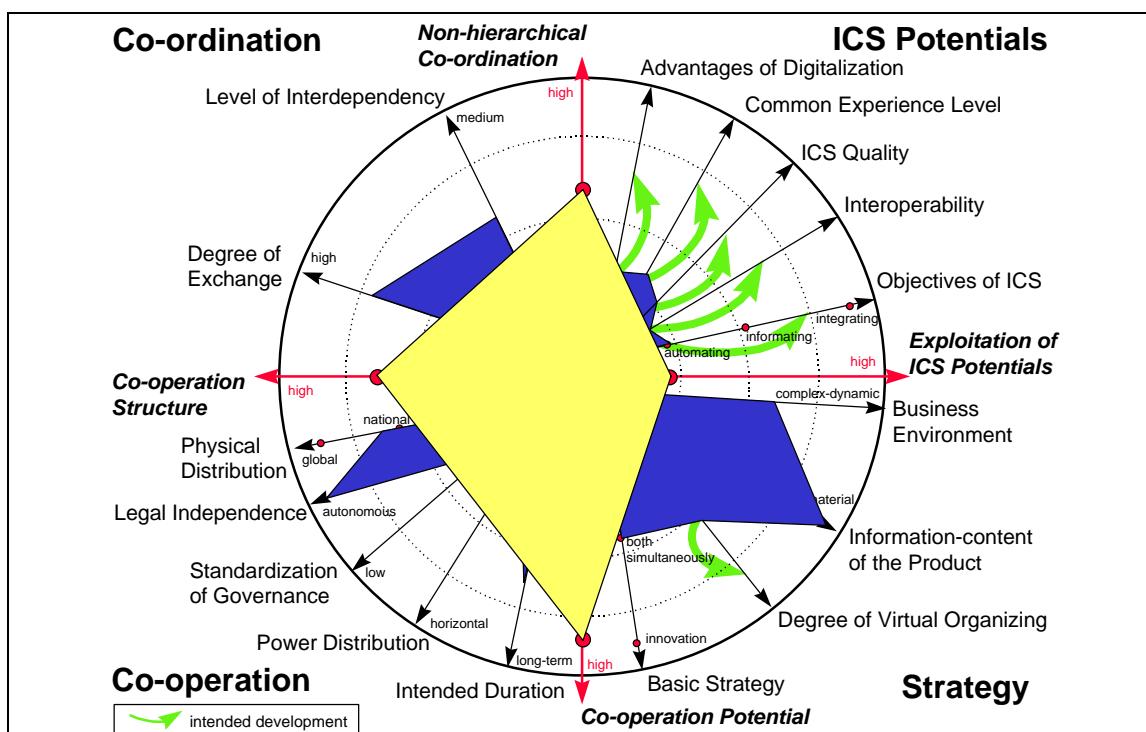


Fig. 3-1: Wheel of Virtual Organizing (ICS-view) in the MLP Network

At the first level of analysis, the diagram shows in general terms that the MLP network is currently unevenly developed with regard to virtual organizing. The model suggests that the use of ICS offers a high potential to improve the degree of virtual organizing that can be achieved. The green arrows show that MLP has identified the need and the opportunity for improvement. It is currently establishing a new ICS infrastructure based on Lotus Notes for internal use and specific solutions based on internet technologies to access partners and customers. Furthermore, new concepts like a virtual bank are under development, which operate on the same infrastructure. There is a tendency to improve all three vectors of virtual organizing with the support of ICS in order to remain the market leader and one of the most profitable and successful companies in Germany.

4 Conclusion

The intention has been to present a sound and complete framework for analysis that is specifically designed for organizations that are open to the potential for virtual organizing.

Empirical evidence suggests that the framework can be useful. Participants were able to understand the structure and the questions asked of them. They considered it to be helpful for analysing their own situation from these different perspectives. The moderated evaluation in the presence of the researcher was helpful in avoiding misunderstandings and misinterpretations. A positive motivational side-effect is that participants often feel that they have identified and described some possible improvement.

The graphical representation of the result reflects the complexity of the subject. The simplification by aggregating the results into a geometrical symbol helps to simplify and synthesise them. This inspires the need and search for a solution.

One advantage is that the model can be used to analyse all three of the possible systems in focus (identified above) from the perspective of the whole network as well as from the perspective of the individual unit. If the framework proves to be useful for more than the three (in-depth) case studies undertaken, a far more developed version could include a fuzzy logic based software tool that paints the wheel according to the participants' verbal specification of the situation and is able to draw comparisons and benchmarks with past objects of analysis.

To aid the solution definition the five dimensions have only been given rudimentary attention in this article. Their full use can only be exploited if in-depth case studies are taken into account. The real value of the models that have been presented can only be shown in practice and professional assessment with any proposals for improvement are highly appreciated.

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Organizational Virtualness

The Case of Small IT Companies

Pascal Sieber

Abstract

IT companies currently have to face heavy changes in technological developments and changes in market situation. The Internet is one of the important drivers for these changes. One of the reactions of IT companies on the new challenge is summarised in the key word „Virtual Corporation“. The following description of virtualness in small companies in the IT industry were developed by applying two methods of qualitative research methodology to generalise data from single case studies.

The resulting conceptualisation of the research field can be categorised in two groups: (1) Characteristics of Virtual Corporations, and (2) a dynamic model of the recursive relationship between Internet and strategy as well as organisational features of companies.

1 Research Design

The following research results were developed in a study comprising three phases. Firstly, a survey of all IT companies with a Web site in Germany and Switzerland showed that there is a correlation between use of the Internet and the construct of virtualness; the more virtual the company, the greater the benefit it derives from use of the Internet (see Sieber (1998)). In Phase 2, I interviewed a total of 24 companies about (1) their co-operation with customers, suppliers and competitors, (2) their use of the Internet to support this co-operation and (3) the competitive effect of these measures (this involved an analysis of the works of Malone (1988); Venkatraman (1991); Davidow/Malone (1992); Griese (1992); Rockart/Short (1991); Gurbaxani/Whang (1991); Nohria/Eccles (1992); Birchall/Lyons (1995); Lucas (1996) and many others). Phase 3 consists of an analysis of seven interviews from the sample in Phase 2. For a better understanding of the dynamic elements of virtual organising, two methods from grounded theory according to Strauss/Corbin (1996) were used. These are „open coding“ to identify the essential concepts of the implicit theories of entrepreneurs and „axial coding“ to derive action-oriented relationships between the concepts. After the identification and description of important concepts a general model of virtualness is designed (see chapter 4). The model can be confronted with further empirical data and with existing organisational theories.

This form of “empirically-led” theory work deviates from the proposal by Strauss/Corbin in that here theoretical sampling is only done within the 24 cases and the explanatory content of existing theories is clarified during, rather than prior to, the research process. Two factors support this approach: (1) other researchers have noted a lack of theories to explain the network phenomenon of virtual companies (see Sydow (1992), Draft/Lewin (1993), Gebauer (1996), Weber (1996)), and (2) the methodology is appropriate for identifying and building elements of theory which can be applied quickly. At present, Internet usage and the associated changes in industry and corporate structures are developing at such a rapid pace that, in my view, an iterative procedure is the only way of obtaining satisfactory results. Furthermore, many proposals within the literature on virtual corporations are neither theory-led nor empirically-led.

With open coding 64 concepts were identified. Using the axial coding method, these were integrated until only seven remained. This paper names these seven concepts, discusses them briefly and proposes a model of virtual companies which represents a description of the empirical material that is action-oriented and dynamic rather than structure-oriented and static.

The interviews selected for analysis came from IT companies in Germany and the USA, with an annual growth rate in excess of 30% p.a., active in the field of systems integration, with their own software product offerings, using the Internet and, with one exception, employing fewer than 50 people. Personal interviews lasting approximately two hours each were conducted with general managers and at least one other manager. The interviews were tape recorded; transcripts have been used for coding. The interviews as well as publications by the companies, their Web sites and email discussions of the results with the case study candidates build the empirical basis of the following explanations.

The main results can be grouped in two categories:

1. Identification of important concepts. These are discussed briefly in the following chapter: Business network, Quasi internalisation of resources, Common business understanding, Co-operation as an interorganisational process, Adhocracy, Network strategy and Trust.
2. Description of interdependencies between the concepts and IT use, focusing on Internet as communication and information system. These are briefly discussed in chapter 4.

2 Concepts of Virtualness

Two distinctly different views on Virtual Corporations can be identified: One the one hand there are rather institution-oriented definitions (e.g. see Byrne et al. (1993); Arnold et al. (1995); Scholz (1997)), on the other hand there are definitions with a clear reference on effectiveness and efficiency of companies. My research design grounds on the latter: „Virtualness is the ability of an organisa-

tion to consistently obtain and co-ordinate critical competencies through its design of value-adding business processes and governance mechanisms involving external and internal constituencies to deliver differential, superior value in the market place“ (Venkatraman/Henderson (1996), p. 4)).

The following concepts have been identified as most important in building and sustaining the ability mentioned in the definition by Venkatraman/Henderson.

2.1 Business Network

The business network (see Venkatraman (1991)) in the wider sense is interpreted as being the entire set of companies which come to mind when the interviewee is describing his action strategies as an entrepreneur. A business relationship exists between each of these companies and the focal company. One of the features of this relationship is resource exchange, the nature and frequency of which changes over the course of time, and this, in turn, means that the business network will evolve. The number and type of companies involved will also change.

The fact that virtual companies have to re-form for each new contract, means that they face a selection problem. As the customer is involved in producing the deliverable (product or service), at least one node in each project is always new. All the greater then is the need for stability in the other relationships. A situation arises however in which the contract cannot be serviced using the normal relationships in the network, or the customer may want a particular partner. The result is a temporary network of companies formed on a project-by-project basis; this is what I term a virtual company. The effect of this phenomenon is that the business network evolves through the partners getting to know one another in the course of one project and then applying the information advantage this gives them to subsequent selection processes. In other words, when subsequent contracts are being placed, they tend to approach known partners first, partners with whom they have successfully collaborated in the past. There is thus a constant overlapping of projects. One player can be involved in several projects simultaneously. This strictly project-oriented way of doing business leaves no time for cultivating the business network; it emerges and evolves through projects.

Companies have three motives for sustaining the business network:

1. Increased process efficiency between the partners involved (value chain community). The fact that each partner in a virtual company is responsible for providing the infrastructure, creates interfaces which lead to inefficiencies. A way to reduce these is by regulating the processes, i.e. by formalising, standardising and automating.
2. The partners meet to consider pooling their activities (quasi holding). Connected with this is the attempt to enhance efficiency by exploiting economies of scale.

3. Representatives of the partner companies come together to consider possible projects and perhaps to develop a product without having a specific customer order (virtual project). A core of companies is constantly examining the question of who in the business network should undertake any work to be done in anticipation of a “prospective contract” - so that economies of scope can be achieved.

These three motives featured in all the interviews. The third was the most prominent however. The business network becomes the reference point for a great many business activities. Some of the differentiation potential is then lost, as the restricted number of potential partners facilitates selection to such an extent that better partners beyond the business network are no longer actively sought.

2.2 Quasi internalisation of resources

As we have seen, once a market opportunity has been identified, virtual companies have to provide a whole raft of resources which cannot be held available internally. At least one element that is missing is specific knowledge about the customer for an individual deliverable. This is quickly built up in co-operation with the customer. If a company tries to internalise as many resources as possible, there is a risk of it being taken unawares. If a project calls for something quite new and the company is required to be innovative, key resources only emerge during the co-operation. In this case there would not be time to build up the necessary knowledge. The challenge, therefore, is to respond to a customer inquiry or to an identified market opportunity with the optimum combination of component parts of different companies. Some of the resources are acquired in the marketplace, through simple exchange mechanisms, others can only be built up in close co-operation with partner companies. This depends on the nature of the resource and on the number and quality of arbitrary providers.

	Value Chain Community	Quasi Holding	Virtual Project
tangible or intangible resources; efficient market available.	I reduction of interfaces and automation	b outsourcing or in-sourcing	c procurement and sales via EM, temporary effects
tangible or intangible, codified resources; no market available or inefficient.	a licensing, quasi-internalisation, close relationships	II economies of scale and knowledge „sourcing“	
intangible, tacit resources; no market possible.		d e.g. Joint Ventures	III economies of scope and knowledge creation

Table 1: Resource exchange in Virtual Companies

In all, three efficient forms of inter-company resource exchange were identified (cf. Table 1): (I) Discrete work packages are outsourced. The company which is

the interface with the customer puts these together as appropriate. (II) Shared pools are created, from which all companies can draw resources; ideally, these companies will have different workload peaks. (III) Joint work is undertaken to solve a problem. This requires the exchange of tacit resources (e.g. see Smith (1996)). Resources only acquire value through being exchanged. All other forms are inefficient for virtual companies. They lead either to a long-term relationship where the resource streams are always the same or to a merger or take-over (**a**, **b**, **c**, **d** in Table 1).

2.3 Common Business Understanding

My study showed that there are two forms of potential conflict. Firstly, there is a danger of individual partners deliberately acting in an “unfair” manner. There are two prerequisites for this: (1) The resources exchanged cannot be evaluated objectively and (2) the player expects to gain economic advantage from his “unfair” behaviour. The second form is where the “unfair” behaviour is unintentional. It is like a misunderstanding. This is conceptualised here as a lack of common business understanding which is characterised by cultural and structural factors. This means that where there is a lack of common business understanding, there is a greater probability of unintentional “unfair” behaviour.

The fear of intentional “unfair” behaviour is not present to any marked degree in the companies studied. It has, at most, a latent effect on the activities of the players; in the industry, practices of contractual safeguards and mutual surveillance have emerged to provide workable sanction mechanisms. The concept identified for further explanation of this issue is termed Trust (see chapter 2.7).

The second scenario occurs frequently. Problems of harmonisation occur, given the available communication tools and especially given the inaccessibility of communication partners with many projects running in parallel. Common business understanding has a structural dimension characterised by a shared system of individual objectives, similar rules of delegation, consensus on horizontal and vertical workshare, a similar approach to hierarchical levels, size of company and compatible information systems; it also has a cultural dimension characterised by similar communication behaviour, a similar approach to the exchange of mission-critical data and a common perception of acceptable ethical standards. This greatly simplifies the setting up of a temporary communication system. The main factor here is the convergence of individual objectives. Identifying a situation in which all partners agree that they have more to gain by working together to achieve a solution to a problem than they could individually, is of the utmost importance. This compelling need for win-win situations requires the partners to be able to convince others of the merits of co-operation. Where a good degree of common business understanding exists, certain interactions become superfluous because it is possible to anticipate the partner’s thinking. Building up the necessary degree of common understanding requires the interaction of all partners.

This, in turn, takes time and the time available is limited. Virtual companies need to be seen in the context of a cultural environment, in the light of the background, socialisation and industry experience of the players.

Appropriate behaviour can be forced, to some extent, by use of technology. Workflow management systems make processes transparent and make it impossible to progress to the next stage until the preceding one has been closed. E-mail systems provide automatic confirmation of receipt, so those involved can see who is in possession of what information and when. Standardisation also has its role to play. Mutual understanding of internal processes increases, for example, when all partners have been certificated to the same standards. Reference to known institutions extends this strategy. Regulations often refer to guidelines from industry associations, discussions in newsgroups and, of course, current legislation.

These action strategies are only partially successful at preventing misunderstandings; this is because the nature of the critical interactions is so novel as to make normalisation impossible. Virtual companies are in the somewhat ambiguous position of spanning boundaries and breaking down boundaries.

2.4 Co-operation as an Interorganisational Process

This concept places the co-ordination mechanism of co-operation at the centre, as a complex process between companies. It is concerned with the management tasks which arise in inter-company Co-operation. For the companies studied, the crucial situation is one where a transaction cannot be handled through the market, either because there is no market or because the particular deliverable is such a complex combination of different resources exchanged in the market that it requires the integration efforts of more than one trading partner. Also, there is no one integrated company capable of providing the same deliverable, or the customer selects a large number of suppliers for economic reasons. In a situation like this, there is only limited scope for hierarchical co-ordination as management authority does not extend beyond the boundaries of the individual companies. Thus, this concept deals with co-operation as a means of co-ordinating tasks that are distributed over different players from more than one organisational context.

The assumption is that co-operative action fosters the creation of co-operation-specific resources and is thus beneficial to the virtual company. As shown in 2.1, inter-company co-operation does not take place in a vacuum. The basis for co-operation is the business network which is conducive to common business understanding for the majority of the partner companies. This co-ordinating layer is essential. It forms the framework for co-operation. Through selection, the companies form artificial hierarchies and/or artificial market mechanisms. In long-term partnerships or in repeated co-operation, constant evaluation is very important as an instrument for the economic justification of previous selections. Where the motives for forming the business network are the value chain community or

the quasi holding, the companies studied have a great many evaluation mechanisms. These are most commonly understood as quality assurance. Business processes are defined exactly and at every stage in the cycle there is a process and a designated authority for checking quality, thus ensuring that the partners receive constant feedback about the quality of their work.

Table 2 summarises the characteristics of co-operation. Implementation of this action strategy brings ever increasing integration with other economic subjects. Quasi-internalisation does however also mean acquiring experience, which makes virtual companies flexible.

	Initiation	Agreement	Implementation	Operation
Communication value chain community quasi holding virtual project	face-to-face face-to-face face-to-face e-mail	face-to-face face-to-face face-to-face e-mail	face-to-face face-to-face face-to-face e-mail	EDI, WFM DMS, EM databases face-to-face
Co-ordination intensity value chain community quasi holding virtual project	high high high	high high high	low low low	low low high
Change of partners value chain community quasi holding virtual project	frequent frequent very frequent	rare rare rare	very rare very rare very rare	almost never almost never very frequent
Evaluation value chain community quasi holding virtual project		for economic justification of the partnership for economic justification of the partnership for rationalisation of the selection		
Allocation value chain community quasi holding virtual project	is negotiated for the operational phase coarse by selection	is negotiated for the operational phase fine by negotiation	defined	stable stable common business understanding
Regulation value chain community quasi holding virtual project	is negotiated for the operational phase coarse by selection	is negotiated for the operational phase fine by negotiation	emergent ad hoc	stable stable common business understanding

Table 2: Characteristics of different co-operation processes

2.5 Adhocracy

The entrepreneurs studied usually have a succession of legally independent companies, or else virtual companies. The first is immediately apparent, the second only on closer inspection. Overlapping business activities carry the business purpose forward over a period of time. The short-term nature of an individual virtual company becomes blurred when the picture is viewed as a whole. New skills are acquired in small projects and experimental start-ups, in much the same way as in

a large company organised along divisional lines. Thus the motivating effect of small units can still be enjoyed but the loss of stability is diminished.

The quality and quantity of employees required varies greatly depending on the number and complexity of projects acquired, which is why the companies adjust their internal organisation to respond to the uncertain environment in which they operate. In interorganisational teams, the personalities, skills and access to assets of individual team members are subject to change, it is therefore not practical for companies to opt for a hierarchical structure. It is not practical internally, because team compositions will vary depending on the relationships which gave rise to a particular project and the capabilities it calls for; nor is it practical on an interorganisational basis, because the focal company may either be the project leader or may be relegated to a subordinate role, depending on the make-up of the partnership (see Mintzberg (1979), p. 434, Waterman (1992)).

Take, for example, a large automotive manufacturer who approaches a small software house for a customised solution equivalent to half the annual turnover of the SME. A relationship of trust has been established between the automotive manufacturer and the software house in the course of earlier, smaller projects and so the SME is to be the project leader. The specific skills it has are vital for the project, which is why it is thought best that this company should be the prime contractor. The automotive manufacturer brings some of the other partners with it into the project; plus relationships of trust with manufacturers of other components.

On the other hand, there is the example of the systems integrator who is approached by an individual entrepreneur from the consulting sector, because he is involved in what is for him a very large project with a major insurance company. The systems integrator will contribute well in excess of 50% of the total project. In its other projects the systems integrator has almost always been the prime contractor. In this case it relinquishes this role, because the relationship of trust which exists between the consultant and the insurance company means that at least *one* hierarchical position in the project is defined. Situations also arise where SMEs are being forced into new roles, in the course of the internationalisation of their customers. Where they were previously project leaders in smaller, local projects, they are increasingly being asked by their customers to contribute their expertise to larger, mostly international projects. These are then headed by international corporate consultants or systems integrators who are able to bear the risks of this type of undertaking.

These three scenarios demonstrate that the companies studied are being asked to take on quite different roles. The companies are responding to this challenge with flat hierarchies - this is not a problem for them - and with changing hierarchical positions. Officially there is no hierarchy at all in some cases. This means a loss of autonomy, however, for the companies and they have to rely on a functioning

business network. Thus, management of the three motives listed above, becomes a strategic task.

2.6 Network Strategy

The challenge for virtual companies, if they are to actively shape change in their own organisation rather than passively submitting to the adhocratical principle, can be identified as strategic tasks oriented to the business network. This is a strategy dimension which, at first glance, is deemed to be external. Its character changes however to internal as a result of the important influence which the individual nodes in the business network acquire. The companies interviewed see themselves as an active part of their networks and try to motivate the other companies to develop joint goals. The more they succeed in doing this, the greater the chances of being able to benefit from economies of scale and scope. This brings with it however an increased risk of excessive integration and loss of flexibility. The strategy dimension referred to above is a balancing act between internal and external, aimed at extending the sphere of influence - the resource potential - without incurring the costs of hierarchy and bureaucracy (e.g. see Henderson/Venkatraman (1993)). If they are to have any chance of actively managing this trade-off, the companies need competences, which can be construed as being an overhead to their core competences. These relate to the initiation and cultivation of interorganisational relationships and the generation of new knowledge to maintain their core competences.

A clear understanding of the limits of their own capabilities and the constraints this imposes on the range of activities undertaken, gives the entrepreneurs time to take measures to support their own core competence and at the same time ensure that they have an opportunity to sell their implicit knowledge, in particular. In the interviews, the respondents refer to awarding and being awarded projects and then, in the same breath, knowledge management.

The following strategy dimensions can be identified:

1) Single company perspective

Decisions to enter into co-operations are always of a strategic nature. The individual company perceives the co-operation strategy as being complementary to concentrating on its core competences.

2) Network perspective

- Conditions for the development of the network are that
- potential partners exist,
- there is a collective interest as regards the objective and
- there is a reason for pursuing the objective (e.g. a project).

The network-oriented strategy may have one of three dimensions as its aim. It may either be aimed at finding new partners, agreeing objectives and improving

the outcome of the co-operation or developing the number and quality of opportunities for co-operation.

Thus, the network strategy can be classified in a hierarchy of strategies similar to that in large companies (Corporate Strategy, Business Strategy, Market Strategy, ...). Virtual companies take a bottom-up approach however. The requirements in terms of positioning are derived from the departments close to the market. Unlike what happens in an integrated company, the network nodes retain their strategic decision-making autonomy. In value chain communities and quasi holdings, overall responsibility lies with a body of voluntary, independent entrepreneurs. In virtual projects there is also a high turnover of partners in this virtual body. An “upside down” world like this comes about because the entrepreneurs see the need to compensate for the lack of autonomy through connectivity. Connectivity to the customers, where customers are involved in analysing the processes as part of each project, to constantly reassess which services can be taken on, but also connectivity to competitors and to suppliers in order to exploit network effects (economies of scale and scope) and obtain information on differentiation potentials. This means that the companies also perform cross-project processes such as innovation, customer care, market monitoring and the renewal of internal resources (e.g. know-how), at least partially in co-operation with the partners.

2.7 Trust

Trust between companies and organisational units within enterprises is just as important in virtual companies as in other forms of co-operation. It takes on a special significance however, because (1) in the initial stages of virtual companies, there is no shared past with the partners and (2) the actual co-operation process lacks the valuable face-to-face contact between the partners in the interaction (e.g. see Giddens (1990), p. 29-36).

