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Editorial

The fourth issue of our quarterly newsletter features three articles. The first one was written by Roland Klueber and refers to the networking of small and medium sized companies, namely on aspects of coordination by describing the functions of a network promoter. The second article was submitted by Claudia Loebbecke, who outlines ideas on the economic impacts on content providers on the Internet. As Claudia gives some worthwhile background information on topics we have been presenting in the last issue, her article is followed by a short interview. Last but not least, Marcus Ott presents the architecture of a possible information infrastructure for Virtual Organizations.

Concerning the following issues, we decided not to impose any restrictions on topics. Every research paper relating to the topic of Virtual Organizations will be appreciated and taken into consideration for being published in our newsletter, no matter if it relates to the industrial or the service sector. Of course, we will also appreciate grounded descriptions of practitioners about their experience in virtual organizing.

Moreover, we would like to announce that we are going to moderate the mailing list VoTalk in order to filter out inappropriate mail and thus to improve the quality of this service. Please note that we highly appreciate contributions of yours to VoTalk. Feel free to subscribe to our mailing list and to start a discussion by sending your viewpoints, questions or experiences to votalk@virtual-organization.net.

Please note the way of citing/referencing articles published in the newsletter:

Author(s) name(s), Title of the article, in: Griese, J.; Sieber, P. (Eds.): VoNet: The Newsletter @ <http://www.virtual-organization.net>, Vol. (Year) No.

Joachim Griese & Pascal Sieber

Statistics VONet / VOTalk

Since the start of our website in December 1996, a lot of researchers and practitioners from all over the world have joined our mailing lists:

- VONet - a list server that provides you with a quarterly newsletter
- VOTalk - an unmoderated mailing list that enables discussions by spreading your viewpoints, questions or experiences to all subscribers.

The following graphics will give you an impression of the structure of the participants:
(period from 1.12.96 to 25.8.97)