The interviews reveal the following five roles for trust:

1. Trust compensates for uncertainty with the partners and with the customer. The actions of players or groups of players generate an expectation which can either be fulfilled or disappointed. Where communication is asynchronous and/or indirect, there is no opportunity to constantly monitor these actions and thus to become increasingly confident of the trustworthiness of partners (“control”).
2. Trust ensures variety and thus encourages innovation. This seems particularly significant between customers and suppliers. If there is trust between sales partners and a supplier, the partners will tend to inform the supplier of opportunities and risks in the marketplace (“common interest”).
3. Trust ensures access to the customer. There are many instances where a relationship based on trust leads to one company being given the role of prime contractor. A contract is placed with a supplier who takes the customer seri-

ously, indicating that the supplier's dependency on the customer is related to trust ("dependence").

4. Trust also compensates for the fact that discrete work packages cannot be defined. This comes about through the ability to anticipate decisions in the operative sphere, based on a shared understanding of how a task is structured ("information deficit").
5. The same applies to critical situations where face-to-face contact would be the optimum form of communication, but where this is not practical ("co-ordination deficit").

Trust does not however replace written, legal contracts. Both forms of agreement are necessary, not always to the same extent, but one is not a substitute for the other. Trust comes about through people (gate keeper). As a result, personal and business networks start to overlap; this leads in turn to integration, social too in this case.

3 The Internet as an Enabling Technology¹

A quantitative evaluation of the statements in the interviews showed that the Internet is used least often to promote common business understanding and trust. Similarly, the concept of the network strategy tends to be supported more by traditional media and less by IT systems. It is used most frequently for monitoring and demonstrating internal and external resources and in co-operation for the joint conduct of projects. It is obviously very good at supporting inter-company projects which are characterised by adhocratical forms of co-operation.

Four layers of technology use can be identified: (1) support in the workplace, (2) support for collaborative team working, (3) support for the information need which exists between projects and at higher management levels when several projects have to be co-ordinated and (4) the creation of communities for long-term planning in the company.

The communication function ensures that the employees (and specifically the customers) are able to exchange data. In co-operation, a distinction must be made between information acquisition for selection and evaluation, and project management for the co-operation process. On the one hand, the Internet is used as an anonymous medium for collecting and disseminating data and on the other, where known senders and recipients are involved, it is used for mutual information, e.g. about the status of the project. The first function is supported by the World Wide Web, as this allows firms to search for external resources. In the second case, the aim is to improve support for team working as far as possible. The companies studied do this by building "virtual workplaces" which combine as many func-

¹ Internet usage was not identified as a concept, as defined by Strauss/Corbin (1996). It is introduced here as a construct.

tions of a shared location as possible. In the third layer, newsgroups, e-mail distributors and mutual access to databases, play a key role. The virtual company is co-ordinated by closed groups of participants, on the other hand market surveillance and technology monitoring is done in open forums. Communities with shared interests emerge and exchange information about their activities and experiences (virtual community). Dynamic analysis of behaviour shows that Layer 1 is the element which links the other forms of use. Because employees have the opportunity to access data inside and outside the company, and particularly because they are able to communicate beyond the boundaries of the organisation, a wide range of contacts develops, there are few problems in virtual teams, business networks are created at employee and at management level. Organisationally, problems have arisen: (1) the external resources are not known, (2) the resource providers are not sufficiently well known (common business understanding) and (3) there are inadequate safeguards against opportunistic behaviour (trust). It has already been shown that these problems cannot be solved by a better information supply alone. The Internet, however, can only take on this function, and in the companies surveyed it is helping to solve the organisational problems described but not eliminating them.

4 Model of Virtualness

Selection is a particular feature of co-operation, but it also involves evaluation, regulation, allocation (see Sydow/Windeler (1994), p. 4) and the use of generic project plans to rationalise the co-operation process. On the other hand, strategic functions can be distinguished which serve to agree objectives for developing a company's own core competences and to position it in the market. The two layers are of course interlinked.

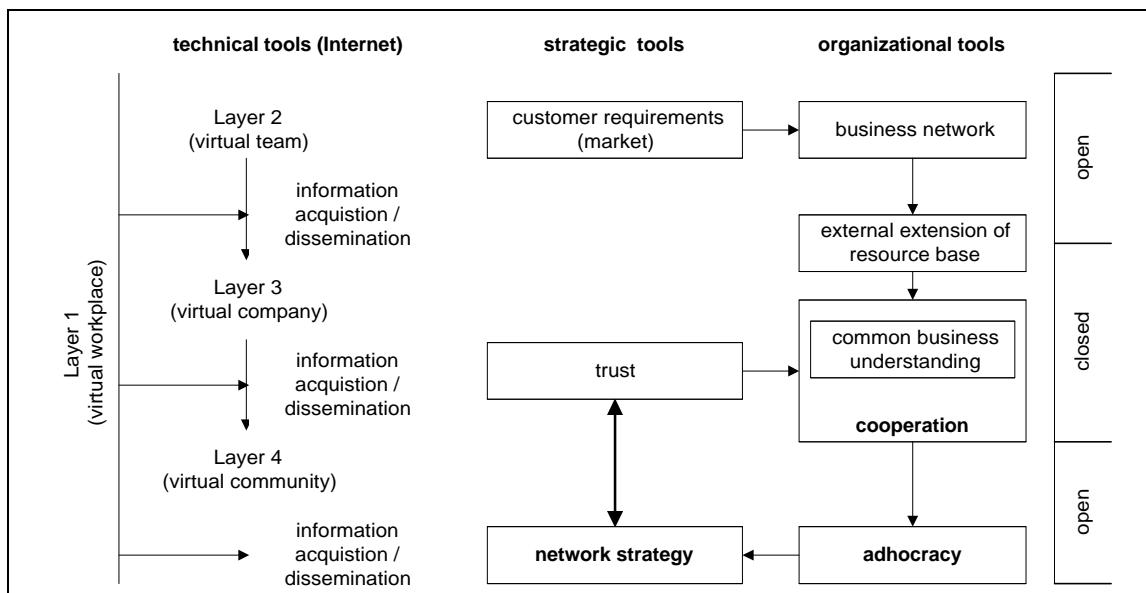


Figure 1: Integrated Framework

Co-operation, understood to be the process whereby several more or less independent companies join forces to produce a deliverable, is an action strategy which is adapted to the external exploitation of resources. If largely tacit resources have to be exchanged, this is evidence of successful project organisation. By contrast, in order to exchange codified resources, the companies either use existing markets or they simulate these.

A dynamic model of virtualness as it was found by the analysis of empirical data can be formulated as follows (cf. Figure 1; also see Sieber (1998)):

One of the players recognises a new opportunity, either by discussion with customers or self enforced. He seeks for business partners to help him fulfil the market requirements. The first step is to rely on the relationships in the business network. If not all the required competences can be found within the network, the player seeks for companies outside. After having put together the project team that is potentially able to bring together all the required resources, the co-operation process starts. During the first phases a common business understanding has to be build. This task is most easy to fulfil if the companies in joint operation know each other from other projects - namely if they participate in the same business network. Because in each project new roles have to be formulated (in one project company A is project leader, in the next project it is only a subcontractor and again in another one it is financially involved e.g. in a joint venture), the companies observed make the adhocracy to their internal and external organisational principal. While engaged in several projects in parallel and heavily concentrated on core competences none of the companies can survive without the others. This loss of autarchy leads to dependencies between the companies forming one business network. Also if it is not intended this has strategic implications. The whole business network is competing against other business networks. Therefore it is important for the companies to deliberately formulate joint strategic will. Many investigations have shown that trust is one of the important factors to successfully build and sustain joint strategies (e.g. see Ebers (1994), Ben-saou/Venkatraman (1995), Handy (1995)). Trust in addition leads to more successful co-operation in projects (e.g. see Iacono/Weisband (1997), Lip-nack/Stamps (1997)).

Internet supports the dynamic between common understanding, trust, external extension of resources and co-operation by communication and information. The companies interviewed heavily use email, newsgroups and newsletters. Some of them complement the open platform by introducing groupware and workflow systems. Furthermore the business network finds an electronic compliment. The companies build up virtual communities. These do not only improve common business understanding and trust but also lead to closer relationships in the business network and help companies seeking for new market opportunities and new business partners.

5 Conclusion

As the dynamic model shows, there is a recursive relationship between Internet and virtualness. Companies adopting the ability defined by Henderson/Venkatraman (1996) do use the Internet without many difficulties. Companies using the Internet, more and more adopt virtualness. Internal lateral communication as well as external communication are two of the great enablers for Virtual Corporations. The Internet as an open platform supports many different communication scenarios and therefore is a mediator for virtualness.

Further research could be carried out to find out more about the dynamics between especially Internet as a communication system and interorganisational relationships as well as relationships to end consumers. The presented model might help by doing so.

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Managing Virtual Work: A Framework for Managerial Action

Mary Beth Fritz and Marvin L. Manheim

Abstract

In "virtual work organizations," people work at different locations and sometimes at different times. Virtual work is a key process in business: How people work as individuals and as part of work groups is a key issue in the ability of businesses to compete effectively. This paper draws on research in telecommuting, globally-coordinated product planning, and supply chain integration to develop a theory of virtual work effectiveness. This theory and the related experiences are used to develop illustrative examples of managerial actions to improve the effectiveness of virtual work organizations. A preliminary conceptual framework is presented to stimulate discussion.

1 Introduction

We define virtual work as interdependent work activities performed by a group of individuals who spend some time working in different physical locations. If the locations are not all in one country and/or one time zone, this may also mean that individuals work in different time zones, and may have different cultural and organizational backgrounds. There are many examples of virtual work in businesses today: telecommuting and telework, and project teams with geographically distributed members are two types of examples.

Virtual work arrangements have probably existed for many years; however, they are now coming into prominence for a number of reasons. Enterprises are pursuing virtual work strategies because this allows a firm a great deal of flexibility to compete in a rapidly changing global business environment. For example, telecommuting reflects both business needs and individual worker desires for flexibility. Also, global project teams for product planning and design, for supply chain management, for marketing, and for other purposes are a necessity in globally-competing businesses [Manheim, 1990, 1992]. However, management of work in this environment becomes more complex than in a traditional environment where workers are co-located.

Failure to manage virtual work effectively can be a source of failure in business today. Conversely, effective management of virtual work can, we believe, be a source of major business benefits, e.g., shorter time to market, more effective

response to competitors' moves, more effective management of integrated supply chains, more effective use of workers with flexible work schedules, etc.

While we believe that effective use of information technology (IT) is important, as IT creates a platform for business processes to be conducted in a virtual environment, the technology component is just one piece of an overall strategy to manage virtual work.

Based on prior work in several different domains, we recognized that a theory of virtual work could be articulated, and would applicable in a range of different contexts. This prior work included telecommuting and telework, supply chain integration, and product management. As we discussed these areas, we realized that there were many conceptual ideas, and management action guidelines, in common in these areas. There are many similar problems and opportunities in the virtual work environment, regardless of the specific domain (e.g., telecommuting or teams in a supply chain).

As we have explored these ideas, we have developed a conceptual framework to summarize the shared ideas. This framework is preliminary and is briefly introduced at the end of the paper to stimulate discussion and evolution of the work.

2 Critical Processes in Virtual Work Organizations

When performing work activities in a virtual environment, individuals access information and communicate with colleagues from a variety of different physical locations. This differs significantly from the traditional office where individuals worked at a single location. Interaction between colleagues often took place through face-to-face contacts (FTF) in both formal meetings and informal settings. However, in virtual environments people work at different physical locations, and possibly at different times. In order to communicate and coordinate virtual work activities, in physically and/or temporally separated locations, individual use a variety of non-FTF communication channels. These channels include electronic communication modes such as fax, electronic mail, shared on-line databases, and non-FTF modes, e.g., paper memos, notes, telephone, and voice-mail.

In the traditional environment communication and information access occurred in a shared context, but in a virtual environment occurs between individuals in a number of different physical contexts. A number of critical inter-related areas are impacted as work is conducted in varied physical contexts. We believe that these areas must be explicitly managed for successful implementation of virtual work.

We discuss these areas as follows: i) people management, ii) relationship management, iii) work management, iv) knowledge management, and v) technology management. We draw from prior research and experience to inform our discussion.

2.1 People Management

People are key to successful virtual work. When people are separated geographically from co-workers, they must work more autonomously and be prepared to make decisions independently, while also working collaboratively with distant colleagues (who may have vastly different experiences, perspectives, and incentives). The success of the virtual work environment is dependent on the expertise, knowledge, and wisdom of individuals.

Research on telecommuting indicates that certain skills are necessary for individuals to be most effective in the telecommuting environment [see Fritz et al. 1994 for review of the literature]. For example, time management and self-supervisory skills are important for telecommuters. In addition, managers of telecommuters must address employee development issues such as the potential loss of visibility for workers leading to reduced promotion and development opportunities [ref]. This is also true in inter-organizational teams such as supply chain management and in teams in globally distributed companies. Bartlett and Goshall [1989, p. 71] find that a sophisticated human resource management system for recruitment, training and development, and career path management is critical to help individuals in the transnational company ‘cope with its diversity and complexity.’ The development of the skills of individuals and overall management of people in any virtual work environment appears to be crucial to effective performance.

2.2 Relationship Management

Relationships are critical for efficient organizational performance [Sachs 1995] as employees perform work activities in a ‘web of social relationships.’ Through these relationships knowledge is transferred from one worker to another, new skills are learned, and work activities are coordinated [Sachs 1995]. In order to be effective, relationships must be developed with a level of shared expectations and trust between individuals [Gabarro 1990].

Relationships between individuals are particularly critical for effective performance of virtual work activities. For example, participants in supply chain management teams have described to the author a need to develop common understanding and a ‘web of trust’ between all participants in the supply chain process. This web of trust is critical as supply chain management processes must be conducted at a level of openness which historically has not existed between manufacturers and retailers, who typically are battling each other continually about price and availability of product [Fritz & Manheim 1998].

Development of relationships in a virtual environment appears more difficult as individuals are working in different physical context, and the development of a shared understanding of information and communication patterns is less easily achieved. In addition, informal social communication, which is important for the

development of working relationships [Kraus et al. 1990], is less likely to happen naturally when employees do not work in close physical proximity. The reduction in informal communication and the impact on working relationships is a concern in telecommuting programs, as managers often fear that employees will be less able to work effectively in teams and that relationships between team members will suffer when workers are geographically separated [Kugelmass 1995].

Management of relationships then is critical in any virtual work environment. This process is multi-dimensional. Relationships between individuals and particular relationships, such as management/employee relationships and relationships between team members, need to be explicitly supported and nurtured. These relationships may be affected by other factors, e.g., previous experience working together, number of members of the team. Also, the relationships between teams must be clarified and managed in a virtual work environment.

2.3 Work Management

In performing virtual work, management of work becomes more complex. Work management involves two dimensions: management of the processes necessary to perform the work and the management of the execution of these processes. Work processes may have to be redesigned for effective performance in the virtual environment. In this discussion, however, we will primarily focus on the management of the execution of work processes. In the following discussion, we provide brief examples to illustrate the changes in communication and coordination of work activities found in discussions of a variety of different virtual work environments.

Coordination: Coordination is the process of linking the activities of different workers together in order to accomplish the goals and objectives of the organization. Coordination of virtual work activities becomes more complex, as goals and priorities must be communicated to individuals in a variety of different locations, often with differing local needs. The conventional office environment aids the management of work activities [Kraut 1987]. Managers often use face to face (FTF) communication with subordinates, through scheduled meetings or on an informal, unscheduled basis, to communicate goals and priorities and coordinate work activities. In the telecommuting environment, managers must develop new methods of coordinating a dispersed work group. The author found many examples of changes in coordination that managers had implemented for telecommuters such as the following. "In one firm, voice-mail was designated as the pre-determined communication link between worker and manager. Workers were instructed to check their voice-mail boxes at least once a day so that communication could always be established on at least a daily basis." [Fritz et al. 1996].

This is also true in globally distributed companies, and may be even more complex as group members in different countries may have dramatically different

needs. And in supply chain management, team members with differing backgrounds, e.g., from a number of different companies including customers and suppliers, must coordinate a number of different activities in order to perform work activities effectively [Manheim 1996b, Manheim 1994].

In addition, the distributed team members themselves often need new coordination mechanisms within the team to efficiently assign work activities, prevent redundant activities from occurring, and effectively perform interdependent activities in a virtual work environment [Fritz et al. 1998].

Control – monitoring and evaluating performance: Control is the process of attempting to ensure that a person or group of persons works toward and attains certain specified organizational goals and objectives. In their discussion of ‘The Virtual Corporation,’ Davidow & Malone [1992] assert that managers of workers in the flexible, adaptable organization of the future must shift from control of the process to facilitating the effective performance of the process. Similar results have been found in studies of telecommuting programs. Managers often report the need to change to an outcome-based measurement system and find that they must develop new strategies to evaluate and monitor the performance of remote workers [for a review of this literature see Fritz 1995]. In addition, Venkatesh & Vitalari [1992] find that to work effectively in a geographically distributed environment, workers must have managerial autonomy, or the tacit permission from management to make independent decisions in the performance of their work process.

2.4 Knowledge Management

Another key issue in virtual work is knowledge management, i.e., access to and creation of tacit and explicit organizational knowledge by individuals and groups. Individuals in virtual work environments potentially provide a rich base for the creation of new knowledge for the work group or organization. Workers in different locations develop different perspectives, have different experiences, and gain new knowledge from their varied work environments, e.g., gather valuable information from customers or other organizations [Tyre & von Hippel 1997].

Because people are scattered, the management of explicit information is more difficult. Making sure that people get access to the right information to do their job is a critical issue and often more complex than in co-located work. Tacit knowledge, or the mental models and ‘know-how’ of the work process is distributed in organizations through socialization between employees [Nonaka & Takeuchi 1995], which as we have discussed earlier can be problematic if not recognized and managed effectively.

Significant differences in perception and understanding of individual knowledge should be recognized to enable effective performance of virtual work. If these differences are not addressed, they can hinder the effectiveness of global teams,

e.g., a product design team whose diverse cultural and political expectations may lead to potentially unresolvable differences. However, the use of explicit strategies to develop and share information, and to help team members increase their understandings of differences and similarities among various global markets and consumer preferences can improve their effectiveness. Also, the development of organized knowledge acquisition and dissemination processes, and structured processes to support individual and group learning are critical in this complex environment.

We believe that knowledge management is particularly critical to success in virtual work. If knowledge is poorly managed, this can be a clear source of failure; however, if it is well managed, there is great potential for increased learning and knowledge creation.

2.5 Technology Management

Information technology plays a key role in the virtual work environment. We believe that while technology alone will not create an effective virtual work environment, an effective technology management strategy is crucial to success.

One key element of the use of IT to enhance virtual work is to recognize that, virtual work will involve interactions in a number of modalities [Manheim, 1994, 1996b]:

- face-to-face, both formal and informal
- structured, as in the use of EDI, transaction processing, and MIS/EIS systems for managing and reporting the structured tasks - e.g. sending Purchase Orders as EDI messages in a supply chain context
- semi-structured, as in the use of Workflow Management (WF) systems - e.g., sending invoices for payment which may involve several levels of review in both the purchasing and the selling organizations
- unstructured, which will use FTF when available, but when distance and/or schedules prevent, will use Groupware such as E-mail, discussions, repositories, etc.

Therefore, in general, for every business process which involves virtual work, the IT strategy for process support should involve the entire range of interactions, in an integrated way. Furthermore, based on the dynamics of the processes supported, there should be explicit management attention given to the totality of virtual work. For example, use of E-mail and discussion forums should include social and personal interactions, and should not be restricted to purely narrow business uses.

People must be not only able to access computerized information and communicate electronically, they must also have the necessary skills, support, and incentives to integrate the technology into their work practices. The use of IT is crucial for the effective performance of work in any distributed work environment. As

individuals become more dependent on information technology, it is crucial that technical assistance is available and that technical problems can be resolved quickly. Training is necessary to ensure that workers have the necessary skills to use the technology effectively. Training and support are particularly critical for telecommuters or mobile workers who work in detached and sometimes isolated conditions.

3 Managing Virtual Work: Different Domains, Common Features

We argue that managing a virtual work environment has many common features that are domain-independent. Understanding these common features allows strategies to be developed for the general problem of managing virtual work. These strategies can then be modified to be more useful in the applicable domain of virtual work.

To illustrate this argument, in Table 1 and Table 2, we have listed some managerial strategies that we have found to be effective in the telecommuting environment [Fritz 1996]. We have then modified these strategies for another virtual work environment – a global project team.

Strategies for Virtual Work	Strategies for Telecommuting	Possible Strategies for Global Project Teams
Enable appropriate FTF communication	Designate days for telecommuting, no meetings to be held that day	Require employees to hold FTF meetings at beginning of project to establish working relationship
	Designate days for meetings to be held and days when no meetings are held	
	Establish a 'bonding day' where all employees work in the office	
	Require all employees working remotely to attend quarterly meetings, even if employees had to fly to the meetings	Require all employees working remotely to attend quarterly meetings, even if employees had to fly to the meetings
Encourage use of appropriate alternative communication channels		
	Encourage use of e-mail in group	Encourage use of e-mail in group
	Hold meetings using telephone conference calls or e-mail	Hold meetings using telephone conference calls or e-mail
	When possible, allow remote workers to attend meetings via telephone	Encourage use of asynchronous communication modes, such as bulletin boards and other forms of groupware
	Allow remote workers to use pagers	
Facilitate and encourage access to		

Strategies for Virtual Work	Strategies for Telecommuting	Possible Strategies for Global Project Teams
group members		
	Use sign-out board for scheduling remote work	
	Use electronic calendar for group which everyone has access to, remote workers keep calendar up to date with remote work days	Use electronic calendar for group which everyone has access to, remote workers keep calendar up to date with work schedule
	Make it known that remote workers are 'at work,' and should be contacted when needed by co-workers and managers	Make it known that group members should be contacted when needed by co-workers and managers
	Keep remote workers 'in loop' - apprised of meetings and office activities	Keep group members 'in loop' - apprised of group meetings and activities

Table 1: Relationship Management Strategies

Strategies for Virtual Work	Strategies for Telecommuting	Possible Strategies for Global Project Teams
Develop appropriate evaluation mechanisms		
	Increase the use of objective evaluation criteria and clearly defined objectives	Increase the use of objective evaluation criteria and clearly defined objectives
	Increase the use of milestones	Increase the use of milestones
	Reduce the use of management by 'watching'	
	Evaluate performance using well-defined output measure where possible	Evaluate performance using well-defined output measure where possible
	Explore alternative evaluation methods, e.g., customer surveys, response time measures	Explore alternative evaluation methods, e.g., customer surveys, response time measures
Encourage and facilitate open communication		
	Keep open communication with remote workers	Keep open communication with members of work group
	Use pre-determined communication link, e.g., remote employees check voice mail at certain times or have scheduled conference call each day	Use pre-determined communication link, e.g., members of work group check voice mail at certain times or have scheduled conference call or video conference each day

Table 2: Work Management Strategies: Monitoring Performance

4 Conceptual framework – a comprehensive theory of virtual work

We present a preliminary version of this framework which (see Figure 1) draws on several blocks of empirical and conceptual work (Fritz et al. 1994, Fritz 1995, Fritz et al. 1996a, 1996b, 1997, Manheim, 1987, 1988, 1992, 1996a, 1997, Manheim et al, 1995, 1997). A brief summary of the framework, which is under development [see Fritz & Manheim 1998], is presented here to stimulate discussion.

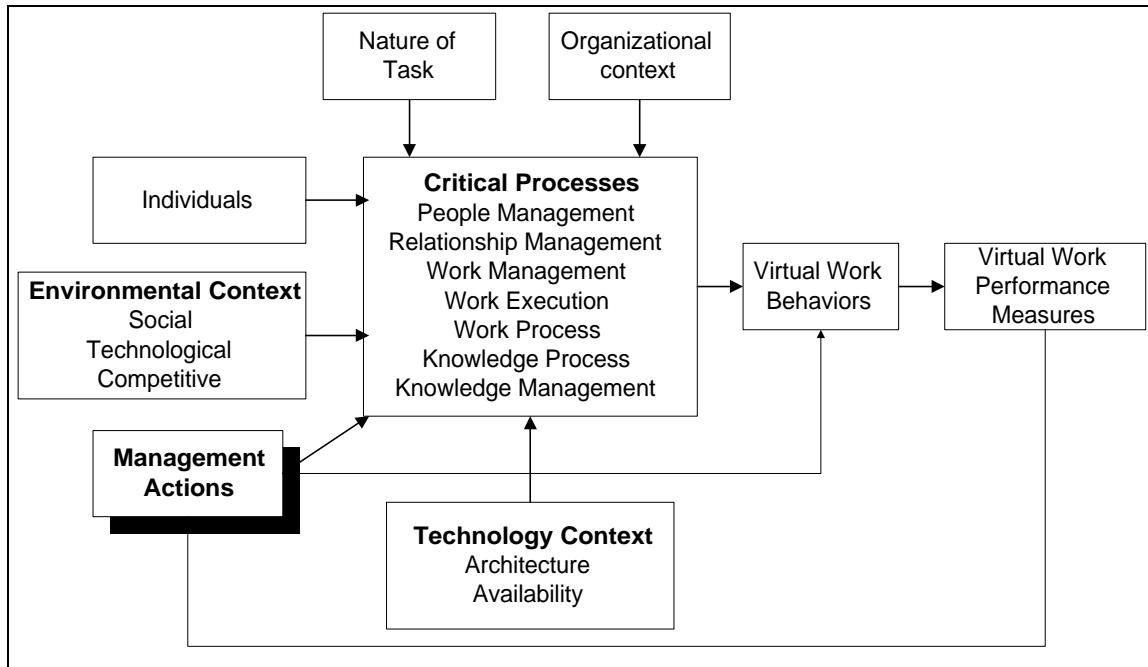


Figure 1: Conceptual Framework

5 Managerial Actions

Our objective is to articulate a theoretical framework identifying factors which influence effective performance of virtual work. This framework will apply generally to a number of different virtual work contexts and can be used to assess the work environment for readiness for virtual work. Also, this framework can be used to develop appropriate strategies for implementing and managing the virtual work environment to insure effective performance.

We believe that such a framework can help identify the roles of different strategies and techniques for different types of virtual work, as well as strategies that are necessary in any situation. Further, a comprehensive theory could help managers ensure that they do not omit critical elements. For example, managers today could easily focus on using groupware as the primary element of their strategy, and forget that effective training of managers and employees to prepare them for a new mode of work is also essential to success. Our goal is to use this frame-

work to develop managerial actions to facilitate effective performance of virtual work.

Management actions include a wide range of activities that influence the performance of virtual work. Potential actions include communications support actions, the choices of individuals to participate, training to prepare people for virtual work, and many other elements. For example, management actions can influence the suitability of business process or tasks being performed in the virtual work environment; job redesign can be used to change certain characteristics of the individual's job to increase motivation and satisfaction [Hackman and Oldham 1980].

There are significant opportunities for influencing the performance of virtual work, through a wide variety of management actions. We explore this framework further and illustrate potential actions in Fritz & Manheim [1998].

6 Implications for further research

The management of virtual work is complex and this research represents only a first step in understanding it. We believe that there is a class of problems in managing virtual work which have similar features in a number of domains. Research in globally-coordinated teams, telecommuting, and supply chain integration indicates a number of common features in these different domains. We believe that continued research is needed, both to develop an underlying theory of virtual work and to better understand the different domains of virtual work. In this manner, the underlying problem of managing virtual work in a dynamic business environment can be more effectively addressed. Including the development of managerial actions and the framework we have presented is preliminary. We propose it to stimulate discussion and dialogue. Additional research is needed to provide more depth and understanding of the factors influencing the effectiveness of the virtual work environment.

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Information Technology Tools to Support Virtual Organization Management: A Cognitive Informatics Approach

Marvin L. Manheim and Mary Beth Fritz

Abstract

The management of virtual work (VW) requires at least three major elements, which must be coordinated in an integrated way:

- A conceptual framework with which to view VW situations, diagnose the situation, and develop and apply candidate actions to manage the work and the participants;
- An information technology (IT) environment which (a) supports the work of the VW participants, (b) supports the communication, collaboration and coordination aspects of the VW team and its processes, and (c) provides capabilities with which to manage the VW process.
- Effective training and education of all participants in VW processes to prepare them for VW and support them daily in the pressured environment of a virtual setting.

In a related paper (Fritz & Manheim, 1998), we present a summary of a framework for virtual work and discuss some of the training and education needs. In this paper, we focus on the IT environment.

We summarize our approach as follows:

People think and act schematically. That is, they store information in memory as schemas, and act by recalling schemas, instantiating them possibly with modifications. We will call „patterns“ those mental schemas which are made explicit. Thus, work involves the execution of patterns, representing previously-learned processes or the development of new processes or revision of old processes.

Therefore, a key element of an IT-based strategy is how individuals can access a library of patterns, use patterns and associated processes to perform desired tasks or achieve desired goals, and manage the evolution of their patterns and processes, both individual and organizational. Based on this premise, we propose an integrated pattern-based architecture which includes these components:

- A user-oriented interface through which users manage all of their information, with the aid of patterns
- an application-independent and document-format independent pattern library

- a user-oriented capability for applying patterns as is, or for modifying patterns or developing new ones
 - a library of standard optional patterns, such as office application suite components, workflow management, groupware, and personal action-management type patterns
- and other features.

At present, many software applications provide support for the uses of patterns, but the patterns are very specific to an application context and usually hidden in the application. What is needed is an approach that unifies these uses of patterns by providing a generic approach to the management, development, and use of patterns, and makes patterns the top level of the user's access to the resources of the IT-enabled work environment. With the proposed approach, the top-level user functionality remains stable, oriented around patterns and their application, while the functionality that can be accessed continually grows in power and in variety through growth in a library of patterns.

We will show how the concepts of Virtual Work management can be applied within this framework.

1 Objectives

The management of virtual work (VW) requires at least three major elements, which must be coordinated in an integrated way:

- A conceptual framework with which to view VW situations, diagnose the situation, and develop and apply candidate actions to manage the work and the participants;
- An information technology (IT) environment which (a) supports the work of the VW participants, (b) supports the communication, collaboration and co-ordination aspects of the VW team and its processes, and (c) provides capabilities with which to manage the VW process.
- Effective training and education of all participants in VW processes to prepare them for VW and support them daily in the pressured environment of a virtual setting.

In a related paper (Fritz & Manheim, 1998), we present a summary of a framework for virtual work and discuss some of the training and education needs. In this paper, we focus on the IT environment.

2 Basic Approach

We summarize our approach as follows:

People think and act schematically. That is, they store information in memory as schemas, and act by recalling schemas, instantiating them possibly with modifi-

cations. We will call „patterns“ those mental schemas, which are made explicit. Thus, work involves the execution of patterns, representing previously-learned processes or the development of new processes or revision of old processes.

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We will show how the concepts of Virtual Work management can be applied within this framework.

3 The Emerging IT Environment for Virtual Work

3.1 The General Context

We take these as givens, in the emerging information technology environment:

- mobile computing
- electronically-connected organizations
- virtual documents
- distributed computing
- common desktop environment(s)
- objects, encapsulation

- application development by multiple players, including vendors, VARs, internal IS organizations, and local business-unit experts, as well as users
- continued importance of end-user application modification and limited development
- continuing evolution of software functionality to more and more specialized applications
- the Internet widely available
- seamless integration of networks, including internal private networks, external semi-private networks, and external public-access networks
- dominance of the Web
- all applications mail-enabled

3.2 Use of Groupware, Workflow, and Other Communication and Collaboration Technologies

These general elements provide the technology support to virtual work: the ability of people to work any time, any place, with others in their own organization or in different organizations.

In this context, the role of technologies that provide specific and focussed support to communication and collaboration is critical. This group of technologies for communication and collaboration is called Groupware, and includes electronic mail, Workflow Management Systems (including Forms Management and Document and Image Management Systems); and the networks on which they operate. (Fischer, 1998; Coleman & Khanna, 1995); (Manheim, 1992)

We see these trends emerging.

We see groupware functionalities becoming widely available. Groupware systems (GW) support collaboration among people by providing such functions as: electronic mail, voice mail, discussion forums, brainstorming, voting, audio conferencing (teleconferencing), video conferencing, shared whiteboards (where people at different sites can work simultaneously on a document, presentation or other object), group scheduling (e.g., for multiple individuals to find a common time slot available for a meeting), WorkFlow management systems, and others. Such systems may use proprietary communication protocols or the Internet or both (e.g. Notes/Domino).

Many such products are now available. One of the leading products in this category is Lotus Notes, which provides many of these functionalities in an integrated, highly-secure, flexible environment. Microsoft has announced Exchange, a product that may eventually have many of the features of Notes. Novell offers GroupWise, which also has a subset of Notes features. Netscape has acquired Collabra and is integrating its groupware tools into its Internet-based client and server strategy. Many other vendors offer subsets of groupware functionalities.

Groupware systems can be very effective in supporting the activities of people in many different modes of interaction.

The integration of groupware and Email is particularly powerful. Email, a simple form of Groupware, is already being used in many organizations; other products such as Notes provide Email features and in addition provide a range of additional capabilities.

We also see groupware functionality integrated into focussed applications, such as word processing or spreadsheets or document management. Initially, this may simply be the ability to mail a word processing document or graphic presentation to someone else directly from the application; or the ability to control who can share a copy of a file. Increasingly, more carefully-articulated strategies are being developed (for example, Avantos' ManagePro and NetManage' ECCO are shrink-wrapped software tools for the workplace which provide information sharing capabilities in a groupware mode).

Workflow management capabilities are becoming widely used. Workflow Management Systems (WFMS) are used to structure the flow of work among individuals and units in an organization. Wherever a process is repeated many times and involves multiple individuals or units, WFMS can be usefully in systematizing those processes and making them more efficient. For example, the process of receiving a customer request for publications, sending that request to the warehouse, processing the order in the warehouse, sending a shipment notice to a carrier, processing the order through accounting, etc., can be viewed as a Workflow process. Similarly, the process of publishing a document is a Workflow process: the author submits copy for editorial review, the copy editor makes suggested changes, the author incorporates changes and resubmits the document, the copy editor sends it to design, the designer lays out the document for publication, a proof copy of the document is sent to the author for final review and indexing, the author sends it back, etc.

Especially important to the role of workflow is the implementation of multi-enterprise workflows through effective adoption of Workflow Management Coalition standards. The Workflow Management Coalition is a group of more than 200 vendors of WFMS products. They have published a set of standards for interoperability of workflows among multiple vendors' servers, and for interoperability of software applications and workflows. Together with the fact that many WFMS vendors provide systems that operate in multiple client and server environments (e.g., IBM's Flowmark products operate on PCs, mid-size, and mainframe servers), these standards provide the potential that ***workflow becomes the glue that ties the enterprise together.***

This is beginning to be evident in vendor offerings, which integrate groupware and WFMS. Examples include: IBM's providing a Notes client that accesses both Notes and Flowmark messages and servers; the development by ONEstone

GMBH of ProZessware, a workflow product in the Notes environment; and by many WFMS vendors offering integrated document and image handling capabilities (e.g. FileNet among others).

We also see collaboration technologies moving into the Infrastructure: Within a few years, we will see basic Groupware functionalities (including email, Workflow Management Systems, and document and image management systems) integrated with almost all applications. Thus, every application, whether word processing, CAD, or order-entry systems, will have on its pull-down menu the options of: mail this, post this for discussion to group XXX, share this with Joe, Mary and Koji, forward this to Pierre following „Workflow #34 - Marketing Budget Approval;“ and so forth.

Especially important is the integration of WFMS standards and the Document Management Alliance standards. As a result, WFMS will be interoperable among vendors' products, as well as document storage and retrieval systems. (See the Interoperability Demo at the AIIM Show, Anaheim, May 1998.)

4 Implications for Virtual Work: A Technology Base, Not a Solution

The implications of all of these forces are profound.

First, communication and collaboration will become activities integrated with, and natural components of, all aspects of daily, electronically-mediated, work. Groupware of all types will move into the infrastructure, providing powerful and widely-used technologies.

Second, these forces in combination define a context—electronically-mediated work environments—in which the thrust of the information architecture of the enterprise can become something substantially different from that of the past: enhancing personal power to think and act more effectively.

This is particularly important for virtual work.

However, simply supporting communication and collaboration with these basic technologies is NOT by itself sufficient. As discussed in (Fritz & Manheim, 1998), effective management of virtual work requires much more than basic communication and collaboration technologies. What is needed is an IT architecture that supports participants in a virtual work organization by providing the tools and techniques to manage the „soft,“ „subtle,“ issues of virtual work, in a pragmatic and focussed way.

To do this, we need tools based on a new philosophy.

5 The Cognitive Informatics Approach: Applying Knowledge in Action

The central issue is this: the participant in a virtual work organization is in a complex, dynamic situation. He/she needs tools and techniques for applying the conceptual framework laid out in (Fritz & Manheim, 1998) in a systematic, yet appropriate manner: managing work, managing relationships, managing knowledge, etc. Patterns provide a basis for this.

5.1 Patterns

From a behavioral perspective, patterns are the ways in which individuals or groups of individuals think and act. These processes are guided by the patterns that they have learned. When a new process is implemented, one of the major tasks is to teach people the new patterns of working. As people learn about the workability and effectiveness of the new patterns, they revise them.

Patterns can be descriptive—„here is how people answer customer telephone calls today.“ Patterns can be normative—„this is the way that people should answer customer calls to achieve our goals of total customer satisfaction.“ Patterns can be individual, workgroup, or organizational. Patterns can be static or evolving. Patterns can be highly-specified, or broad templates which need to be specified in detail when instantiated for application in a particular situation. [(Manheim, 1996); (Manheim & Isenberg, 1987; Manheim, 1995)].

To understand how patterns enter into the processes of organizations, consider how the organization deals with various types of situations. In a disciplined, stable organization, there will be patterns of performance which individuals will follow in performing their work. Examples include:

- patterns for answering the telephone
- patterns for setting meeting agendas
- patterns for being effective in a sales call on a customer
- patterns for implementing Total Quality Management and ISO 9000. TQM is an example of the application of patterns: the objective of TQM is to change the patterns by which people operate in their company. [(Manheim, 1995)]

Business process redesign can be understood as a process of changing people's patterns. When a process is redesigned, it is still a „paper“ design. To be effective, the paper design must be implemented, that is, translated into action as a „live“ process being used by the organization.

The range of patterns is very broad. [(Alexander, 1977); (Alexander, 1979); (Barker, 1992) (Fletcher, 1993); (Gamma, Helm, Johnson, & Vlissides, 1995; Isenberg, 1984); (Isenberg, 1987); (Manheim & Isenberg, 1987); (Schank & Abelson, 1977)] An overall process design is a pattern; the way a screen display for data input is constructed is a pattern; the way a customer service agent tries

alternative search patterns to query a database for information requested by a customer, is a pattern (more precisely, a pattern of patterns).

Patterns are templates. Sometimes, the patterns available to an individual will be fully-specified operational procedures. More often, the patterns will be templates, or frames, which an individual then operationalizes by creating an instance in the context of a particular situation and the information he/she has about that specific case and circumstances.

Patterns are implemented by individuals. Often, too, each individual will have unique, personal ways in which they tend to instantiate patterns. Put another way, there will usually be organizational template patterns, and individual template patterns, as resources; and the specific actions taken by an individual will utilize case-specific patterns derived from these templates.

Part of the repertory of patterns of the organization is patterns for developing and modifying patterns. For example, there need to be patterns for flagging when a process is not working, and needs to be reexamined. There also should be patterns for thinking creatively; for example, a pattern for initiating a „brainstorming“ session, or an „issue surfacing“ session. There need to be patterns for accepting criticism, initiating experiments („intrapreneurship,“ e.g.), for rewarding and recognizing risk-taking even when experiments are not successful, and so forth. Most importantly, there need to be metapatterns, patterns for dialoging about alternative patterns.

5.2 The links between patterns and groupware and workflow management systems

Patterns have many links to Groupware and Workflow Management Systems. (Manheim, 1995)

- Patterns for collaboration, dialog, debate and cooperation using groupware. For example, patterns for various forms of interactions are provided as templates in groupware systems such as Lotus Notes. Notes includes templates for: shared news databases, simple discussions, basic customer service or help desk applications, and other forms of processes. To use these, an individual (with the right access rights) takes a template and creates an instance of it. For example, any team member might have the capability to create a specialized discussion database among a specific set of individuals concerned with a particular set of issues; Notes powerful access control capability allows the application developer to provide different levels of access to different team members.
- Patterns for workflows: Workflow management systems require Workflow process designs, or process patterns, for their execution. Based on the nature of the task to be accomplished, a process pattern is selected and launched for each new instance of a task.

- Patterns for collaborative pattern development: The development, selection, and use of patterns, and their evolution, should be a dynamic and collaborative process. Groupware functionality supports the collaboration of users around the use of patterns. Every pattern is subject to discussion and debate; out of this dialectic process emerges revised patterns, or alternative patterns, which are richer and more powerful. A groupware component is essential for the dynamic management of knowledge when embodied in patterns. Every pattern library must have capabilities for mail, discussion, and possibly even Workflow. As appropriate, the development of new or revised or supplemental patterns might be managed with a structured Workflow. Thus, Workflow or groupware patterns are used to manage and support the evolution of patterns.
- Patterns for developing and maintaining interpersonal relationships, where those relationships are supported by groupware functionalities, including email, news, discussions, document repositories, workflows, and others. Thus, team leaders concerned with effective relationship management - building and maintaining effective relationships—will use patterns of team management that will be supported by patterns of use of appropriate information technology. For example, team leaders in a multi-organization partnership might consider adopting the pattern proposed by (Gabarro, 1990), with four phases of evolution of interpersonal relationships as a process pattern for building and maintaining effective working relationships. They might then choose a combination of email, and discussion, and Workflow patterns that would most effectively support and reinforce this process model.
- Patterns for knowledge management: The evolution of patterns in the pattern library is a form of learning and of knowledge management. Every organization needs to develop and use appropriate patterns to support learning and knowledge management in general, and especially about patterns. Groupware and Workflow components will be key elements of these processes, as discussed in the next section.

5.3 Theoretical foundations: Schemas as the cognitive bases of patterns

From a macro perspective, patterns are organizational processes. From a micro perspective, patterns are cognitive processes; the basis of individual patterns is cognitive. The role of patterns is as a guide to individual thought and action. Isenberg's studies of managerial effectiveness [(Isenberg, 1984), (Isenberg, 1987), (Isenberg, 1986), (Isenberg, 1986) (Manheim & Isenberg, 1987)] showed that effective general managers were effective precisely because they had libraries of mental patterns which they could execute effectively and efficiently, with little waste of mental energy.

Mental patterns are stored and retrieved as structures called **schemas**. (Manheim & Isenberg, 1987) showed the link of Isenberg's results to the concept of schemas [(Hastie, 1981; Pennington & Hastie, 1985; Rumelhart, 1985; Schank & Abelson, 1977)]. The skills of effective managers can be described as the ability to store a large variety of patterns, to retrieve appropriate patterns quickly, and to adapt patterns or invent new ones effectively as needed for novel situations.

5.4 Schemas and an IT architecture

These findings were used in the design of Symbiotic DSS and Personal Construct-based Action-support Systems (PCAS) (see below) [(Manheim, 1989); (Manheim, Srivastava, Vlahos, & Tseng, 1991)]. We now propose that schemas as cognitive constructs are key elements of an enterprise IT architecture, not just of support tools for individuals. We argue [(Manheim, 1995)] that the IT architecture should

- support the enriching of the variety of schemas which people can apply in their thinking and acting;
- support the rapid execution of previously-learned patterns, either as learned or as adapted in context;
- support the development of new patterns; and
- support the users use of a rich variety of support tools in the form of software modules or applications.

5.5 Cognitive Informatics

We define Cognitive Informatics (CI) as follows:

Cognitive Informatics is the use of knowledge about how people think and act to design information technology (IT) support that enhances the ways people think and act.

CI is a normative theory based on a descriptive theory: we must first have a valid theory that describes how people think and act (Manheim, 1996). Then, we ask, how can we enhance the ways people work? The answer is a normative theory, a set of propositions about what to provide in IT support (and other dimensions, such as organizational reinforcements) to enhance work.

CI is based on these principles:

- Schematic Basis of Thinking and Acting: Human thought and action is based substantially on the rapid execution of previously-learned patterns, either executed as learned or as modified in the process of execution. These patterns are stored in memory and activated. Mental patterns are termed schemas.
- Appropriate Software Support can Enhance Human Thinking and Acting: A variety of software tools can assist people in thinking and acting more effectively. Especially useful are tools based on the application of schemas.

6 Applying the CI Approach to Virtual Work Management

To apply the Cognitive Informatics approach, we analyze the ways in which people think and act. Out of this analysis, plus normative theories and insights, we develop a set of schemas, which are articulated as patterns. We then make these patterns available part of a software system for supporting effective work.

6.1 Patterns for Virtual Work Management

To summarize concepts presented in (Fritz & Manheim, 1998):

- We present an overall conceptual framework for managing virtual work
- Within this framework, we identify several key processes, including people management, work management, relationship management, knowledge management, and technology management.
- We illustrate the application of this framework by giving several lists of candidate actions to consider undertaking in a particular situation (see the tables in (Fritz & Manheim, 1998)).

These concepts provide the basis for a set of patterns, which can be applied, to managing VW. But what should the software support for applying these patterns be like? At the cognitive level, thinking and acting are based upon application of schemas as stored in memory (see Figure 1). At the level of the user working in a software-aided mode, thinking and acting are based on mental schemas as augmented by patterns stored in software (see Figure 2). To implement this, a number of key features are required in the software.

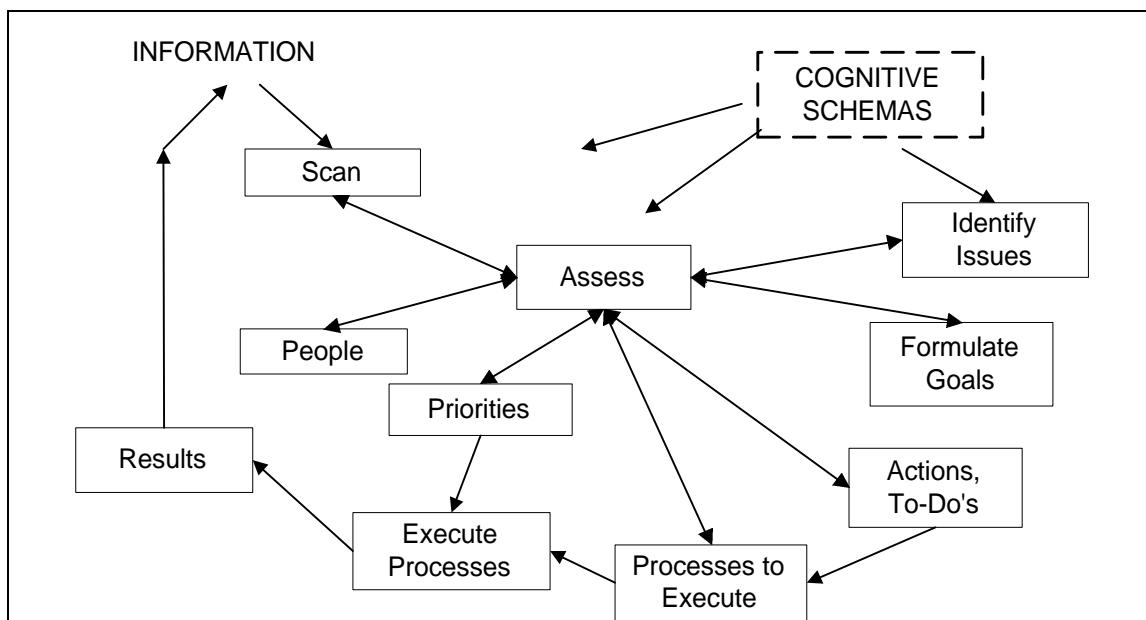


Figure 1: Mental Processing Based on Schemas

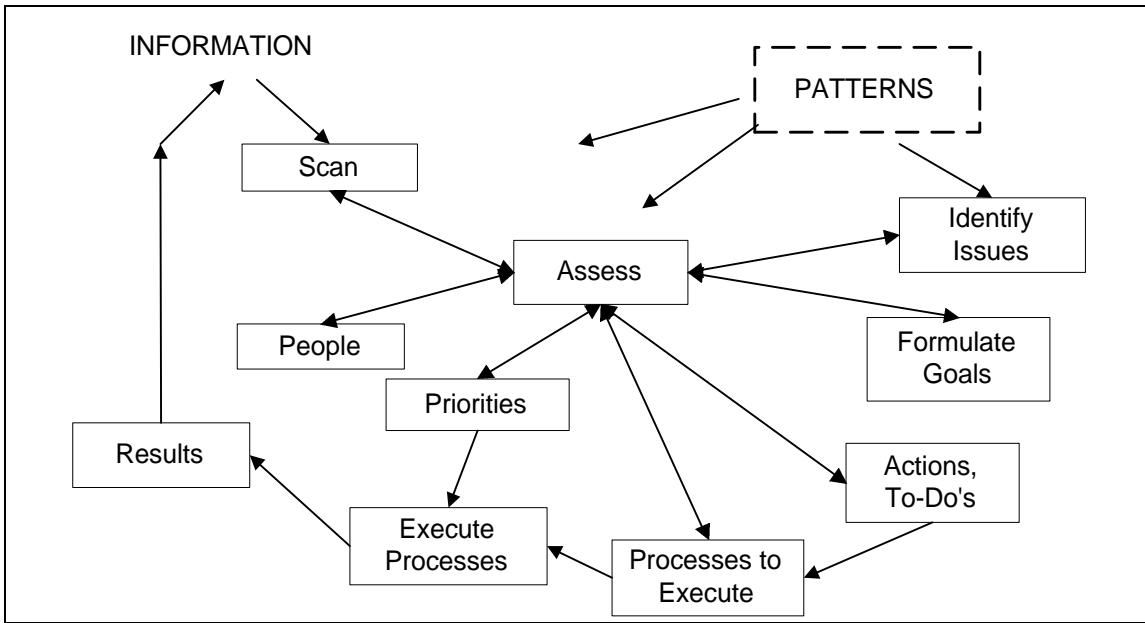


Figure 2: Computer-supported Processing Based on Patterns

6.2 Features of a Virtual Work Support System (VWSS)

A Virtual Work Support System (VWSS) (VWSS © 1998) should have these features (Manheim, 1995) [(Manheim, 1989; Manheim, 1996)].

- Provide support for the basic Individual Work Cycle Pattern: receiving new information, scanning it and assessing it, organizing priorities and to-do's, selecting processes to execute, executing processes and reviewing the results.
 - Provide a universal in-box for receiving all forms of information electronically: Email, workflow tasks, EDI messages, faxes, query results, etc.
 - Provide information-management support: support for managing a rich variety of information, including personal jottings, formal documents, email, workflow tasks, groupware-supported discussions, product design documents or other worktask-specific documents including multimedia, etc.
- Provide JAIGAP support: The key features of personal, action-focussed information are summarized in the JAIGAP pattern: Jottings, Areas of Concern, Issues, Goals, Actions, People.
 - Provide support for a personal note-taker („Jottings“): provide support for taking jottings and sorting, classifying them by personally-defined „Areas“ of interest, and viewing them. (Manheim, 1989)
 - Provide support for keeping track of Issues; of Goals and progress toward achieving them; of Actions, items on a personal „to-do“ list and a list of Actions to be accomplished by others; of People, including groups, teams and organizations.
 - The JAIGAP pattern provides an overall framework for managers and other participants in a virtual work setting. Managers in a VW situation will

regularly scan their electronic and non-electronic information, especially newly-received information in their Universal Mail Box. As they scan, they will make Jottings or notes for their own use, jotting down observations about the process and its current state, and jotting down insights, questions, concerns, etc.

- For example, the manager will identify a number of Issues in Relationship Management:
 - are relationships with key stakeholders okay, or are there emerging problems?
 - are relationships with a key customer beginning to be significant problems?
 - are there interpersonal frictions among key members of the VW team itself?
 - are there key stakeholders outside the team whose concerns need to be dealt with?
 - Is there a need for more Face-to-face interaction to overcome some of the communication problems that are beginning to surface within the team?
- Based on the identification of issues, concerns and opportunities, the manager will begin formulating possible Goals, and Actions to implement to pursue those goals. Lists of candidate actions, such as those provided in (Fritz & Manheim, 1998), are patterns for possible items to add to a „To-do“ list: for example, provide regularly-scheduled face-to-face meetings on a more frequent basis.
- Provide support for keeping track of personal schedules and other time commitments.
- Provide patterns for managing critical processes in VW (Fritz & Manheim, 1998):
 - relationship management patterns; knowledge management patterns; process management patterns; work management patterns
 - patterns for building and maintaining support of key stakeholders: Identification of key stakeholders; assessment of stakeholder views and concerns; identifying issues regarding stakeholder views and concerns; prioritizing goals and actions for managing stakeholders; preparing meeting agendas; actions to consider for resolving stakeholder concerns
 - patterns for managing collaboration tasks, using email, groupware, workflows, or face-to-face meetings or other events.
 - Patterns implemented as Workflows or as Groupware-supported processes (e.g. do opinion-polling on an issue);
- Provide each user with a rich library of patterns: The user acts by selecting and executing patterns and their associated processes.

- Provide flexible capabilities for the users to manage their personal libraries of patterns however they wish and to develop and modify patterns, personal or shared.
- Exploit patterns in existing software products:
 - Treat workflows as patterns; provide patterns for groupware and for other applications.
 - Package major software functionalities in modules to be used as pattern components.
- Enable patterns to be composed of other patterns.
- Support user-centered development and modification of patterns.

6.3 VWSS Implementations

We are experimenting with implementation of VWSS in several alternative environments. Some our pattern work involves use of Lotus Notes. These patterns can be applied as is by the user, or can be modified and evolved. One advantage of a platform like Notes with replication, mail, and discussion capabilities, is that patterns can be readily discussed, exchanged, and modified. Thus, this prototype also demonstrates the power of patterns as the basis of a knowledge-management architecture. We are also experimenting with Zoot, a shareware product (www.zootsoftware.com), and Trellix (www.trellix.com).

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A Cooperation Platform for Virtual Enterprises

Benno Suter

Abstract

This paper describes the main aspects of a reference model for developing a software system to support cooperation, designed to enable small and medium enterprises in the information technology (IT) sector to form virtual enterprises as quickly as possible and to manage them as efficiently as possible. Given that in the “real” world, the business level is inherently linked with the relationship level, in the virtual business world of cyberspace too sufficient attention should be paid to the building of social relationship structures to foster trust. The concept of the VEGA*¹ Business Community is then introduced; as a virtual sector forum, this forms an appropriate platform for initiating cooperative business activities.

1 Introduction

The growing demands of global and dynamic markets and the availability of new information technologies are having the effect of making small and medium enterprises (SMEs) drive forward the virtualization of the value chain, to an increasing degree, in order to maintain their own competitiveness (e.g. see Birchall & Lyons, 1995; Goldman et al., 1995; Grenier & Metes, 1995). So far however, there have been hardly any appropriate tools for providing holistic, integrated IT support for virtual structures, which, on the one hand recognize the heterogeneous context of the individual participants and, on the other, create a polyvalent whole in the sense of a complete functional organization. The aim of the VEGA* project is, accordingly, to develop a software system that will enable SMEs to set up and manage virtual enterprises as easily and quickly as possible (e.g. see Hirschmann & Scheer, 1997).

In order to identify an initial target sector, a pilot study was undertaken to investigate the potential in specific industries for improving the efficiency of cooperation processes using an Internet-based software system. For this purpose, some structured interviews were conducted with Swiss companies in a variety of dif-

¹VEGA* (Virtual Enterprise Generic Applications) is a joint project by the Universities of Lausanne (HEC INFORGE: Prof. A.-R. Probst, J.F. Bitschnau, R. Troillet) and Berne (Institute of Information Systems: Prof. J. Griese, B. Suter, K. Erben), the Swiss Federal Commission for Technology and Innovation and the main contractor Swisscom (Corporate Technology: M. Zweicker, G. Kaufmann).

ferent sectors, in order to investigate their ability and motivation to rapidly form virtual structures (Probst et al., 1997; Suter et al., 1998). Based on the results of this analysis of different sectors, the first choice fell on the IT industry, specifically on the businesses of consulting services, software engineering and system integration. In subsequent development stages, generic structural elements of this support system should be transferred to other industries. As part of this pilot study, a detailed analysis of business processes was also undertaken at the same time; together with findings of previous empirical studies on organizational, behavioral and functional requirements of virtual organizations (see Sieber, 1997; Probst & Sieber, 1997; Sieber, 1998), this analysis was used to establish principles for specifying a reference model. This involved identifying generic patterns within specific industry sectors, as well as generic patterns independent of an industry sector

This paper gives an overview of the VEGA* reference model and then focuses on the object, the purpose and services of the VEGA* Business Community, the actual platform for initiating cooperative business activities.

2 VEGA* reference model

The VEGA* software system is based on a multi-layer framework (figure 1), which enables individual system layers to be specified successively, in a top-down approach (Suter et al., 1998). The advantages of a layered framework lie in the reduced complexity, the hierarchical arrangement of terms and functions and the identification of interdependencies (Tanenbaum, 1989).

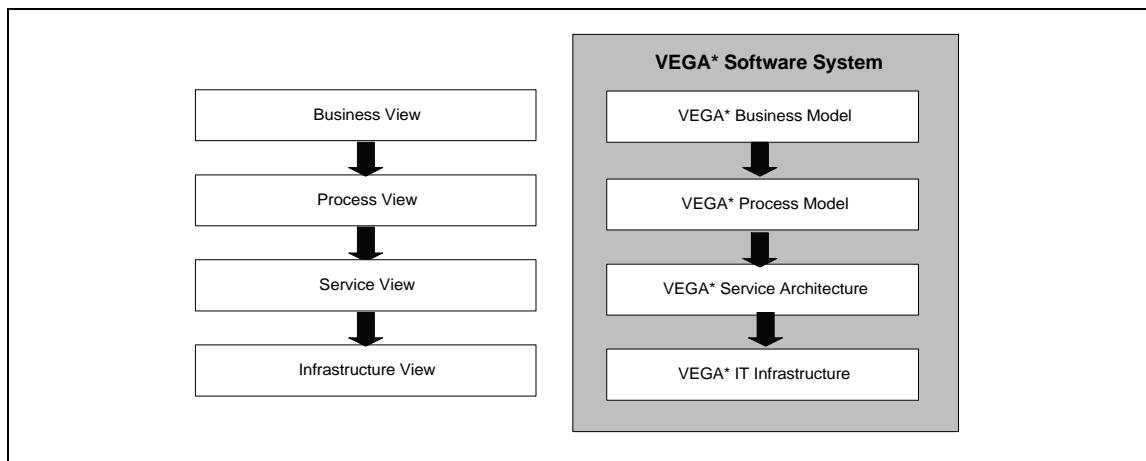


Figure 1: VEGA* system levels (adapted from Schmid & Lindemann, 1997)

The top layer (*business view*) deals with the system specification from the economic perspective, in the form of a business model, i.e. it specifies the purpose and the strategies of the VEGA* software system by defining organizational and cooperation rules for the players involved. Research findings of Sieber (1998) show that business networks generally act as a reference point for the flexible

creation of temporary virtual enterprises. According to the author, business networks emerge and evolve mainly through partners getting to know each other in the course of joint projects. He consequently interprets the term “business network” as the entire set of companies which come to mind when an entrepreneur is describing his action strategies. Therefore, the VEGA* business model is based on the concept of a dynamic business network (Snow et al., 1992), a largely informal pool of independent, specialist companies, subsets of which come together to form project-based virtual enterprises (e.g. see Davidow & Malone, 1992; Arnold et al., 1995; Hopland, 1995) in order either to satisfy existing customer needs or to exploit a market opportunity that has been identified. To handle an upcoming project, the necessary companies are initially recruited from the pool of partners and employed as subcontractors for the necessary tasks by the focal player in his role as general project manager. If the competencies needed are not represented in the partner network or if they are not of a sufficiently high quality, then external companies will be called in if need be (see Sieber, 1998). Thus the challenge when putting together temporary subsystems like this, for a specific objective, lies in achieving the optimum overall competence for the specific context (Best-of-Everything-Organization; Byrne, 1993).

From the business model, both at the strategic level of the business network and at the operative project level, the relevant cooperation processes are identified and integrated into a generic process model (*process view*). The structure of this model is based on the Malone & Crowston (1990) three-tier scheme, which shows the hierarchical relationship between communication, cooperation and coordination. According to this, communication is the fundamental prerequisite for cooperation activities, which in turn entail coordination activities, i.e. the allocation of cooperating subsystems to a functioning whole (Piepenburg, 1991) or according to Malone & Crowston (1990) “the act of managing interdependencies between activities”. This involves coordinating different, heterogeneous objectives and finding a common denominator. According to Sydow & Windeler (1994), this essentially involves coordination with reference to four basic management functions, i.e. selection, allocation, regulation and evaluation. At the strategic level of the business network, all partners are involved in the selection of new partners, the allocation of network resources, the regular economic evaluation of interorganizational relationships and the regulation of processes by establishing standards, formal mechanisms and automatisms (Sieber, 1998). At the operative project level, a focal player in his role as general project manager, selects suitable partners, allocates the project roles and regulates and evaluates activities which arise.

In order to provide continuous support for the identified communication and coordination processes, within the framework of a three-tier service architecture (*service view*), the components of the VEGA* software system are specified:

Operative closed user groups provide continuous support for business processes of project-based virtual enterprises. Appropriate project management tools (allocation, regulation & evaluation) form the core element of this component.

Strategic closed user groups support the integration processes necessary within in the context of business networks (allocation, regulation & evaluation). According to the business model, strategic closed user groups (business networks) generally form the starting point for the creation of operative closed user groups (virtual enterprises).

These two, logically deduced service components are embedded in the VEGA* Business Community. As a basic component, this forms an open forum for SMEs in the IT industry and consequently acts as a platform for initiating cooperative business activities as part of the defined closed user group services. An electronic company catalogue (selection) forms the core element of the community.

As the lowest layer, the IT infrastructure (*infrastructure view*) has to implement the requirements imposed in the business, process and service layer, using telecommunication and information technologies. This is done by applying three principles. The first principle is openness: open platforms (Internet) and standards (e.g. CORBA) should be used in order to offer the widest possible range of applications, cost-effectively and unproblematically. The second principle is that of modularity: integration into existing legacy systems and combination with new components and services, and maximum adaptability and expandability of existing services. The third objective is the principle of a distributed environment. All VEGA* components support communication and coordination in an environment which is both geographically dispersed and asynchronous (Suter et al., 1998).

3 VEGA* Business Community

3.1 Object and Purpose

In the conventional context of the “real” world, business activities are always rooted in the social environment of the players involved. If we consider the activity of face-to-face communication, the business level is always interlinked with the relationship level, which means that in addition to the actual exchange of information, time must also be invested in building social relationships, if the inherent demand of the business partners for trust is to be satisfied. By analogy with cooperative business activities in the “real” world, in the virtual business world of cyberspace too, there must be a certain socialization of the partners involved, aimed at building trust. Internet-based, virtual cooperations are however based primarily on technically mediated communication, which is fundamentally different in nature to conventional face-to-face communication. Thus, for example, text-mediated communication having by definition a limited ‘social presence’ (Short et al., 1976) may not express the entire spectrum of the direct interpersonal

exchange of information. The lack of information about the social context of potential business partners effectively removes trusted social cues (e.g. see Sproull & Kiesler, 1986; Culnan & Markus, 1987; Walther & Burgoon, 1992). The purpose in setting up the VEGA* Business Community as a basic service is to counteract this decontextualizing effect of cyberspace and thus be conducive to the initiation of cooperative business relationships.

Basically, virtual communities aggregate members, content, and member profiles. In the widest sense, these are social aggregations that emerge from the Internet when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships and build knowledge in cyberspace (Rheingold, 1994; Hagel & Armstrong, 1997). VEGA* takes the basic idea of virtual communities and transfers it to the business-to-business context. The resulting VEGA* Business Community as a shared, ubiquitous forum for potential cooperating partners in the IT sector, thus aims to achieve coherent integration of players in a business, of relevant content, resources and services as well as the necessary technology in a persistent virtual environment. Once a *critical mass* of members is reached, the resulting unique ‘information commons’ (Borman & Williams, 1996) create, on the one hand, transparency as to the pool of potential cooperating partners available and, on the other, results in an active take-up of the available community services. The attraction of the VEGA* Community can basically be defined as a function of the following three interdependent factors (see Hagel & Armstrong, 1997; Peppers & Rogers, 1997):

- Attractive content: The aggregation of member-generated content results in unique information sets once a critical mass of contributions is reached.
- Relationships: Personal relationships between the members strengthen mutual trust and loyalty. There is a consequent increase in willingness to participate actively and in mutual feedback processes.
- Member profiles: The availability of aggregated user data increases transparency about the spectrum of potential cooperative partners. User profiles also allow selective personalization of the service offering in a heterogeneous environment.

The interaction between members implicit in a high level of use of attractive community services makes it easier to establish social relationship structures (community networking) and as a result fosters trust, which is the basis for initiating cooperative business activities (figure 2).

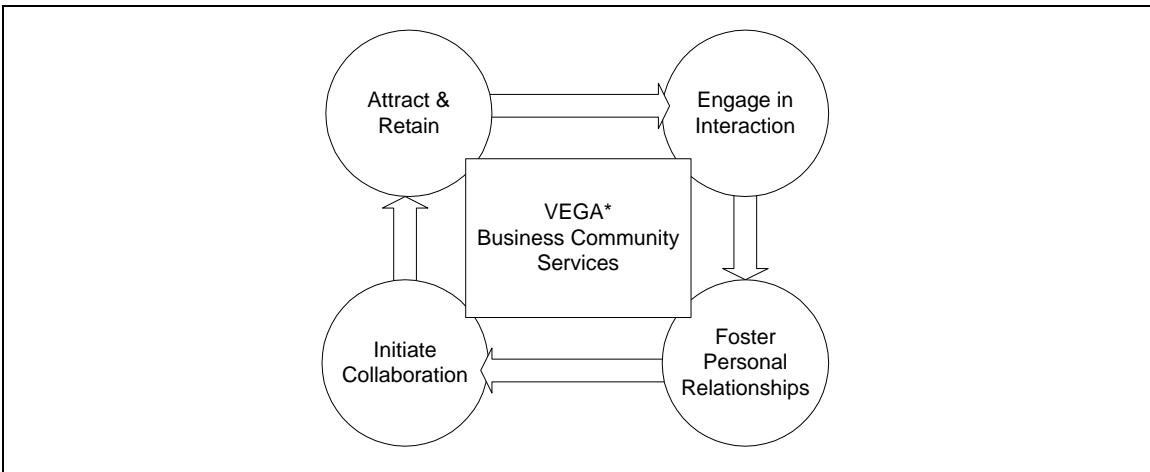


Figure 2: Interaction cycle of the VEGA* Business Community (adapted from Luedi, 1997)

3.2 Services

The core of the VEGA* Business Community is an electronic company catalogue, which supports the process of partner selection by means of mechanisms which mimic the marketplace. Use of this tool reduces selection costs on the one hand, and on the other supports the optimization of interorganizational value-adding processes, in that the increased market transparency means that a larger number of alternatives can be considered in any given situation. The company catalogue basically uses two methods for acquiring information on potential partners: based on an appropriate ontology which defines structure and terms, and how these are interrelated, for the semantic description of potential partner companies (see Gruber, 1995), people looking for information on available competencies and software products can obtain it by means of a pull mechanism, while a push mechanism enables requests for proposals to be invited, with potential business partners being asked to submit bids. In both cases, special functionalities are implemented to simplify the search process and the overall aim is to match supply and demand efficiently (e.g. see Keller, 1995).

The company catalogue is surrounded by information and communication tools which encourage interaction, e.g. discussion forums, news boards or a directory of members. In order to counteract decontextualization in the virtual business world, personal profile data (of the sort normally revealed in the course of face-to-face interactions) should also be accessible as part of indirect, Internet-based contacts. To achieve this, member-generated content always contains a reference to the *personal profile entry* in the community directory of members. This linking of business content with content which imparts identity, forms the basis for building trust and loyalty which is reinforced by the moderating of contributions and the establishing of text-based rules of behavior (business netiquette; see Pearce, 1996). The desired contextualization is given the added dimension of

service personalization through the use of agent technologies (see Peppers & Rogers, 1997; Luedi, 1997). The ability to configure personal agents means that customized content can be delivered automatically to users. It is thus possible, for example, to filter relevant contributions out of discussion forums or to list members with similar interests (professional and/or personal) from the directory of members, as potential business partners.

4 Conclusions and Perspectives

This paper described the main aspects of a four-layer reference model for developing a software system to support cooperation, designed to enable SMEs in the IT industry to form virtual enterprises as quickly as possible and to manage them as efficiently as possible. In the top layer (business view), business networks act as a reference point for the flexible creation of temporary virtual enterprises. The management functions identified as part of this business model, were then integrated into a generic process model (process view) and in order to provide IT support for this, the logically deduced services of the strategic and operative closed user groups and additionally the VEGA* Business Community were specified (service view). Finally, in the bottom layer (infrastructure view), the necessary communication infrastructure based on Lotus Notes/Domino™ was described.

Given that in the “real” world, the business level is inherently linked to the relationship level, in the virtual business world of cyberspace too sufficient attention should be paid to the building of social relationship structures to foster trust. Consequently, the VEGA* Business Community acts as a virtual information and communication environment for potential cooperating partners in the IT sector, combining the advantages of *both* worlds, in that it conveys the requisite, “real” social context of the members, relevant for relationships, while also retaining the low barriers to communication or increased opportunities for making contact which exist in cyberspace. The VEGA* Business Community thus forms an appropriate platform for forming Internet-supported business networks, the reference point for the creation of virtual enterprises. In other words, the socialization of potential business partners within the VEGA* Business Community is the preliminary phase, prior to integration of network partners by means of strategic closed user groups, the structural prerequisite for project-related collaboration on the basis of operative closed user groups.

The initial stage of the software system being developed will now be to implement the concept of the VEGA* Business Community and trial it in the IT industry. Through ongoing recording and evaluation of user behavior and of the aggregated profiles, together with personal questionnaires, the community services can be constantly adapted to reflect the findings. As well as modifying and refining existing specifications, the prototype will then be progressively extended to in-

clude the defined closed user group services, before the generic structural elements can finally be transferred to other sectors.

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The Management of Organisational Core Competencies

Sue Balint and Athanassios Kourouklis

Abstract

It is widely accepted that effective competence analysis and management are critical activities for achieving competitive advantage in a dynamic business environment. However, a detailed understanding of the issues associated with the identification and management of organisational competencies is still missing. This paper proposes an initial process for understanding the identification and management of organisational competencies. Competence-based theory relating virtual organisations is critically evaluated. The need for competence management tools is highlighted and a competence management process is proposed. The process contains four key activities namely: competence identification, competence development, competence leverage and competence protection.

1 Introduction

Throughout the last decade there has been a growing number of articles in both the academic and business press discussing how companies can compete successfully in a dynamic business environment. Although many of the prescriptions proposed differ significantly in their scope and detail, there appears to be a consensus emerging that effective competence analysis and management are critical activities for achieving competitive advantage in the current dynamic business environment. However, little attention has been paid to gaining a thorough understanding of the practical issues associated with the identification and management of organisational competencies.

The purpose of this paper is to examine these issues. Recent theoretical advances relating to the resource-based and competence-based view of the firm are briefly described. The applicability of each theory to a virtual organisation assessed. The need for competence management tools is highlighted and practical issues are discussed. A competence management process is proposed. The purpose of the process is to assist managers in the transition from a resource-based organisation to a competence-based one. The process identifies four key activities namely: competence identification, competence development, competence leverage and competence protection.

2 Competencies and the Virtual Enterprise

The capability of an organisation to build and leverage competencies to satisfy customer needs more quickly and at a lower cost than competitors is fundamental to business success. (Prahalad and Hamel, 1990; Amit and Schoemaker, 1993; Sanchez, Heene and Thomas, 1996). The virtual enterprise model provides a mechanism to facilitate this. Zimmermann (1997) defines a virtual enterprise as "a combination of best-of-class core competencies of co-operating and legally independent enterprises. They are coupled with the use of modern IT for the time until a certain business purpose is achieved and without considering enterprise or country boundaries. This is performed with hardly any institutionalised governance and control mechanisms". Therefore the creation of best of class core competencies is an essential prerequisite for participation in a virtual enterprise. However, anecdotal evidence suggests that current business theory does not adequately address the issues associated with the development and management of organisational capabilities in the current dynamic competitive environments.

The business functions, performed by organisations, are executed by using a bundle of competencies or capabilities of various kinds and supported by all sorts of resources or assets. Key competencies can be referred to as invisible assets (Itami, 1987), while (Prahalad and Hamel, 1990) have drawn attention to core competencies, the ones that have developed deep within the organisation over its history and explain its comparative and competitive advantages. These can be distinguished from shallow or common competencies, which are more tangible, codified and imitable in nature. These core competencies must be sustained and enhanced as the key to the organisation's future through accumulation of experience. Indeed, the organisation should shed as many of its non-core competencies as it can, in order to become lean and flexible. Thus the old strategy of vertical integration gets replaced by the new one of outsourcing, resulting in the formation of a virtual organisation.

Competencies can be combined in various ways, for example in different forms of alliances and long term contracts the extensive combinations of which result in networks as defined by (Miles and Snow 1986) and (Laubacher, Malone et al, 1997). To maintain effectiveness, such organisational forms require a balance between two catalytic forces, co-operation and competition. That balance should constitute a dynamic equilibrium over time to avoid constant tension between ideology and politics. Most of the time, preference lies with the co-operative pulling together of ideology contained by a healthy competition so that the virtual organisation can pursue its perspective with full vigour.

Within the context of the virtual organisation, it is essential for a firm to be able to identify its core competencies and to leverage them with core capabilities of other firms. This will allow a firm to compete and qualify for a place in the value

chain and to co-operate towards optimisation of emerging and created market opportunities. Competition for qualification suggests that there is a requirement for identification and development of core competencies where co-operation imposes their exploitation and leverage to maintain momentum.

3 Limitations of current business strategic thinking

Much of current strategy theory is based on the resource-based view of the firm (RBVF) (Penrose, 1959; Wernerfelt, 1984, Prahalad and Hamel, 1990). In the RBVF, the firm is seen as a bundle of tangible and intangible resources and tacit know-how that must be identified, selected and developed, and deployed to generate superior performance. However, RBVF theory assumes that the firm's resources are spread uniformly throughout the firm and does not contain any clear basis for identifying the effect that a particular resource has on the firm's performance (Penrose, 1959; Lippman and Rumelt, 1982; Wernerfelt, 1984; Mahoney and Pandian, 1992). This results in core competences can become core rigidities (Leonard-Barton, 1992; Burgelman, 1994; Barnett, Greve and Parks, 1994) or a competence trap (Levinthal and March, 1993) and that high productivity can only be achieved at the cost of decreased flexibility (Utterback and Abernathy, 1975). However, virtual enterprise theory requires companies to have flexibility in acquiring and deploying new resources effectively in changing circumstances. This represents a major restriction to the applicability of RBVF theory to the current, dynamic environment.

Sanchez also argues that:

- (1) RBVF has not yet addressed theoretically the influence of managerial cognition on resource development processes at the firm or industry level, nor the fundamental impact on the strategic value of firms' differing abilities in directing and co-ordinating the use of resources (1996).
- (2) RBVF does not adequately incorporate the „structural“ characteristics of dynamic markets increasingly have to do with intra- and inter-firm processes for creating knowledge and information assets (1993,1995).

4 Competence-based view of the firm

To address these limitations the competence-based view of the firm has been proposed (Sanchez, Heene and Thomas, 1996; Sanchez and Heene, 1996). Indeed, Sanchez and Heene (1997) argue that competence theory's attention to the organisational and cognitive processes of firms and industries constitutes a shift to „higher-order content variables“ that provide the theoretical means to move beyond the current limitations of industrial organisation and resource-based theories.

CBVF views the firm as a goal seeking open system in which interrelated tangi-

ble and intangible assets are organised under a firm's strategic logic for achieving its goals and co-ordinated by using various management processes for leveraging and building new competencies. The firm functions as an open system in that it must constantly replenish its stocks of tangible and intangible assets (including capabilities) through its interfaces with other firms and markets. Strategic change is motivated by managers' perceptions of strategic gaps between the perceived and desired states of assets and processes within the firm. Firms both compete and co-operate with other firms in efforts to obtain the resource flows and market responses needed to close the strategic gaps that motivate firm behaviour.

This model of a firm and its interactions with its environment extends the RBVF as a collection of asset stocks and flows (Dierickx and Cool, 1989) by explicitly recognising the critical effects of:

- (1) Managers' cognitions in determining a firm's capabilities
- (2) Managers' co-ordination abilities in deploying resources both within and outwith the firm.
- (3) Managers' abilities to support both organisational learning and effective knowledge management.

The model also provides a mechanism a framework for analysing how competencies can be developed and changed. Two distinct types of processes are defined; competence-building processes and competence-leveraging processes. Competence building processes are those processes within a firm designed to qualitatively change a firm's existing stock of assets and capabilities. Competence-leveraging processes are those processes that aim to apply existing competencies to current or new market opportunities in ways that do not require quantitative changes. Competencies are managed through feedback loops called control loops that provide the mechanism that enables managers to monitor and develop competencies by identifying strategic gaps in the firm's operations.

5 A Process for Competence Management

The concept of competence development and leverage is fundamental to the theory of virtual organisations. To become part of a virtual enterprise, a firm must be able to identify its core competencies and be able to leverage them with the core capabilities of other firms. However, current strategy formulation processes do not assist managers in these activities. These processes concentrate on analysing the external environment, trends in the market and customer requirements together with the expected actions of competitors. Strategies are then formulated to satisfy customer needs with current capabilities.

CBVF provides a theoretical framework to enable companies to develop and modify competencies in a managed proactive way. It does not ignore the need to analyse the external environment, but balances against it an inward looking perspective that requires companies to identify its core capabilities. Therefore an

additional competence management process needs to be incorporated within the strategic planning activity as shown in Figure 1.

This competence management process needs to assist managers not only in identifying current competencies but also assist them in identifying a wider range of future scenarios in which the firm could leverage these competencies.

It is proposed that the process needs to incorporate four activities

1. Competence Identification - In this activity, future competencies are identified by analysing future business scenarios
2. Competence Development - This activity is concerned with the acquiring and integrating the skills, knowledge and technologies to strengthen the companies current competencies
3. Competence Leveraging - This activity is concerned with the ability of a company to deploy its competencies not only in its own core products produced internally but also those resulting from alliances with other companies.
4. Competence Protection - To maintain competitive advantage, companies must actively protect their core competencies. This activity is concerned with developing plans to achieve this.

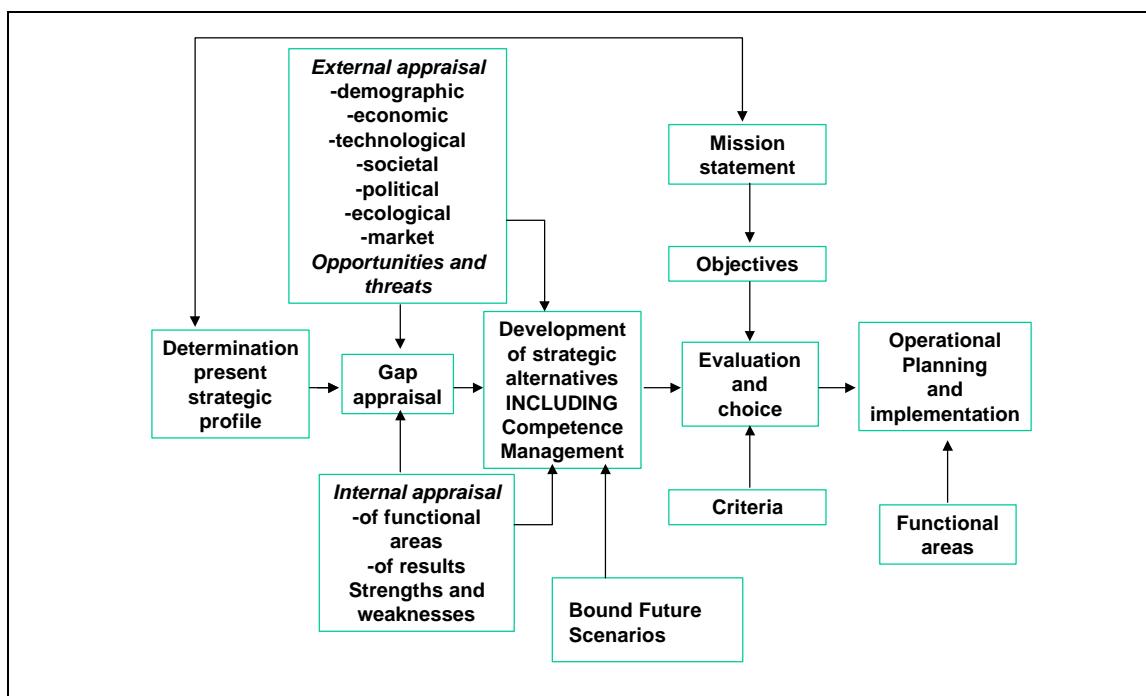


Figure 1: Proposed Strategic Planning Process

6 Conclusions

The concept of competence development and leverage is fundamental to the theory of virtual organisations. To become part of a virtual enterprise, a firm must be

able to identify its core competencies and be able to leverage them with the core capabilities of other firms. CBVF theory offers a theoretic framework that relates competencies to the performance of the firm. Research is now being undertaken to operationalise this theory. In particular a new strategy formulation process is required which incorporates the ideas of competence development and leverage in a dynamic environment.

In this paper an initial competence management process is proposed. The purpose of the process is to assist managers in the transition from a resource-based organisation to a competence-based one. The process identifies four key activities namely:

Competence Identification which is concerned with the identification of future competencies by analysing future business scenarios

Competence Development which is concerned with the acquiring and integrating the skills, knowledge and technologies to strengthen the companies current competencies

Competence Leveraging which is concerned with the ability of a company to deploy its competencies not only in its own core products produced internally but also those resulting from alliances with other companies.

Competence Protection which is concerned with the ability of a company to maintain competitive advantage by actively protecting their core competencies.

It is intended to use this initial framework as the basis for empirical research to investigate how companies manage their competencies in practice.

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Shared services in Accounting and Finance

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Abstract

The purpose of this paper is to present examples of the current state of the Shared Services Concept as applied to the finance function. The paper arises out of the ongoing research after current developments in the finance function enabled by information and communication technology, at the University of Twente.

The rapid developments in information and communication technology (leading to new ‘economics of information’) combined with developments in organisation theory, have far-reaching implications for the way activities are best organised (‘the new economics of organisation’). As a result, organisations are being restructured, and boundaries of organisations are shifting. These developments are captured by the powerful concept of the virtual organisation. As being argued by the authors, the Shared Service Concept could be understood as providing an answer to these new economics of organisation. As such, it is related to the more general concept underlying the virtual enterprise. The Shared Services Concept implies consolidating certain support services into a shared services centre. The relations of the shared services centre with business units is governed as much as possible by market conditions. After having explained the Shared Service Concept in general, the authors will focus on the way this concept is applied to the finance function. In the finance function, several examples exist of the Shared Services Concept. Such examples include accounting houses and in-house banks. For the next years, financial shared services can be expected to enjoy an increasing amount of attention.

1 Introduction

This paper discusses the application of the Shared Services Concept to the finance function. With information and communications technology (‘ICT’) as an enabling factor, organisations are reviewing the current structuring of their activities, in some cases finding that the most sensible thing to do is to outsource their non-core activities. To put the Shared Services Concept in a proper perspective, this paper also provides some theoretical and conceptual background. An enabling factor in helping companies reach corporate goals, ICT is the driving force behind a corporate rethink of core activities. Up to this point management has applied the Shared Services Concept to different sections, while it is increasingly focusing on its possible application in the finance function.

2 Current trends

Before elaborating on the Shared Services Concept, we would like to discuss some general trends concerned with the economics of organisation. However diverse these developments, we reckon that ICT plays a pivotal part in enabling all of them, with a redrawing of organisational boundaries a definite trend in business (BIR95). This arises out of the rather simple maxim that companies should do things they are good at (and should not do things they are less good at). Recent encouragement to define core competencies and make them point of focus has led to corporate restructuring. This encouragement to re-engineer and not just to fine-tune operations often results in more radical reorganisation than otherwise would be the case (TAY96).

The outsourcing of a growing number of support activities traditionally found within the boundaries of the firm is a very evident sign of corporate restructuring. While the boundaries between activities that can be outsourced and those that cannot are shifting in favour of outsourcing, the question is where the ultimate line between ‘outsourceable’ and ‘non-outsourceable’ activities will be found to be. ‘Because of technological developments non-core activities can be outsourced in ways not possible ten or even five years ago (BIR95)’. The whole concept of core competence basically tries to answer this truly essential question of which activities an enterprise should engage in, and in which it should not.

Although a much less visible way of restructuring, support activities within firms are also being subjected to massive overhauls, the aim of which is to attain economies of scale and scope, while avoiding particular drawbacks. Roughly speaking, such economies of scale are generated through changes in the organisational mix of centralisation, decentralisation and concentration / consolidation¹ of both decision-making and operations. As with outsourcing, the emphasis is on increasing the degree of specialisation, while duplication is eliminated to a large extent. Against this backdrop of increasing specialisation, outsourcing may be seen as just a special case of this specialisation trend; of ‘doing what you are good at’.

This redrawing of boundaries, both inside and outside firms, is captured by today’s influential trends such as the networked organisation and virtual enterprises (BIR95). As we have mentioned, we believe ICT underlies much of this restructuring. In short, ICT is changing the ‘economics of organisation’ in a number of ways. Traditionally, a distinction is made between activities that are carried out most economically through the market (i.e. co-ordination between firms), and activities that are carried out most economically by using hierarchical co-

¹ To avoid any misunderstanding: the authors mean with concentration / consolidation integration of activities on a more central level. In principle, this form of integration does not lead to centralisation of decision power. Rather, it leads to more co-ordination in the way operations are performed.

ordination mechanisms (i.e. co-ordination within firms). Shifts in cost structures attending the co-ordination of economic activity are likely to usher in a new equilibrium between market co-ordination and hierarchical co-ordination, compelling companies to redefine their boundaries in the process.

A number of authors observe that market forces have been replacing traditional ways of co-ordination within firms. As a matter of speech, the market is creeping in the firm, and is setting apart activities that were traditionally tied closely together. Ultimately, activities may be outsourced to an external entity, but there are many options in between. An internal market would be a possibility; for example, with activities outsourced to an internal entity within the structure of a holding. As we will explain later, the need to pursue certain activities ‘under one roof’ is taken away by ICT-enabled co-ordination possibilities.

Aside from the shift in favour of market forces, the nature of market co-ordination itself is also changing with the relationship between customers and suppliers growing closer. The paradox that presents itself here is that on the one hand market forces are replacing other co-ordination mechanisms, while on the other the market has incorporated some characteristics traditionally attributed to hierarchical co-ordination. This incorporation of characteristics traditionally attributed to hierarchical co-ordination in market relations is the subject of a recent article (EVA97), which discusses the ‘new economics of information’. Its authors argue that traditional economics of information implied a trade-off between ‘richness’ and ‘reach’. Coase and Williamson (COA35), (WIL75), point out that the boundaries of a corporation are set by the economics of exchanging information: organisations enable the exchange of rich information among a narrow, internal group; markets enable the exchange of thinner information among a larger, external group. The point at which one mode becomes less cost-effective than the other determines the boundaries of the organisation. According to the article, the trade-off between richness and reach that underlies the choice for co-ordination by organisation or by market, is now being blown up by the new economics of information. Its authors claim that this broken trade-off (that favours the replacement of internal co-ordination by market co-ordination) will cause existing value chains to unravel: ‘Existing value chains will fragment into multiple businesses, each of which will have its own sources of competitive advantage’.

3 Shared services centres

The general trend, then, is towards concentration / consolidation, specialisation and outsourcing, all of which lead to redefining boundaries both within and outside the firm. Falling in with these three trends, the ‘Shared Services Concept’ enjoys increasing popularity. Although the concept is easy to understand intuitively, capturing it in a definition is tough. We will however try to clarify its meaning by providing some definitions by other authors, and by listing aspects

we think are of particular importance. With shared services, traditionally separately executed activities are being brought together in one organisational entity (ULR96). Of course, this does not mean the activities are actually concentrated in any one place; IT allows wide freedom as to the choice of location (LES97). In this respect, the term ‘centre’ should be regarded as virtual: by certain forms of co-ordination, a certain degree of ‘commonality’ like standardisation of technologies and procedures, the transparent entity is - in certain respects - able to act as one centre. A shared services centre (‘SSC’) is based on the idea of sharing resources, organisational staff and technology, providing defined services (GUN93). The organisational entity can be part of the company it is providing services to, or part of a third organisation (outsourcing). The activities that are brought together in an SSC tend to be part of support functions, with the SSC in its purest form explicitly leaving actual decision-making to the business units. The relationship between the business unit and the SSC is governed by a service level agreement. On top of that, the SSC operates often on a fee-for-service basis. Dekker however states that a strict distinction between concentration of activities and decentralisation of SSC management is not feasible in practice (DEK95).

On the face of it, the following comment could be made of the Shared Services Concept: ‘Whether management theory really evolves, or simply goes through cycles of fashionable thinking such as centralised or decentralised, hierarchically accountable or matrixed teams is a topic separately worthy of consideration (TAY96)’. This quotation points up an important source of scepticism. Although we argued that shared services is as much about centralising as it is about specialisation, there is of course some truth in this assertion, which is to say that there is a distinct relationship between past centralisation/decentralisation trends and the Shared Services Concept. As the Peoplesoft report (PEO97) states, SSCs serve as a counterblast to the unbridled decentralisation of the 1980s, which in turn was a clear move away from traditional hierarchical, bureaucratic, centralised management. The emergence of the Shared Services Concept can be said to combine the best of both worlds (centralisation and decentralisation), without the drawbacks. In this sense, the Shared Services Concept represents a highly balanced way of thinking with a sensible trade-off as its main aim, while trying to avoid the undifferentiated prepossession of organisational paradigms of the past. In this respect, the concept is not new; it has been ‘recycled’ from older concepts. The following chart compares decentralisation and centralisation.

	<i>Advantages</i>	<i>Disadvantages</i>
Centralised	<ul style="list-style-type: none"> • Entities well integrated • Consistency among entities • Economies of scale 	<ul style="list-style-type: none"> • Bureaucratic • Remote from operations • Unresponsive
Decentralised	<ul style="list-style-type: none"> • Close to source • Answers to specialised needs • Responsive 	<ul style="list-style-type: none"> • Not cost-efficient • Redundancy • Disconnected from corporate goals

**Table: Comparison of centralisation and decentralisation of decision power
(source: (PEO97))**

Similarly, SSCs try to find an optimum equilibrium between standardisation and customisation in terms of procedures and systems. ‘A system flexible enough to build quirks into the standard can make the difference between a successful shared services initiative and an imposed bureaucracy (PEO97)’. The ever-increasing costs of ICT relative to other costs in support functions constitute a key driving force for greater co-ordination between divisions: by reducing the number of accounting systems from twenty to just one, for instance, a large company could cut down significantly on ICT spending and systems maintenance. Having said that, information systems are increasingly built to allow for a considerable degree of flexibility to meet the needs of different users. More and more, standardisation and flexibility can be combined in one system (harmonisation).

A distinction can be made between a ‘centre of expertise’ and a ‘centre of scale’. The latter handles routine administration, transactions, data processing, and procurement for economies of scale, efficiency, and workflow standardisation. A centre of expertise offers high value-added services to clients at competitive cost (PEO97). In practice, SSCs are nearly always a combination of the two types.

The Shared Services Concept seeks to bring commonality, cohesion, efficiency, expertise and strategic planning to the fulfilment of these service requirements (PEO97). Shared services have a dual value and cost focus: improved quality and extended scope add value while efficiency and economies of scale help cut costs (PEO97). The literature about SSCs generally lists the following advantages:

- Economies of scale, leading to reductions in the workforce and management as well as providing opportunities for further specialisation of staff. An increasingly important aspect is that the IT spend is more thinly spread (DEK95) (see above). Economies of scale will make it easier for the company to keep up with the fast trends in the IT industry.
- Quality improvement, due to a higher level of expertise, increased transparency, and because SSCs are easier to manage (personnel can be instructed more directly and activities are undertaken by fewer people) (DEK95).

- Client-supplier-relationships. Due to their emphasis on customer-friendliness, SSCs are more responsive to real business needs (ULR96).

In recent years many moves have been taken towards establishing SSCs. For every support activity included in Porter's Value Chain, examples of SSC-like applications can be found: in recruitment (IBM (ULR96)), in procurement (combined procurement), in sales (direct call centres), maintenance (particular lessors, company-wide maintenance services), customer services (in-bound call centres), logistics (logistic centres), and in the financial and administrative functions (emerging accounting houses, on which we will elaborate later). The sudden rise of the call centre as a major instrument in providing customer service illustrates how fast such a development of a new type of a shared services centre can be. Only a few years ago virtually no one had ever heard of such a service. The call centre also is a good example of the speed at which companies have grown accustomed to the idea of outsourcing a critical activity such as customer services. In this respect, this example takes the edge off the 'invincible resentments' currently surrounding the idea of outsourcing certain financial and accounting tasks.

In case of outsourcing the SSC -which is sometimes regarded as a second step after establishing an in-house SSC (DEL96)- some of the advantages of outsourcing in general could also apply:

- First of all, outsourcing makes it possible to cut back on assets and to remove the need for further investments. In an extreme form this is demonstrated by some young, fast growing enterprises in Silicon Valley. Existing of a core of only a few people, in a rented building, they buy almost every support service from specialised suppliers. In doing so, they have a turnover as high as a traditional medium-sized company, without having to make major investments.
- Changing more or less fixed costs into variable costs, thus reducing risk. A good example is provided by the 'serviced office'. A serviced office offers office space and meeting facilities to clients according to their varying needs. As it is put in the words of Birchall and Lyons: 'The organisation's office has thus become virtual; it is visible, yet the need to sink capital into it has been avoided and replaced with a variable cost (BIR95)'.
- Benefiting from economies of scale that could not be attainable otherwise. As an increasing number of companies outsources activities to an external entity that also provides the same kind of service to other companies, this entity can achieve considerable economies of scale and scope thanks to its large 'service pool'.
- Management attention can be focused on core activities.

We would like here to emphasise the importance of the two advantages of outsourcing that were mentioned first; cutting back on assets and changing costs

from fixed into variable. In our opinion these advantages will be an important rationale to outsourcing.

Depending on the situation, outsourcing has the following disadvantages (GRA96):

- Dependence on an external party. Switching costs can be very high. In case the insourcing party cannot meet the standards in terms of quality and costs of service, the outsourcing party could be confronted with high expenses.
- Disposal of confidential information. The insourcing party might be a competitor, or might have other interests in the information disposed. For example, a bank that sources in accounting processing, might use the information for its credit rating of the company.
- Loss of expertise. In a way, expertise which might have taken years to build up is wasted, and bought back from an external supplier.
- Co-ordination. Tuning the outsourced activity to core activities could be difficult in some cases.

The prevalent opinion on outsourcing is that core activities should not be outsourced. The problem of course is to determine which activities are core activities and which are not.

4 How the Shared Services Concept relates to the virtual organisation

As we already pointed out earlier, the concept of the virtual organisation and the Shared Services Concept are related to each other. On the one hand they originate from the same developments (changes in the economics of both information and organisation), while on the other hand introducing shared services is a way of effectuating an organisation that incorporates features of the concept of virtual organisation. These features include an ‘atomisation’ of traditional firms into more specialised and independent units, as well as an increased degree of co-ordination by market. There are some important differences between the concepts as well. The possibility of dynamic linking of resources being an essential feature of virtual organisation (WIG97), is in many cases not feasible in shared services applications. This is due to the generally high degree of interdependence between the provider of shared services and its suppliers over a longer period of time. This interdependence is caused by asset specificity (e.g. tailored software and expertise), high switching costs and a rather immature outsourcing market for services (implicating less alternatives). However it can be expected that the interdependency between the provider and the supplier of shared services will decrease (due to greater flexibility in ICT-applications and a maturation of the outsourcing market).

5 The Shared Services Concept applied to the finance function

Having described the general characteristics of an SSC, we will now discuss the implications of the Shared Services Concept for the finance function? First of all, are there some special characteristics to the finance function that affect the application of the Shared Services Concept? To answer this question, we will regard the SSC as a tool to cut costs by improving efficiency, and a tool to upgrade quality. To start with, the finance function is one of the (if not the) most resources consuming support functions within organisations. It is not exceptional for the costs of finance functions to add up to 1.5 per cent of total revenue (ROY95). Its relative and absolute importance in terms of costs incurred, make the finance function potentially one of the most rewarding areas for the Shared Services Concept.

Secondly, also if one looks at the potential quality improvements that could be made, the finance function seems to be a good candidate. Given the important role finance plays as a provider of management information and control, quality of finance is critical to overall business success. On top of that, the effectiveness and efficiency of financial and administrative processes within firms is being increasingly questioned. It is felt that administrative processes are unnecessarily complex, that too much emphasis is put on accuracy of reports instead of on their relevance, that too much time is spent on drawing up budgets and reports, that there is not enough attention for advising executives, that requests posed by management are not answered promptly, and that there is insufficient support for innovating the organisation (SCH95). Also, there are enormous differences among firms in expenses for standard accounting operations, such as accounts payable, accounts receivable, journal entries, etc. According to Gunn the best practice of 'Fortune 100' companies can often differ with the mean of the 'Fortune 100' companies by a factor ten for standard operations such as making an invoice, paying an invoice or making journal entries (GUN93). We are not totally convinced of the accuracy of these figures, but at least it gives a rough indication that there are major advantages in restructuring finance and accounting. According to AT Kearney management consultants, cost savings of between 35 and 40 percent could be achieved by introducing financial SSCs (QUE94).

Research also indicates that in traditional finance departments 65 per cent of the time is spent on transaction processing, while in restructured finance departments this is only 35 per cent, while the total time spent reduced by about 20 per cent. The extra time can be used for high value added activities such as reporting and auditing and decision support (KPMG94). The sheer scale of finance, combined with the relative importance of quality and the potential for upgrading quality and cutting costs, indeed makes finance a very likely candidate for SSC. At the same time, there are some obstacles in applying SCC. Given the important role finance

plays in providing pivotal management information, the opposition to consolidating and centrally streamlining certain tasks is accordingly high. If tasks for subsidiaries in various countries are performed on one location, staff is expected to meet much higher requirements. This is because of different currencies, different regulations (reporting, tax), different languages, and working with different cultures. It could be difficult to find a provider meeting the requirements of the outsourcing party (DEK95): the market for outsourcing finance and accounting activities is far from mature.

In practice, initiatives to establish some form of SSC in the finance and accounting field are numerous. As the field is in many respects rather dynamic, a clear overview of the initiatives is not easy to give. To create some order in the diversity, two basic forms are distinguished in practice: the accounting house ('AH'), and the in-house bank ('IHB'). The AH is primarily concerned with accounting activities, while the IHB puts emphasis on performing activities from a treasury perspective. However, as they are both dealing with activities comprised under the finance function there is considerable overlap between the two.

Besides these two categories, we would like to distinguish a third category: 'other forms of SSCs'. These forms are more fragmented, less integral arrangements, i.e. financial SSC initiatives that are not comprehensive solutions like the IHB or the AH. The latter comprises a diversity of SSC forms. We are aware that our 'taxonomy' is not fully accurate.

6 The role of banks

Traditionally, banks have played of course an incredibly important role in facilitating the finance function of organisations. As providers of financial infrastructure and as 'enablers' of both economies of scope and scale, in some respects they acted as an external SSC. Roughly, their core-capabilities could be found on fields of confidentiality, efficient transaction processing, and financial consulting. At first sight, these core-capabilities could be very useful to banks in providing financial shared services to organisations. As cited from a senior vice president of ABN AMRO: 'In fact, these (ed.: routine transaction processing) are much closer to a bank's core business and competencies than they are to most companies outside the financial service sector' (LES97). Likely as this may seem, on the other hand there are considerable psychological barriers to be overcome by both corporates and banks (ERP96). These barriers have to do with concerns of organisations about not giving banks too much insight in their businesses (they have interest in maintaining information asymmetries with their bank), and of too much dependency of a single bank. The banks on their behalf are questioning themselves whether offering these services is a logical step. A further complication is given by the fact that banks are limited in the functionality they can offer their clients by their legacy systems. We will elaborate on this later in this text.

7 Accounting house

The rather recent concept of an AH originated from the United States. In the US, the AH concept is practised on a much larger scale than in Europe (DEL96). The concept is being imported by U.S. multinationals to Europe to enhance efficiency of their European subsidiaries. Most of these initiatives are pan-European. ‘An AH is an independent service-unit, in which part of the finance function is concentrated. This unit performs (bulk) activities, in general processes on the field of financial and accounting, treasury and to a lesser extent processes associated with control (DEL96)’. AH are (primarily) directed towards efficiency and quality enhancement of transaction processing. The accounting house concept means that parts of the finance function are concentrated in a single service unit, carrying out bulk activities. ‘Characteristics of an accounting house are that only routine activities are involved and the services are enterprise-generic (KPMG96)’. The generality aspect KPMG adds to the AH concept, stresses the fact that there are possibilities of outsourcing to an external AH (the generality will make it possible to provide services to several firms with a limited number of adjustments).

The literature mentions the following benefits (on top of the general benefits attributed SSCs) with regard to establishing an AH:

- More uniform accounting procedures: This will lead to simplification, i.e. lower costs, to increased possibilities for comparing performance of different divisions, to lower auditing costs, and to lower information systems costs.
- Possibilities for future outsourcing of low value added activities: Transaction processing consists mainly of bulk processing activities having low added value. On top of that there are strong indications that these processes, like accounts payable and receivable, could be carried out at much lower costs by specialised parties (GUN93), (LES97).
- European Integration: In the advent of the introduction of the euro, and ongoing regulatory harmonisation, the opportunities for establishing an AH will grow.
- Increased possibilities for tax planning: By establishing SSCs in countries with relatively low taxes taxes can be evaded to some extent (KOS95).

To illustrate the AH concept we will present two recent examples of AH initiatives in the Netherlands.

Avery Dennison

Avery Dennison, which has its European headquarters in the Netherlands, operates in most European countries with twenty-four different administrative departments. The Shared Service department is set up for efficiency reasons, by means of standardisation and re-engineering of the administrative process. All European accounting functions are now centralised in the Netherlands. There is one general ledger system for all subsidiaries. Financial reporting based on the

European accounting standards and the FASB directives are possible. Also the inter-company bookkeeping between the different subsidiaries is changed. In the past the subsidiaries in the different countries invoiced each other. The sales offices act as agents of the factory. The customers get their invoices directly from the factory. The next step is the further development of a multi-currency centre. This Ireland-based centre co-ordinates the exchange risks for the local factories.

Shell

Shell is planning to outsource its internal accounting function. Shell set up a new company called Tasco ('The Accounting Service Company') with two shareholders Shell and the auditors Ernst & Young. This new company will not only offer financial and administrative services to Shell subsidiaries, but also to other companies.

We have derived some additional characteristics of the companies currently considering an AH. Some comments could be made about the scientific and methodological nature of our conclusions. However our objective is only to indicate a certain direction for further research. The population of the sample of examples of Shared Services and AH applications is too small, and, as said, no complete theoretical framework is available yet.

As an addition to these examples, we will conclude this paragraph with a short list of characteristics that seem to us typical of many companies setting up an AH.

Additional characteristics:

- Mainly multinational organisations, with an international flow of goods and materials.
- Most initiatives are in-house, outsourcing is hard due to immature outsourcing market.
- Most companies now adopting the concept are US or UK based.
- Adoption of the GAAP accounting standards.
- A more or less directive style of management.

8 In-house bank

Today, many companies are under pressure to cut costs as part of the drive to boost corporate earnings. In the treasury department, this usually implies reducing external financing costs, improving liquidity, lowering bank charges and minimising risk. To accomplish these diverse roles, companies are establishing IHBs to consolidate, manage and control their long- and short-term liquidity, as well as their risk position (WIE96). An IHB could be defined as 'the concentration of the treasury and banking activities of an organisation at holding level (REB95)'. The IHB acts as bank towards the subsidiaries; it provides services that would normally be delivered by a bank. The holding hedges the financial positions of the business units centrally. Mostly, market conditions prevail in the financial rela-

tionship between the IHB and business units. The concept of an IHB builds on recent technological advances in bank computing and communications, which have allowed companies to take advantage of efficiency generated by the banking industry (WIE96). There are an increasing number of standard applications that offer IHB functionality. Even more than an AH, an IHB essentially consists of an information system. The paradox of in-house banking is that it involves in-sourcing activities that were traditionally performed by banks, as well as new tasks that were not carried out before. In a way it can be regarded as a consequence of the failure of banks to meet the client demands; at first glance it would seem more logical that banks would perform the aggregation of certain accounts (e.g. cash pooling, zero balancing) and charge accordingly. Some answers to the question why this is not the case might be found in the inability of the legacy systems at banks to properly aggregate / consolidate on an enterprise level, rather than on account level. On top of that, providing such ‘consolidation functions’ is not in line with short-term interests of the bank; it would put pressure on their charges. However, it looks as though many banks are investigating the provision of IHB to their clients. We expect that in the medium term, the ‘out-house bank’ (‘virtual in-house bank’ (REB95)) will come into being. This service may be provided by banks, or by new entrants. Banks could circumvent problems with legacy systems by placing a system ‘in front’ of the legacy system that is capable of supplying the requested functionality. However, we do not expect that the IHB as it exists now within firms, will cease to exist.

The structure, size and nature of the internal operations of the IHB depends on the strategy and organisational philosophy of the organisation. In general, an IHB provides the following activities:

Operational level: financial payment transfers, foreign currency transactions, cash-management activities.

Corporate level: capital market transactions.

There are several additional advantages in setting up an IHB, such as:

- Lowering of banking costs, due to larger sales volumes and better bargaining clout.
- Lowering transaction costs, due to combining different transaction processes and better operation of the infrastructure.
- Improved use of different financial instruments.

A disadvantage of an IHB could be that the staff feels more like a banker than a corporate member. The future developments could be that the IHB not only delivers banking products to the business units but also acts as the front office for the administrative process. The IHB could easily develop into a virtual bank. For the customer of the (internal) IHB products it is not always clear who delivers the product, the external bank, or the IHB?

9 Other forms of financial SSCs

We have mentioned examples of two types of organisations; the AH and the IHB. These examples are the most evident forms of SSCs, but there are other organisational entities that are not as evident, but could still fall under the shared services umbrella. Examples are co-ordination centres, a factoring agent etc. These forms of SSCs are in general less reliant on ICT, and for that reason generally less innovative.

Treasury agent organisation ‘P2iV’

Five co-operative housing companies in the Netherlands outsourced some of their treasury activities to a new organisation, called ‘P2iV’ (KOS97). The companies have recently made some serious misses in the use of derivatives. One of the reasons for their blunders was the lack of specialised expertise of these sophisticated treasury products. The financial structure of the housing companies is such that they have large amounts of interest charges on their Profit & Loss Accounts. Interest rates are volatile by nature. It is worthwhile for a housing company to hedge the risk of unexpected interest rate movements. Due to their scale of operations housing companies are not in a position to attract and keep highly experienced treasury professionals. These five companies have solved this problem by expanding the scale of their treasury operations by outsourcing these activities to a new organisation operating on their behalf. Aside from being oriented towards capital market transactions, the activities are operational, such as cash-management tasks.

10 Conclusions / Future developments

The rapidly growing flow of publications about SSCs in connection with the finance function, the number of initiatives towards financial SSCs, and the fact that many consultancy and accounting firms are paying a lot of attention to financial SSCs, justifies the conclusion that the application of the Shared Services Concept will further develop. US firms are clearly ahead of the rest of the world, but the concept is now catching on in Europe very fast. We expect that restructuring of the finance function to the Shared Services Concept, will make entities more manageable, more standardised, and, consequently, easier to outsource. However, there will always be finance activities that should be performed in-house, whether for strategical, ‘safety’ and for economic reasons. In our opinion there is a ‘twilight zone’ between activities performed in-house and outsourced activities; there could be all kinds of arrangements in between (for example having shares in the external SSC, thus enabling some kind of influence). As is the case with the Shared Services Concept, which aims at having the best of both worlds when it comes to centralisation / decentralisation, it seems important to combine the best of both worlds when it comes to retaining activities within the firm and out-

sourcing as well. Once the concept has really proved its usefulness to finance, it can be expected to spread very fast. Because of the relative generality of much financial activities (e.g. certain accounting operations), usefulness of the concept to a few organisations, will imply some usefulness for other organisations as well. Also, the more generic activities will be the most likely candidates for undergoing some form of restructuring.

In our opinion the result of all this restructuring will inevitably be that the core activities of organisations will become much more distinct from the non-core activities.

Finally, we would like to remark that no comprehensive theoretical framework is available yet. Further research will be necessary. The research will stress the study of the contingency factors, i.e. which factors determine how financial activities will be structured with the organisation and between organisations).

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Electronic Software Distribution in a Virtual Software House

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Abstract

Internet has the potential to change many aspects of production and distribution of software products. The whole value chain from partner search over production to selling can be performed by using innovative information and communication technology. In this paper the concept and the technical platform of a Virtual Software House supporting electronic software distribution will be presented. The electronic market for software products should provide the first step towards a virtual software house supporting cooperative software production. In the paper first the motivation for establishing a software house is described, than the business and technical strategy of the commercial platform is described.

1 Introduction

Virtual Organizations (VO) are considered one of the most promising organizational structures in the information age [Arnold/Faisst/Härtling/Sieber 95, p. 1], [Scholz 97, p. 408]. Yet, to this date there is neither unique definition for VO [Arnold/Faisst/Härtling/Sieber 95] nor definite assessments of their legal and business aspects [Scholz 97, p. 368-370]. Despite this fact two characteristics of VO can be found in almost any definition or description of existing VO. These are (i) an innovative information and communication technology (IT) [Scholz 97, p.371] and (ii) a coordination broker [Arnold/Faisst/Härtling/Sieber 95, p. 9], [Mertens/Faisst, 95, p. 2].

Innovative IT is the necessary prerequisite, i.e. infrastructure, for VO. On the one hand IT makes virtualness possible by representing real world objects and concepts without the burden of their physical counterparts. On the other hand it makes information ubiquitous and enables cooperation over time and space. Thus it provides support for the coordination of activities previously thought to be too costly to synchronize.

The broker acts as an information broker and initiator of the VO. It coordinates the activities of the VO members through defining the business arrangements and their assignments, i.e. roles, as well as through moderating during operation of the VO. [Faisst 97, p. 4]. The broker also is the primary point of contact for customers of the VO [Arnold/Faisst/Härtling/Sieber 95, p.12-13]. As a primary point

of contact for external customers it can also provide mutual services in marketing and selling.

Extensive research is undertaken to determine the features and functionality of both essential parts of a VO. Concerning IT a focus on support for cooperation, management, and integration of the possibly heterogeneous systems of the member organizations can be observed [Faisst 1997], [Arnold 96], [Ott, Nastansky 97]. There is less concern and research about needed functionality of IT supporting the common appearance on the market and the performance of market transactions. The same can be observed in the area of research dedicated to the role and tasks of the broker. The main emphasize is on the tasks and activities of the broker related to partner search and coordination of the VO activities. Its role as a representative of the VO towards end-customers is less considered.

In this paper we will discuss the establishment of a common market place as a first step towards a virtual organization in the software branch. Thereby the example of Information Objects, a virtual software house (VSH) and a spin-off of the Institute for Media and Communications Management of the University of St. Gallen, will be used.

In section 2 the motivation for establishing the virtual software house Information Objects will be explained. Then in section 3 the business strategy of Information Objects will be described. Section 4 contains a short description of the current technical realization of the VSH. Finally in section 5 a summary and a short overview of future work is presented.

2 Motivation for Establishing a Virtual Software House

Internet as the currently available information highway has the potential to change all aspects of production and selling. An especially great impact can be observed on industries, which produce intangible goods as digital products. In such industries the whole value chain from finding potential partners with specialized know-how and communication with suppliers, over production, to sales and after sales activities can be performed by using information and communication technologies. All phases of the value chain can be supported without media breaks leading thus to greater efficiency and effectiveness [Hansen 96].

One branch, which could benefit from innovative information and communication technology is the software branch. The potentials of Internet are especially enforced by the trend in development of component software. Despite the obvious business opportunities of the mentioned potentials for the software branch, they are nowadays used in a limited manner. There are no published examples of already established VO, which aim the cooperative design and production of

software, as they can be found in other branches [see the examples in VO Arnold/Faisst/Härtling/Sieber 95, p. 8-10].

More activities can be observed in the area of after sales support and on-line distribution of software products. After a product is sold conventionally on CD-ROM, Internet serves at the present time mostly as a distribution channel for patches and bugfixes, on-line documentation and news groups. In addition major software producers like Microsoft, Lotus Notes and others [Clarke 98] have announced or already established platforms for on-line distribution of their products.

Especially small and medium sized software producers are not able to use the potentials of Internet. Comprehensive investments are still required for the establishment and maintenance of a platform for on-line distribution of software. In addition cooperation with possible partners is prevented by the insufficiency of currently available search engines and facilities on the Internet.

One possible solution for the problems of small and medium sized companies could be provided by intermediaries, which provide specialized meeting and selling platforms for software products. On the one hand, these platforms can serve the retailer as a means to present its assortment of goods. On the other hand, a model is imaginable in which the distributor makes his platform available to other software manufacturers for a service fee. First examples of intermediaries, which provide an electronic market place from different producers, can be observed. One such example is the electronic marketplace for Java components [Buxmann/ Rose/König 97]. Yet the available intermediaries focus on the selling process. Thus search facilities and management support is concentrated on isolated products. Less or no support is provided for presentation of the producers, for partner search and for cooperative design and production of software.

The required features as well as business and technical strategies for comprehensive intermediary platforms, which besides on-line distribution of software provide facilities for cooperative software design, are subject of research in the project "Virtual Software House", which is funded by the Swiss National Fonds. As a result of the project the concept and business plan for a virtual software house was developed as the base for a commercial platform, Information Objects. Information Objects is a spin-off of the Institute for Media and Communications Management at the University St. Gallen and will in the first stage offer an electronic market place for software and a virtual meeting place for software producers and buyers. It will also serve as a testbed for further research and development of technologies necessary for cooperative software design and implementation.

3 The Business Strategy of the Virtual Software House Information Objects

The vision with which the research project “Virtual Software House” started, was to define and realize a VSH, which is a coordination platform for the on-line support of the whole process of production and distribution of software. Yet different types of software products as well as implementation approaches for software can be distinguished. In order to determine the target processes and customers of a VSH we first conducted an extensive analysis of software products, the software production processes, and of producers and consumer needs. Based on the results of the performed analyses a short, mid and long-term business strategy and a business plan for the commercial platform Information Objects was defined. Following, the results of the analysis and the resulting business strategy will be presented.

3.1 Classification of Software Products

Software, in a broader sense, is a complex product consisting of two parts:

- The core software product in the narrow sense, which is available in form of source or executable code and is capable of performing some functions
- Additional services such as training and consulting as part of the product during selling as well as support for users as part of after sales customer care.

Software products in the narrow sense differ in size, amount of needed support, training and customization and in the way they are applicable by customers. Not all software types are suitable to be sold or produced via the Internet and not all require the same type of additional services. For example one cannot imagine procuring SAP R/3 on-line. Therefore, in order to determine the target products of a virtual software house an initial evaluation and classification of software products is required.

Using a categorization introduced by Lippold [Lippold, 96, p. 50], we differentiate between four types of software:

- **Type A:** Custom software, which is produced or adapted according to the functional requirements of firms. This type of software is often associated with a higher service requirement. The potential customer needs very specific information, which allows him to evaluate the software. Information obtained via the WWW will in many cases not be sufficient and specific enough. Most likely an additional communication medium such as video conferencing will be necessary. This would allow a potential customer with the assistance of a sales consultant to determine whether the software in question will fit into the existing system architecture and can be adapted to his requirements. In addition, firm-specific software applications require special and extensive training and support.

- **Type B:** This type of software is rarely adapted to the individual requirements of customers. It is designed for an open system architecture and can be adapted and programmed by the customer himself. As general rule, additional services are restricted to implementation and training. With this type, conventional marketing information can be passed on to the customer. For example, on-line demo versions and screen-shots could be supplied. One possible approach is that the buyer receives an on-line course and some hours of support or consulting.
- **Type C:** Software products of this type can be used without having to make modifications. They usually have integrated extensive self-explaining help, demos and training systems. This type of software applies to the mass market and can be found at retail stores. Examples of such software are games, and usually standard office packages.
- **Type D:** This is a relatively new type of software, namely component software such as Java Beans or ActiveX components. Components are not real applications, but can be combined with other software components to form an application. The development of components allows a focus on core competencies of software producers and is the most suitable production approach for virtual coordination and production.

Whereas the product in the narrow sense is predominantly of type C, the service component is most importance with type A software. This means, the more an application is positioned in the direction of type A, the greater the degree of customization and the less the suitability for on-line distribution. In contrast, software packages, which can be classified as type C, can be described as standard software.

The additional services are also suitable for online performance. Training, consulting, or support can be fully performed over Internet. Many software providers offer support via the Internet [Haertsch/Hauser 97]. For this purpose Email is predominately used. It is furthermore imaginable that online support is introduced in which desktop video conferencing or chat is used. Using a shared desktop, the person providing support could access the hard drive of the user's computer to help to solve the problem.

3.2 Production and Distribution Processes of Software Providers

Each software provider is involved in two main processes: i) software engineering and ii) software sales, each of which can be broken down into several sub-processes.

Software Engineering

Software engineering includes all activities, which involve the production of software. Software is either produced on request from a customer (custom software) or the provider creates an application, which can be distributed to many clients (standard software) and may entail slight modifications. In the first case a common project involving partners from the software producer and the customer is usually established. If specialized know-how from different software providers is necessary one of the partners performs the coordination tasks. In the second case the product idea and its realization stem from one software provider and are offered to possible users.

During the production process of software, products from other software providers can be used in two different ways. On the one hand software instruments such as CASE, project management tools or programming languages and environments are used to support software development and the management of the entire process. On the other hand software components or products can be used as part of the own product. Thereby the product from the other producer can be used or embedded in the own product with or without modification. In order to define interfaces and to perform adaptation of existing systems usually a cooperation between the involved software producers is defined. The cooperation can be based on a loose agreement or within a new joint organization. A special case of joint software production is the implementation of software components.

Software Marketing and Distribution

This process is concerned with making potential customers aware of the software and performing sales and delivery activities as well as after-sales customer care. Marketing and distribution of software is performed either by the software provider himself, by mass retailers, or through value-added resellers. Most software providers usually use all these distribution channels. At least every provider uses the first distribution channel, i.e. each provider has established an infrastructure to sell their products. The second distribution channel is appropriate for software products from type C, i.e. those which can be used in the same manner without modifications by a large amount of customers. The last distribution channel is used especially for software products of type A and B, which require extensive support and customizing activities before the customer can use them.

For all types of distribution channels one can find appropriate examples on the Internet [Hauser/Heartsch 97]. Many software producers have established on-line information and sales stores for their products. Examples of intermediaries, which perform the role of retailers, are also available. Such an intermediary is the already mentioned Java Repository. Value added resellers have also established information spaces aiming at the representation and offering of products and consulting services.

3.3 Survey of needs of potential customers of the Virtual Software House

To determine what market potential a VSH may have in Switzerland, the Institute for Media and Communications Management at the University of St. Gallen conducted a survey in Switzerland and Germany [Hauser/Heartsch/Lange 97]. In December 1996 and January 1997, questionnaires were sent to 196 potential customers and to 131 software providers that might be interested in the services of a VSH. Due to the relatively small sample size, both surveys are not statistically representative. However clear trends can be observed.

On the supplier side, the survey mainly involved small and medium-sized software manufacturers in Switzerland and Germany. The restriction to small and medium-sized enterprises (SMEs) was made, since this group of manufacturers is experiencing some problems with making themselves present on the WWW.

The questionnaire for the possible suppliers comprised 21 questions, with 7 questions being the same for both customers and suppliers. 50 software providers returned the questionnaire, which is a return rate of 26%. This high return rate illustrates a strong interest in the services of a virtual software house. 44% of the interviewed providers have already used Internet for software distribution, 48% of them for support, 33% for training and 33% for consulting. The majority of providers (82%) would accept strict guidelines from the VSH for the representation formats of products and services as well as 85,% would accept standardized guidelines concerning payment services. Interesting is the fact that there was no great interest for outsourcing activities such as product support, training, consulting or for coordination of activities concerning the development process through a VSH. Especially the composition of new products from the offerings by the VSH received a low interest of only 10%. The greatest interest was directed towards common marketing and sales services provided by the VSH.

In summary the survey showed, that software providers are not willing to leave the coordination of their core competence – software development - to the VSH. In order to support such processes a greater trust must be built up. Concerning payment modalities towards the VSH both commission and participation in income were considered to be appropriate by the majority of software producers.

There were also 31 answers (24% return rate) from potential customers. For customers a well-structured product catalog in their own language as part of the virtual software house is of importance. The plurality of customers finds a download time of less than 15 minutes and a demo run of less than 5 minutes acceptable.

Some of the common questions received divergent answers from suppliers and customers. Customers found facilities for the support of product comparison very helpful. The majority of suppliers were against such services, since they fear competitors. The fact that there is great interest from the customer's point of view

for online consulting and support is also interesting. Producers have less interest for online training and support since they fear to lose income.

Based on the evaluation of the questionnaires sent to the providers, it was possible to narrow down the boundaries of an output system for a potential software house. It is evident that software providers wish to predominately sell software along with consulting. Only a little more than half of the providers wanted to make support and training available via the Internet. This is surprising since most of the small and medium software providers develop and sell custom software. In this market segment, training and support is very important as described before and should be a lucrative business. Since the software providers do not want to or cannot supply these services, it is imaginable that a third party will fill this market niche.

Fundamentally, it can be concluded from the responses of both parties that the concept of a VSH could be successful [Hauser/Haertsch/Lange 97]. The challenge lies in finding a common denominator of services, which is accepted by both the customer and provider so that both parties would use such an institution.

3.4 The business strategy of the Virtual Software House

Based on the results from the surveys and analyses the business strategy of the virtual software house was defined. It was clear that it would not be possible to realize the initial vision from the start. Instead, a stepwise approach towards achieving the vision was adopted, by starting with a common market place in the short term and adding further functionality in the long term. Thus, the commercial platform was set up as an intermediary market place, which provides an integrated support for online distribution of software, preferably of type B, C, and at a later stage of type D. A major responsibility of the VSH would be to ensure that the sold software is of high quality and that the providers of the promised services actually keep their word. The VSH also provides a central, virtual meeting and information space for producers and consumers of software products.

Besides online distribution of software the VSH will, in the short term, also introduce in a test phase online consulting. This service is particularly important for custom software and also the technological base for online training and support. Within the VSH, such services will be supported by desktop video conferencing. An example of this is the consulting firm BIW (URL=<http://www.biw-ag.de>). The customer will be offered facilities to bundle offered software with consulting services.

The VSH will finance itself predominately through the presence of providers. A realistic means of payment is via subscriptions and based on a commission. A combination of these two approaches will be applied. As an additional source of revenue advertising will be used.

In the medium term it is planned to add functionality necessary for the support of online integration of software components to applications. After the initial testing phase of on-line consulting it is planned to include such services permanently in the VSH.

In the long term the VSH should be enhanced with additional technical support necessary for cooperative software design and implementation such as facilities for partner search and project management. One possible way to achieve this is by cooperation with other intermediaries specialized for that type of services. In addition further value-adding services, forcing community building like discussion groups and know-how knowledge bases, should be introduced.

4 Architecture and Technical Realization of the Virtual Software House

As mentioned above the first step towards achieving the vision of a virtual software house was to establish a broker, who will offer a platform, i.e. a common virtual marketplace for the online distribution of software. The platform will be open for software suppliers in order to share marketing and distribution costs.

As a next step an appropriate platform had to be developed. In order to achieve this first the necessary scope of functionality for integrated support of online software distribution was determined. As a bases for that served the reference model for electronic markets (RM-EM) developed by the Institute for Media and Communications Management at the university of St. Gallen [Schmid/Lindemann 98]. The RM-EM provides a framework, i.e. a meta-model of business and IT aspects of electronic markets. It provides on the meta-level an overview of both necessary functionality to provide integrated support for market transactions and of the needed IT infrastructure. Based on the meta-model the necessary scope of functionality of an electronic market for software was determined and a specific software architecture was designed and implemented. Following both achievements will be presented.

4.1 Necessary Scope of Functionality for Integrated Online Distribution of Software

Before a product is definitely sold to a customer several activities are performed on the suppliers and buyers side as for example searching for products, evaluation of customers or payment. The goal of such activities is to initiate, arrange and complete a contractual agreement for exchange of goods and services in the most efficient manner.

According to the reference model market activities can be grouped in three inter-related phases each representing a specific status reached during the process of selling and buying goods and services. The tree market phases are [Schmid/ Lin-

demann 98]: the information phase, the negotiation phase and the settlement phase. In the information phase suppliers and buyers acquire a market overview by exchanging information on themselves, the products as well as on selling and payment conditions. The information phase results in an offer. In case an offer is accepted, then the agreement phase starts. In this phase the concrete sales and delivery conditions are negotiated between supplier and customer and are layered down in a contract. In the settlement phase the agreed upon contract is fulfilled.

Depending on the specific goods or services that are traded online, the three phases may consist of varying activities. In case of software products the three phases have the following specific features:

In the information phase, the buyer evaluates offered software products, which will fit his needs. This can be performed by searching in electronic product catalogs or combined with intensive consulting and contacts with the seller when software of type A and B is involved. Within an electronic market place consulting can also be supported online by video conferencing or application sharing. In many cases potential buyers are sent or can interactively try a demonstration version to see if software meets the requirements. In order to initiate and support the activities of customers in the information phase suppliers try to represent products in appealing manner. In addition they collect information about the solvability of possible buyers.

In the agreement phase the specific selling conditions as payment or delivery modalities (for example download or pay-per-use) are negotiated. They can be offered for selection as part of an electronic product catalog. After signing a contract or purchase order, settlement takes place. In case of online software distribution this means that the user downloads the purchased program onto his computer or is provided access to online use of components. The download of software should be coordinated with payment activities. Thus in the settlement phase most of the changes will take place compared with conventional software sales. On the one hand, it has to be ensured that software can only be accessed after payment has been received while on the other hand, payment and distribution of software must be carried out securely. Diverse companies have specialized in the development of applications which allow for a secure transfer of activation keys. An overview of these systems is provided by the Software Publishers Association [SPA, 97].

4.2 The Architecture of the Virtual Software House

The RM-EM proposes a generic architecture for electronic markets (c.f. 1).

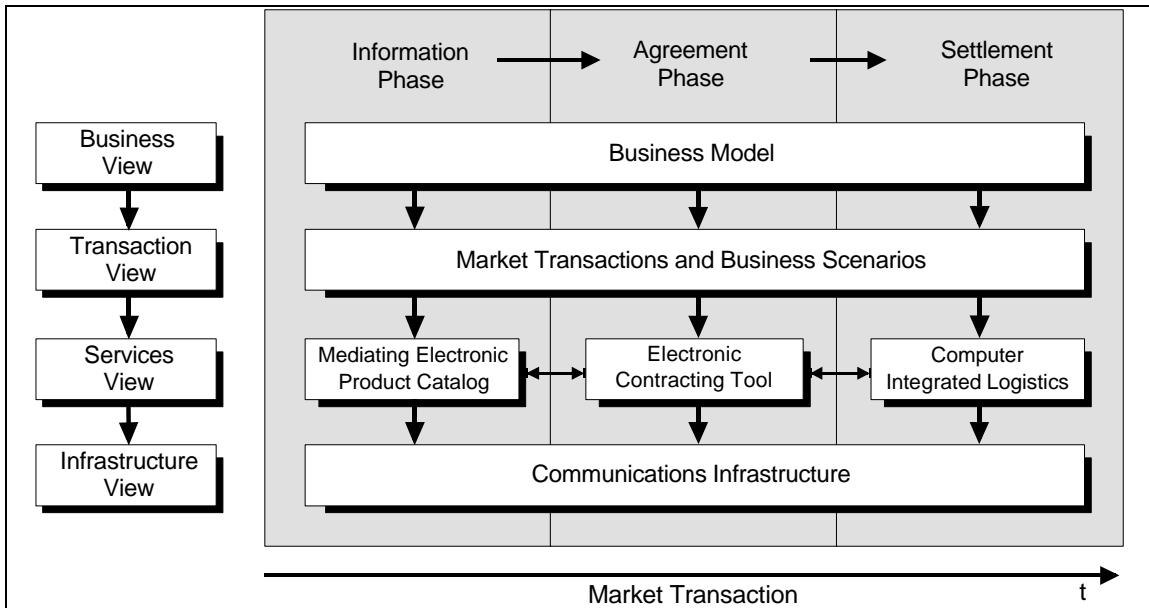


Figure 1: Reference Model of Electronic Markets [Schmid/Lindemann 98]

Each phase is supported by a specific tool providing an appropriate functionality and dedicated interfaces to other components of the integrated solution. At the lowest level there is basic support for coordination of communication and data services.

As the features of goods and services offered online vary and require different types of market transactions respectively different tools are required for the support of the market transactions in different types of markets. As there are already comprehensive merchant solutions on the market providing integrated support for the launching of electronic markets the following strategy was applied in determining the appropriate tools:

- to use as much as possible already established technologies for electronic commerce,
- to enhance standard solutions with additional specific tools on by applying the “plug-and-play” principle.

As a result first an extensive evaluation of existing merchant solutions was conducted [Lincke/Haertsch/Hoffmann/Lindemann 97]. The Microsoft Site Server Enterprise Edition merchant server was chosen as the appropriate solution [Lincke/Haertsch/Hoffmann/Lindemann 97, p.38-45]. For aspects where it does not provide sufficient functionality addition tools were integrated into the basic infrastructure. The Microsoft Merchant Server provides a transparent solution for basic communication and database services. The core of the system is a relational

database used to store information about suppliers, products and market transaction. Based on the general services of the merchant server an intelligent electronic catalog was developed providing more sophisticated search facilities [Handschat/Schmid/Stanoevska-Slabeva 97]. The catalogue is the entrance point for customers to the market. It can be used for search of companies, products as well as consulting services. For the operator the electronic product catalogue offers convenient support for classification of suppliers and products.

Contracting is currently supported by issuing standard contracts in which the name of the customer and the supplier is introduced. Settlement is on the one hand provided by secure download facilities and electronic payment by using Secure Electronic Transaction (SET) [Himmelsbach/Runge/Schuibert/Zimmermann 96]. The payment system is implemented in cooperation with the Electronic Mall Bodensee.

5 Summary and Further Work

The virtual software house in its current implementation provides a platform for sharing market related services for enterprises from the software branch. In addition it provides a virtual meeting place and a common information space for companies from this branch. With this features it meets only some of the features stressed by definitions of VO [Arnold/Faisst/Härtling/Sieber 95]. It provides the first step towards a VSH, which supports the whole value chain of software production. In order to achieve and realize the vision further research will be conducted in the direction of including component software and the production of software from components.

The way taken by the virtual software house is the opposite one described in several papers where existing organizations evolve to VO through outsourcing and lean management [Arnold/Faisst/Härtling/Sieber 95], by first establishing a simple meeting and sharing platform for online distribution of software.

The commercial platform will be launched in Mai 1997. It is planned to perform extensive empirical research concerning suppliers and customers satisfaction.

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Lessons From Managerial Theories for Improving Virtualness in Electronic Business

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Abstract

Electronic business and virtual organisations are important research topics in the IS research community today. At the same time these research topics are very appropriate for interdisciplinary research. The panel aims:

- presentation of lessons from managerial theories for improving organisational virtualness;
- exploration possibilities for interdisciplinary oriented research forum of the phenomenon virtual organisations in electronic business.

Chapter 1 discusses electronic business and the role of information and communication technology (ICT) in changing fundamentally electronic business transaction patterns between economic actors. New intra- and inter-organisational structures are emerging, known under labels like virtual organisation, virtualisation and organisational virtualness. These emergent virtual organisational structures will be considered as a challenge for (continuous) transformation. Chapter 2 gives an overview of the panel presentations of different approaches of change (management) found in managerial literature and their lessons for virtual organisations. Lessons are presented from strategic choice led, improvisation or market led, network interaction led, stakeholders led and evolutionary stage led concepts of change.

1 Introduction: Organizational Virtualness and Electronic Business

Arien Wassenaar

1.1 Objective and Structure of the Paper

Electronic business and virtual organisations are important research topics in the IS research community today. At the same time these research topics are very appropriate for interdisciplinary research. The panel aims:

- presentation of lessons from managerial theories for improving organisational virtualness;

- exploration possibilities for interdisciplinary oriented research forum of the phenomenon virtual organisations in electronic business.

Chapter 1 discusses electronic business and the role of information and communication technology (ICT) in changing fundamentally electronic business transaction patterns between economic actors. New intra- and inter-organisational structures are emerging, known under labels like virtual organisation, virtualisation and organisational virtualness. These emergent virtual organisational structures will be considered as a challenge for (continuous) transformation. Chapter 2 gives an overview of the panel presentations of different approaches of change (management) found in managerial literature and their lessons for virtual organisations. Lessons are presented from strategic choice led, improvisation or market led, network interaction led, stakeholders led and evolutionary stage led concepts of change.

1.2 Definition of Electronic Business

Electronic business is in this paper considered as a general comprehensive term and is defined based on Wigand, Picot and Reichwald (1997) and Wassenaar and Swagerman (1998) as:

„application of information and communication technology to enhance or redefine any form of resource exchange between firms and their customers, suppliers or other business partners governed by dedicated intra- and inter-organisational structures and general (inter)national agreed institutional arrangements“.

The bandwidth of electronic business spans from inter-organisational systems like electronic trading to intra-organisational applications like accounting houses. It covers different specific processes of information exchange in the area of commercial ordering, physical (production and) logistics and financial logistics. There is a large variety of forms and terms like Electronic trading, Electronic commerce (Kalakota and Whinston 1997), Electronic shopping (Baty and Lee, 1995) Electronic markets and electronic hierarchies (Malone, Yates and Benjamin, 1987; Bakos, 1991) Electronic payment (Holland, e.o., 1995) Electronic logistics and electronic procurement (Brenner and Hamm, 1996) and financial logistics (Swagerman and Wassenaar, 1998).

1.3 ICT enabled business transaction patterns and organisational virtualness

In the 90's firms are facing new developments like globalisation, economical, political and technical unpredictability, world-wide competition and co-operation on the market place, mass customisation and customer demands for shortening time to market (Gartner, 1991). Companies have to improve their responsiveness (flexibility) on global markets. Electronic business enforces —by introducing quite new business transaction patterns between firms and their partners— an

ongoing reshaping of intra- and inter-organisational structures. At one side, organisations are internally broken up in small self-containing business units co-ordinated by quasi-horizontal market mechanisms. On the other hand, organisations are externally integrated in an interdependent network co-ordinated by quasi-vertical hierarchical mechanisms. These new emergent intra- and inter-organisational forms are described in literature under labels like network organisation (Miles and Snow, 1986), intelligent enterprise (Quinn, 1992), associations (Wassenaar, 1995), virtual value chains (Benjamin and Wigand, 1995), virtual organisation (Sieber, 1996), and electronic markets and electronic hierarchies (Malone e.o. 1997). Virtual organisations will be considered as continuous transforming intra- and inter-organisational structures embedding and controlling communication processes within and between companies consisting on a portfolio of vertical and horizontal co-ordination mechanisms for governance of new electronic business transaction patterns. Structures are considered as conditions and constraints embedding processes.

1.4 Organisational Virtualness

These new virtual organisational forms —shaping fundamental changes in the commercial, physical and financial processes and their underlying information and communication processes— are enabled by new ICT applications. Especially, ICT enlarges the range and reach of information exchange between economical actors by a standardised technical ICT infrastructure facilitating new forms of communication in commercial, physical and financial logistic processes that support electronic business transaction pattern within and between companies (Keen, 1991).

1. The (intra- and inter-organisational) commercial process patterns, like identifying trade partners and negotiating contracts, have to be redesigned by implementation of telecommunications networks together with multimedia facilities for enhanced product presentation and specification, like Internet and World Wide Web. New concepts like Efficient Consumer Response (ECR) (Coopers and Lybrand, 1996), Electronic commerce (Kalakota and Whinston 1997) and Electronic markets (Bakos, 1991) can be realised. There is a shift from physical markets and value chains (place) to electronic or virtual markets and virtual value chains (space) (Rayport and Sviokla, 1995).
2. The (intra- and inter-organisational) physical production and logistic processes like distributing, transport and warehousing are becoming reengineered by a new breed of standard software packages like Enterprise Resource Planning (ERP) and Operating Resource Management Systems (ORMS). This software together with the breakthrough of Internet's open standards and a new breed of information brokers has given the way to the virtual factory: a community of dozens, if not hundreds of factories each focused on what it does best, all linked by elec-

tronic networks that would enable them to operate as one-flexible-and-inexpensive regardless of their locations.

3.The (intra- and inter-organisational) financial logistic processes —reflecting the money or fund flow in combination with the flow of goods and services— are becoming more and more tightly integrated. Banks will no longer be able to generate interest-based revenues and they will in the future charge only on the volume of transactions, as the trend towards just-in-time money develops (Holland et al 1995). Virtual banks will emerge just like virtual factories (Swagerman and Wassenaar, 1998).

Basically, organisational virtualness is the responsiveness of intra- and inter-organisational structures on new (electronic) business developments determined by the interdependency of four elements:

1. opportunities for new electronic business network transaction patterns;
- contracted in virtual markets and value chains (electronic commerce);
- produced in virtual factories (electronic physical logistics);
- accounted in virtual banks (electronic financial logistics);
2. enabling portfolio of ICT applications;
3. controlling and integrating ability of electronic business management
4. intra- and inter-organisational structures seen as conditions and constraints.

1.5 Improving Organisational Virtualness as a Challenge of Change

(Continuous) transformation and adaptation of intra- and inter organisational structures are needed in order to facilitate over time new electronic business transactions patterns and the belonging commercial, physical logistics and financial logistic process patterns and their underlying communication processes enabled by emergent ICT capabilities. Management science is a source of interdisciplinary approaches to electronic business problems (e.g. Gebauer, 1996). Therefore we will review different approaches of change (management) in managerial theories and summarise their lessons for improving organisational virtualness of intra- and inter-organisational structures.

The following managerial theories will be discussed:

- strategic choice led theories
- improvisation or market led theories
- network interaction led theories
- stakeholder led theories
- evolutionary stage led theories

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2 Lessons from Strategic Choice Led Theories

Arien Wassenaar

No single issue has so dominated the attention of top managers, consultants and management theorist as the subject of corporate strategy. In a vast outpouring of writing on the subject during the last forty years management theorists have come up with many alternative views. Soon after the second world war, when a new class of professional managers began to start for ideas about how to run big companies the original view of strategy was borrowed from the military. Baron von Clausewitz writing his classic work "On War" for the German General Staff stated that the most effective general concentrates his forces on the few significant battles. Managers still talk about attacking markets and defeating rivals.

By the sixties corporate strategy had come to mean a complex plan based on detailed forecasts of economy and specific markets. This approach to strategy fell into disrepute during the 1970's. The two sudden oil price rises also meant that many firms had to tear up their plans and start again. However, this is not to say that forecasting is useless in a world of rapidly changing technology. Forecasting can be useful but only in certain ways -not as a driver of strategy.

Then in 1980's Porter launched his book "Competitive strategy". The structural analysis of industries instead of being a specialised planning tool for forecasting evolution over considerable periods becomes useful as a capability to quickly understand the continuously evolving nature of the industry. He argued that a firm's profitability was determined by the characteristics of its industry and the firms' position within it, so these should also determine its strategy. Applying the

analytical techniques common to industrial economics, Porter said that a firm's primary task was to impure transparency of markets by creating niches it could defend from competitors, either becoming the low cost producer. Nonetheless his ideas have had limited impact on how most firms go about formulating strategy. Porter's checklists provide little guide to what firms should actually do or avoid doing. Every firm likes to be in an industry with high barriers to entry, weak rivals and high profits. But few are so lucky.

At the same time Quinn (1990) published the results of studies about how (big) firms actually went about formulating strategy. Quinn found that they proceeded by trial and error, constantly revising their strategy in the light of new experience. He called this "logical incrementalism". The qualitative nature of uncertainty has changed in one further important matter. Industry dynamics have become increasingly non-linear as waves of technological change have swept across industries. For example, the basic model for technology diffusion —the learning curve— is the classic example of non-linear relationship that can exhibit chaotic behaviour. Under conditions of non-linearity, cause and effect are not proportional and strategic responsiveness of organisations is the watchword. Traditional industrial analysis is similar to taking a snapshot of a moving target.

Further, Quinn is raising in his publication the "Intelligent Enterprise" question marks on the concept industry of Porter, usually described as being composed by firms producing products that are close substitutions. However the boundaries of industries are seldom clear and are changing over time. There is a movement toward disaggregation where large multipurpose organisations are broken up in networks of specialised units. Hamel and Prahalad (1990) stressing the expansion of a firm's core capabilities made the most influential strain of theorising about theory in the 1980's. Their message was that in an era of rapid technological change and resultant unpredictability, sustainable advantage is far more likely to come from organisational resources, capabilities or competencies than from formal long range strategic planning.

Drucker (1988) envisioned a future wherein „business will integrate themselves into the world economy through alliances“. One of the reasons is that information technology is moving so quickly that it is impossible for businesses to keep up without forming strategic alliances with other businesses as well as with other non-commercial entities as universities.

He notes that in the future work will move to where the people are, rather than people will move to where the work is, and therefore business have to farm out to concentrate on their own unique core competencies. This farming out is termed by Quinn and Hilmer (1994) as „strategic outsourcing“ so managers can leverage their firms' resources and skills for increasing competitiveness. Their message is in line with Hamel and Prahalad's ideas.

Conclusions

Despite the changing fashions, decades of theorising have not been entirely useless. How a company views strategy does depend largely on its circumstances. Big companies, having a dominant market position, may find Porters industry analysis illuminating for matching their resources with its opportunities and for influencing external industry forces. Other companies may find Hamel and Prahalad's theory useful to set goals that stretch a company beyond what most of its managers believe it is possible. All firms should try to exploit and hone their skills.

In strategic choice led managerial theories change is considered as a top down strategy driven transformation process often by pursuing co-operative advantages in partnerships and strategic alliances in a world of electronic business. These theories are in general dominated by a proactive management attitude (Wassenaar, 1996). Based on Konsynski and McFarlan (1990) and Wassenaar (1995) these theories can be summarised in lessons for improving organisational virtualness in electronic business.

- 1. Partnering companies have a clear vision (shared destiny) and focussed market strategy supported by involved top management.** It is a key factor for success in electronic business: there are business objectives whether it be cost reductions, obtaining new markets or cross-selling services elaborated in key performance indicators to measure progress. These objectives have to be agreed by all internal and external involved partners.
- 2. Companies have not only to focus on commanding a higher profit margin but they have to erect barriers to affect competitive forces.** Competition increasingly takes place among networks and not atomic firms based on platforms like the Intel/Microsoft based network currently competes with the Apple/IBM/Motorola based network. Therefore common platforms are locking in their customers by high switching costs and are creating high entry barriers for new rivals.
- 3. Companies together have a focus on complementary competencies:** internally on developing „best of world“ capabilities around a few activities —the company competencies and externally (partners) on managing a rapidly changing network of „best in world“ partners for its other needs. It is important they improve their competences by continuous improvement based on common assessments, learning mechanisms and intensive relationship with other institutions like universities.
- 4. Companies have (reciprocal) skills and competencies in information and communication technology.** (Partnering) companies work better when they possess the necessary skills to manage the complex information technology that may be involved. These companies have to develop (complementary) core competencies especially in the field of information and communication technology. Attention has

to be given to develop and organise data exchange systems in a way it is useful for the partners.

5. Companies have concrete flexible implementation plans based on step by step projects and if possible starting with early successes. These plans have to be managed by inter-company task forces responsible for executing projects and co-ordinating (and developing) common electronic business policies and standards for financial, marketing, quality, logistic and information systems. It is important, that plans are flexible in order to face changing circumstances or surprising new developments and opportunities.

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3 Lessons from Improvisation or Market Led Theories

Elisa Moreno Bragado

Hayek (1945) described the **market** as a discovery process, where new opportunities and innovations are relentlessly found out and the news of such findings are transmitted instantaneously through the price system. The market constitutes the framework in which organisations perform their activities from two different perspectives (Ciborra, 1997a):

- In first place, the requirements of the market outline the goals, plans, strategies etc. that the organisation is willing to achieve; the achievement of certain goals and objectives is called the „*in-order-to*“ motives of action.
- At the same time, past experiences when trying to reach those objectives also determine the kind of actions to perform; this frames the „*because-of*“ component of action.

Independently of the reasons to perform certain activity, the organisation will face a transformation, which will be more or less dramatic depending on the objectives to reach, and the organisational path dependency. In this section, **transformation** is considered as a bottom up, incremental and individual driven process of change. Therefore strategy's devising is a formation process, instead of a formulation one.

Strategy is the creation of a unique and valuable position, involving a different set of activities (Porter, 1996). This is true for the physical value chain, but it is also applicable for the virtual value chain, in which information is not only a supporting element in the value-adding process, but a source of value itself (Rayport and Sviokla, 1995). Any strategy seeks the development of business's competitive advantage (Henderson, 1989), and therefore, a change or transformation in order to match the requirements of the market.

Mintzberg (1987) defines strategy as plans for the future and patterns from the past. In this definition it is possible to find a „in-order-to“ and a „because-of“ element. The presence of these elements in this concept is due to the way Mintzberg reached such definition: strategy is defined *a posteriori*, after the action has been carried out and managers are aware of the activities that enable such performance. Furthermore he also accepts that strategies „*can develop inadvertently, without the conscious intention of senior management, often through a process of learning*“. This emerging strategic management conceptualisation describes strategic decision as messy, disorderly and disjoined processes (Hutt e.o., 1988).

In this (to some extent) chaotic context, **improvisation** is playing an essential role. Ciborra (1997a) defined improvisation as „*situated performance where thinking and action seem to occur simultaneously and on the spur of the moment*“. Many *a-posteriori* called strategies have an improvised origin. Improvisation is possible and successful if there is enough knowledge that can support a non-planned decision. Otherwise there is a big risk of failure if the results of improvisation are not rightly controlled.

That knowledge is provided through a **learning process**. As pointed before, the learning process plays an important role in the formation (as well as it does in the formulation) of strategies. In order to understand the sources of knowledge and the learning processes, Ciborra (1997b) described the „learning ladder“. This model shows that knowledge is created in four different levels: routines (experiences or work practices), capabilities (skills), core capabilities (skills that confer a competitive advantage) and formative context (organisational context, culture, values...). Those four levels determine the learning process and the knowledge that evolve from it.

Therefore even if improvisation can be, and in fact it is, a way of strategy decision making, it is influenced by the knowledge of those who improvise. That

knowledge is determined by the learning process by which it has been achieved. And at last, this learning process is determined by the resources of the organisation, the past experiences, business mission, competitive environment and other factors. Consequently knowledge acquisition is a path-dependent process. Path dependency means that the way a firm owns its assets (capability or competency) depends on the process through which they were acquired (North, 1990).

Those influencing factors can be defined as a set of rules that affect the improvisation practise. Using the terminology of the Institutional Economics discipline, those rules are called **institutions**: „*institutions are the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction*“ and they provide a structure for everyday life (North, 1990). They can be formal constraints (like laws or contracts) or informal (values or customs). Having into account that only those rules that affect the expected payoffs of actors can be titled as institutions (Eggertsson, 1997), it is possible to accept that the rules affecting learning process are informal institutions since they influence the performance of the organisation.

Furthermore institutional factors are also to be found in the market side of our analysis. In this case, rules' sources are threefold: consumers (when determining the requirements of the products and services), technology (that determines the final characteristics of those products) and competition (or how other organisations react before the same situation).

All those constraints or institutions aim to reduce uncertainty about the environment by providing certain behaviour patterns. The virtual organisation, due to its special characteristics —among them, the use of information technology for accessing the market-space, and the fast changing environment, in which they are working— can be defined as a complex system. In order to achieve a consistent solution to problems in complex systems, a sequential process that involves institutions is necessary. „*Dealing with all issues simultaneously exceeds the computing capability of individuals*“, and therefore individuals have to operate with an *institutional rationality* (Colander, 1996).

Conclusions

In this section we have defined the market as a set of rules and also as a discovery process in which organisations are embedded. In this framework and having into account that in last term the performance and activities of organisations seek to fulfil the requirements of the market, we are analysing a decision making mechanism through strategy formation. Figure 1 shows the schema of the conclusions of this paper.

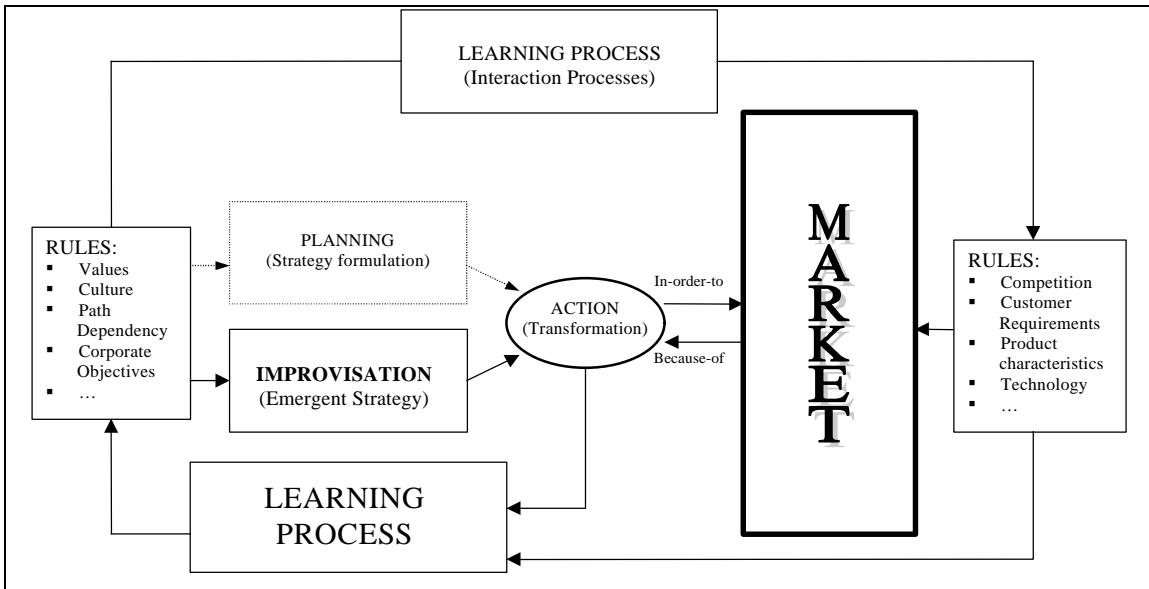


Figure 1: Improvisation on Market Led Decision-Making

In our view market-led action would have two origins: improvisation (or strategy formation) and planning (or strategy formulation). In this section the focus is on strategy formation, in which improvisation plays an essential role, even if it appears this concept cannot be matched with that of strategy because it is too formal.

Nevertheless, what it can not be denied is that even improvisation is determined or to certain extent, influenced by a set of rules or institutions that will guide the direction of that non-planned performance. Those rules are part of the learning process by which organisational knowledge is achieved:

- On one hand these rules come from the very *organisation* so they will ensure a result coherent with the rest of the organisational activities, culture and objectives.
- On the other hand, the characteristics of the *market* will state the direction of the action.

Even if individuals are not aware of the rules or institutions in which they are embedded,—since these constraints can be formal or informal—, their influence is essential in order to facilitate the solution to certain high complex problems, by providing action guides. A complex problem is that of transformation in virtual organisations to match the requirements of the market. In an anarchic (and hypothetical) situation, where there are no rules, a successful result can not be guaranteed.

Besides the learning process commented above, it would be possible to recognise another relationship between organisational level and market level. This process is a learning one in which markets and industries „learn“ from the activities, decisions and skills of organisations. Competitors, consumers, providers, and other

participants in the market will recognise the performance of certain organisation. If the results of such performance are successful, the market will accept the sources of that action as general accepted patterns (i.e. institutions).¹

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4 Lessons from Network Interaction Led Theories

Ariane von Raesfeld Meijer

In this section is acknowledged, in the light of new arrangements emerging between organisations, the uncertain nature of organisational reality which inherently involves various forms of disputes, differences in cognition, opinions, etc. Uncertainty is a widely recognised feature of modern organisational reality (Handy 1996). In organisation studies, post-modernism (Clegg and Hardy 1996) emphasised uncertainty as a general process of destabilisation. These new conditions demand new ways of thinking with regard to organising and managing.

Clegg (1990), for example, views post-modern organisational forms, among which are virtual organisations, as alternatives to modernistic forms such as those described by Morgan (1986) in constructs of organisations as machines and as organisms. If we accept the view that organisations have been able to modify their forms to the extent that they might now be described as post-modern, the network approach and process approaches in general will be able to explain how and why organisations have made this transition. Many of these 'new' organisational forms depend on co-operation with other organisations. All this requires an attuning of the diverse activities conducted by different organisations.

In the case of electronic business development, usually a new technology is adopted only if a large part of the network involved accepts the attached technical standards. In these circumstances, co-operating with various counterparts could decrease risks, shorten cycle times, lower investment and create better responsiveness to the different actors of a network. This implies that successful electronic business development requires that attention is paid to exchange relationships with customers, suppliers, competitors and other important stakeholders.

In the light of this, the insights of the Industrial Network Approach (e.g. Axelsson & Easton 1992) seem relevant. In order to describe electronic business development on the level of the network, one can use studies of technological development in industrial networks (Håkansson 1987; 1989). The model of industrial networks (Håkansson 1987) with its three groups of variables (actors, activities and resources) provides a basis to describe substantive activities in networks. The industrial network model can be used to describe the content, process and context of electronic business development. The content refers to particular areas of electronic business. The process of electronic business refers to the actions and interactions from the various involved actors. The context of electronic business refers to other past and present substantive interactions in the network. In this model *actors* in a network are considered to allocate resources and perform activities together. In the network model two types of *activities* are delineated, transformation and transaction activities. Transformation activities are characterised by resources being improved by the use of other resources. Transaction activities are concerned with the exchange of resources; they link transformation activities and create relationships with other actors. *Resources* are the means used by actors when they perform activities. Possible resources are physical (machinery and materials), financial and human assets (labour, knowledge and relationships). When we relate the network model to the area of electronic business development, *substantive activities* can be described by reference to the actors participating in the electronic business development who perform activities and control resources. From a network perspective, technological innovation and thus developing new electronic businesses, comprises three aspects: knowledge development, resource mobilisation, and resource co-ordination.

Here, this section continues by discussing how electronic business development projects may be assessed and managed. Assessment involves some sort of evaluation about whether the technological innovation develops in the 'right' direction. However, especially in new electronic business development, where outcomes are unclear and where participants have different goals, the 'right' direction can only be assessed in retrospect (Weick 1979:194), which is rather too late from a management point of view. Therefore, it is proposed to view electronic business development as evolving through the elimination of undesirable qualities (Morgan 1986:358). Consequently, assessment will be based on exposing such undesirable qualities. This approach considers hindrances in new electronic

business development as undesirable. Accordingly, one can deduce from the Industrial Network Approach some conditions that could hinder electronic business development. Emphasising, however, that ultimately the participants in the projects are the ones who have to decide whether specific developments are desirable or undesirable.

The Industrial Network approach distinguishes four forces that could have a stabilising effect on networks (Håkansson 1987:17) and therefore could hinder technological development. These four forces are:

1. *Functional interdependence*: actors, activities and resources together form a system where heterogeneous demands are satisfied by heterogeneous resources.
2. *Power structure*: on the basis of control over activities and resources there are power relations between the actors. The performance of the activities is to some extent organised on the basis of those power relations.
3. *Knowledge structure*: the design of the activities as well as the use of resources is bound together by the knowledge and experience of present and earlier actors. The knowledge of the actors is related to one another.
4. *Inter-temporal dependence*: the network is a product of its history in terms of all memories, investments in relationships, knowledge, routines, etc. Changes of the network must be accepted by at least large parts of the network. Therefore all changes will be marginal and closely related to the past.

Conclusions

On a macro-level these four forces could be used to detect the present hindrances in electronic business development.

This approach has been used to describe and assess a case where seven organisations co-operated to develop the Electronic Data Interchange (EDI) for the Dutch construction industry. The project was followed in real time from the start in December 1992 to the end of the first phase in February 1994 (see Von Raesfeld 1997). From the case study one can conclude that the four network forces reflected the interactions in the network. The project seems to have been especially hindered by the existing functional dependence of one of the participating organisations in the network and the use of power by the Director of this organisation. Moreover, the parties in the construction industry did not yet seem ready for EDI. This lack of functional dependence and power structure concerning EDI hindered the project. The findings showed that the substantive interactions in the larger network had an observable effect on electronic business development. The general conclusions of the case study:

- 1) That existing network conditions can hinder the electronic business development.

- 2) That if there is no network basis to support the electronic business development progress will be slow.
- 3) That the industrial network approach can be used to describe, assess and support management of electronic business development in networks.

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5 Lessons from Stakeholders Led Theories

Pieter Ribbers

Research on the effects of IT on exchange organisations is relatively new. Early research applied transaction cost theory and agency theory to predict shifts from hierarchies to market form of organisations. The central argument of this line of research was that IT would improve communication, search, monitoring and information sorting capabilities, thereby reducing transaction costs and enabling purchasers to take advantage of production economies available in markets.

A critical drawback inherent in this analysis was the definition and treatment of markets in abstract economic terms. In reality, different market structures exist, e.g. direct search, brokered dealer and auction markets. Each of these structures organises the trading process and related information processing activities in dif-

ferent ways. Thus the role and impact of IT can vary across types. The literature provides some examples. Konsynsky at all provide a descriptive case study of an electronic market in used cars[14]. Clemons and Weber examined the effects of computerisation on the London Stock Exchange.

Due to the convergence of IT and telecommunication, and the proliferation and availability of bandwidth, the impact of electronic markets is expected to grow rapidly. Their effectiveness is however dependent on their design. Existing research in this new area provides examples of relevant issues supporting an effective design.

Also the literature shows that most researchers view markets (auctions) as single isolated markets (auctions). This viewpoint is however too narrow. E.g. Dutch flower auctions are market places in an international flower market. There are other market channels among sellers and buyers. Competition between other markets and market channels is an important element in explaining the success of an electronic market.

Market organisations are the meeting point for multiple stakeholders: buyers, sellers, and intermediaries with conflicting incentives. Given existing or competing market alternatives, no new IT based initiative is likely to succeed if any stakeholder is worse off after the IT enabled innovation.

The concept of stakeholders has been introduced in the study of organisations. As put forward by Simon and March not organisations but people have objectives. Stakeholders are those whose contribute to the functioning of an organisation and whose contribution depends on what is received in return. The continuation of the contribution is dependent on the degree that goals of stakeholders with the organisation are met.

Electronic commerce systems, like electronic markets are organisations. They depend on the continual contribution of different stakeholders. We can distinguish between buyers, sellers and intermediaries (those who organise and offer the electronic market).

Stakeholders behave in a bounded rational way. They are motivated by their goals and by satisfying behaviour. Their decision to enter an electronic market will be based on the perceived contribution to their individual goals.

The concept of stakeholders is important to understand the success or failure of electronic commerce systems.

6 Lessons from Evolutionary Stage Led Theories

Rajesri Govindaraju and Dirk Swagerman

In this part of the panel paper, we would like to explain the two ways of change in order to achieve the virtualness of the organisation: evolutionary and revolu-

tionary change. The relationship between the evolutionary change process and the organisational virtualness will be stressed.

Rapid and uncertain change is the most unsettling marketplace reality that companies and people must cope with today. The pace of innovation continues to quicken, and the direction of innovation is often unpredictable. Co-operation within companies but especially among companies, is the key to the competitive advantage offered by the challenges posed by a business environment dominated by change and uncertainty (Goldman, 1995).

Although there are many reasons that make it may be easy to encourage the use of virtual organisation concept, it is not yet simple to form and operate a virtual organisation. Some of its advantages give rise to its most significant implementation difficulties. To achieve something virtually, implies the introduction of a new process or a new structure (Saaksjarvi, 1997).

The implementation of virtual organisation requires an analysis of the technical and work systems in a company. The change in behaviour and structure needed for this is enhanced and enabled by a number of systems in a suitable infrastructure.

There could be made the division between evolutionary and revolutionary change process (Venkataraman, 1991). These changes in their relation with the virtualness of the organisation are possible by means of the use of information technology (IT). The formation of virtual enterprises is possible only if communication and information exchange technologies are capable of supporting the plug compatibility required by the organisational structure of virtual companies. Venkataraman (1991) described several levels of change that electronic integration stimulates —from increased functional integration to changes in the business's scope—and each of these extends the reach of the change project.

The phenomenon that changes happen due to the use of IT leads to an opinion that IT can be used as „enabling factor“. The term „enabling factor“ means that the particular factor, in this case IT, could be used as a strategic objective for reaching the organisation's goal.

Benjamin said that IT-enabled change process is different from more general change processes. They create unique issues for managers. Managers must know how to integrate the technology, business processes, and organisation in order to achieve the goals they expect with the technology (Benjamin 1993).

Knowing the fact that IT is one of the enabling factors for organisational virtualness, technological changes happen due to the use of IT that is playing an important role in the organisation. Even more important are changes in managerial values, organisational structure, and the prevailing corporate culture paradigms that are required. Work force empowerment, self-organising and self-managing cross-functional teams, performance- and skill-based compensation, flatter managerial

hierarchies, distributed authority, and point-of- problem decision making are all expressions of moving toward the acquisition of business capabilities (Goldman, 1995).

It is common to consider the introduction of IT in companies as a more revolutionary change, but in this paper we would like to mention that this change could also be seen as an evolutionary process. It is not a matter of good or bad which type of change process could be applicable. It depends on a set of contingency factors.

The introduction of IT will lead to all kind of organisational virtualness application and phenomenon, such as group-ware. The organisation's objective is that the organisation will migrate towards a form of organisational virtualness. The objective will be led by some business reasons and strategic direction. In that case the organisation has to choose between evolutionary change or revolutionary change, depending on the contingency-factors. An important element that will be incorporated in this decision process is the cultural factors.

CHANGE CONCEPT	
Evolutionary Change	Revolutionary Change
Step-by-step approach Continuous improvement Learning organisation Incremental approach Sustainable growth Harmonious Planned	„big bang“ approach radical terms big leaps chaotic unpredicted

Figure 1: Different Change Concepts

It is not right to say that one form of change is better than another. The use of induced change depends on situational factors, we could say that these factors are the contingency-factors of relevant change concept.

The application of that contingency-factors is used for the first time by Lawrence and Lorsch, for explaining different organisation forms depending on the organisation in their environment (Lawrence and Lorsch, 1977). Later on, these concepts were further developed by Mintzberg. He explained that there are only a few contingency factors relevant for the main organisation structure (Mintzberg, 1979). We could see that depending on the environmental factors and the organisational goal, organisations will make their decision of using a particular change model.

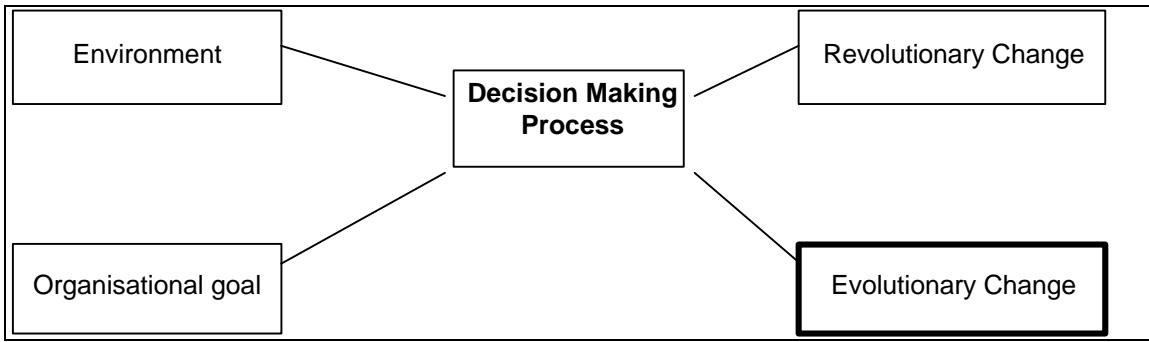


Figure 2: Decision Making Process

We will see how the evolutionary change process is relevant for the organisational virtualness.

If an organisation has a high expected degree of resistance against change, it is better to use the evolutionary change concept, by mean of the incremental approach. One important comment must be made in the Business Transformation Model (Venkataraman 1991). Business process redesign (BPR) is a part of the revolutionary change process. The IT as an ‘enabling factor’ will be used for a fundamental and revolutionary change at the current procedures. In our way of thinking a BPR could be also realised by mean of other instruments. In the past, the term ‘organisational development’ was frequently used for a fundamental change process, not led by IT. The fundamental change of process in an organisation using BPR concept and not based on the revolutionary change concept, is that an organisation will migrate step-by-step, as a form of continuous improvement toward the desired end situation. If an organisation would like to migrate towards organisation virtualness, redesign of the processes are necessary. This could be done in an evolutionary way.

Contingency theorists stress the importance of an organisation’s ability to adapt to its environment. Evolutionary models specify a cycle of variability, natural selection, and ongoing modification. Evolution is driven by either changes in the environmental context or the entrance of variant „species“ of organisation that is better able to compete for scarce resources. The change stimulates other organisations to modify their forms, and a number of variations emerge. Organisation that can not adapt, decline and fail. When a new „population“ of organisations becomes established, forces of inertia impose other, and only incremental adjustments occur until the next radical environmental changes (Applegate, 1994).

Conclusions

Organisations must recognise that to manage the change enabled by IT in its relation with the organisational virtualness is very important. The change can take the form of revolutionary or evolutionary change. If an organisation would like to migrate towards organisation virtualness, redesign of the processes is necessary.

The evolutionary change process is a suitable change solution for certain organisations. Based on the contingency-factors, the appropriate change concept could be chosen.

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