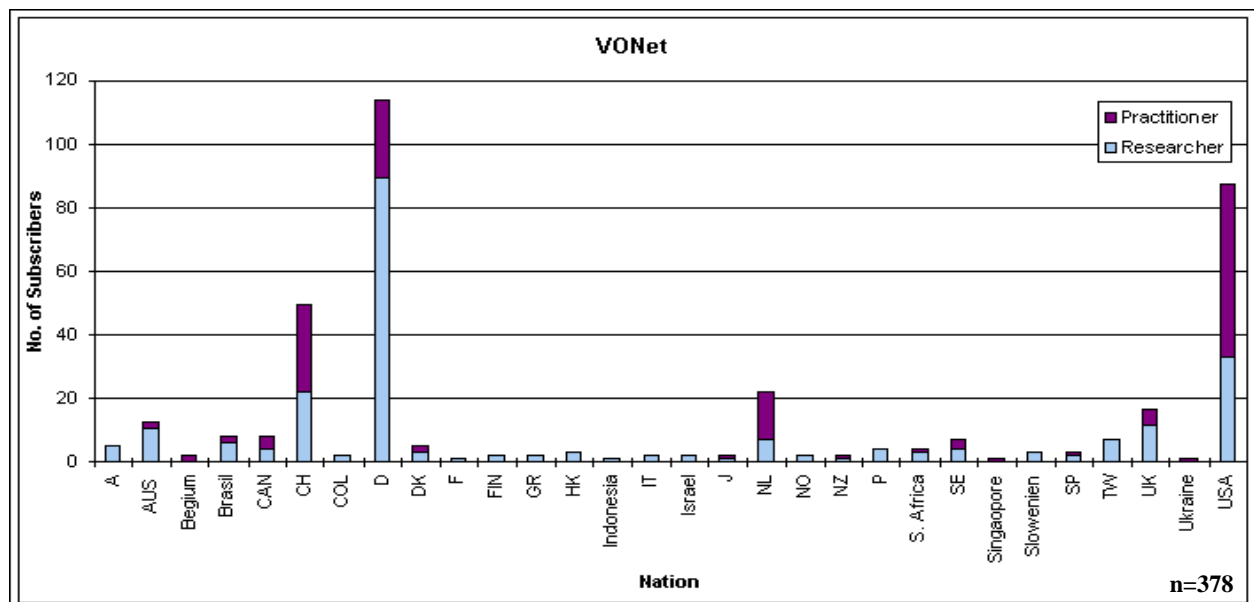


Figure1: VONet Statistics

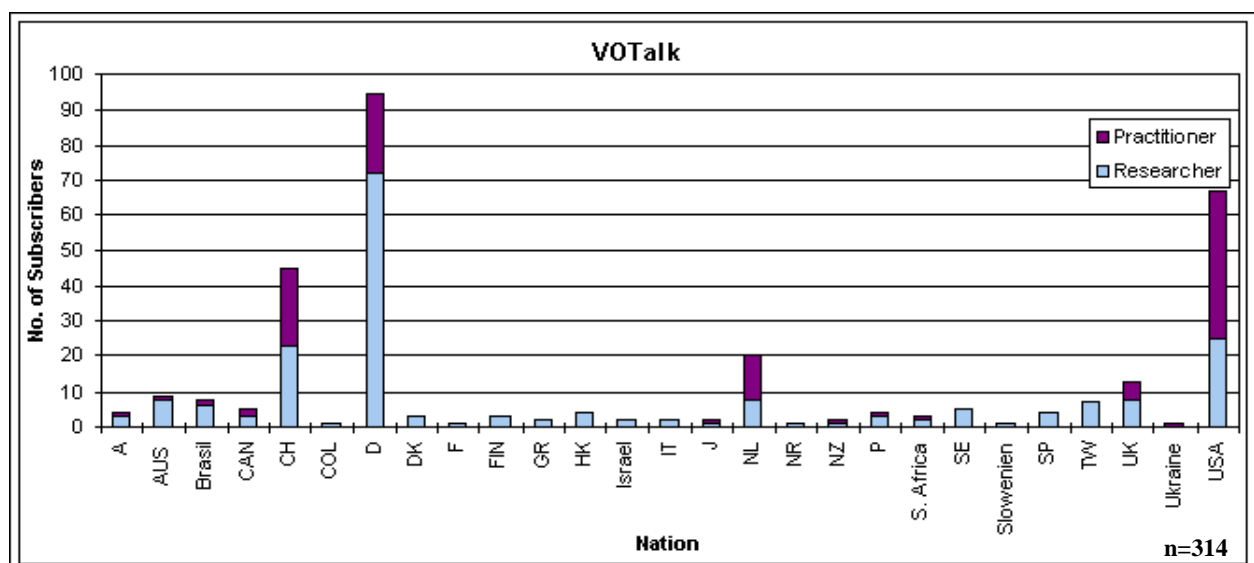


Figure2: VOTalk Statistics

The Need for the Function of the Promotor

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When considering a scenario of a small or medium sized enterprise (SME), which has the idea to produce a product or service that it cannot possibly produce with its own resources and capabilities, building a virtual organization might be an interesting option. Another motivation could be the strategy of focusing on core competencies without losing the deeper interaction and influence as well as the reduction of uncertainty that a partnership may offer.

In order to achieve this, a new organization has to be build that is able to coordinate a much more complex situation than that which it normally does with its present boundaries and focus [Bada91], [ZeScKr95, 3]. To draw a biological analogy - this is like building an organism of a higher level on the basis of vital 'operative' organs and skeleton. What is still missing is the nervous system as well as the brain in order for it to become (temporarily) viable. Since a partnership of SMEs cannot be coordinated with the same hierarchical coordination mechanisms of an integrated company¹ other coordination structures have to be established. The necessary coordination mechanisms might require a different organizational design logic, which relies more on openness, empowerment [Malo97], loose coupling [OrWe90] and heterarchy to allow for more flexibility and innovation [Schw94, 58], [ScNo94]. It will be argued that the function of the promotor² can be a salient component to cope with the need for a generic task structure with clear responsibilities on a meta level while still being open to change and flexible. The activity of promotion describes a specific function that facilitates the coordination processes in virtual organizations constituted by SMEs through generating the requisite variety [Beer79, 92].

Unless the network architect [MiSnCo92, 15] has sufficient excess capacity, experience, knowledge and relationships, a further institutionalization of functions may be needed. Although some authors argue that virtual organizations should not have any additional institutions (e.g. [ArHä95, 22]) this might not be the case for a virtual organization set up by SMEs.

We will look at the promotor function in virtual organizations and the specification of life-cycle oriented subfunctions necessary to build, maintain and develop virtual organizations.

1 Theoretical Foundations

BEER'S Viable Systems Model (VSM) [Beer79, Beer81] is concerned with exactly the problem that was described above. The design of the information and communication system and the coordination structure needed to make a (virtual) organization (temporarily) viable. In BEER' terms we are at the stage of System One, which tries to build a new VSM at a higher level of recursion. The use of the VSM seems straightforward, as not only the biological analogy seems to fit, but also organizing principles such as a high degree of **autonomy** and **recursion** [Mali92, 103] are highly

¹ An integrated company can rely on a legal entity and the acceptance of an organizational hierarchy.

Furthermore it can establish an elaborated organizational structure in a relatively stable environment.

² Promotor (lat.) means literally the support for a forward moving power [Dude80] and implies dynamic and active influence to change. That is the reason why this term is more preferable than the more commonly used broker. Another advantage is the higher specificity and novelty of the name, which facilitates change [EcNo92].

relevant for virtual organizations. Furthermore, it presents a generic model which can be used as a check-list in order to prove that a design of the virtual organization is complete and to challenge assumptions about the design of subsystems and their interplay. It presents the formal apparatus to design recursive and self-organizing networks [Schw94, 58]. Finally it provides the structure to prevent a complete heterarchy, which would lead to a chaotic system. The main focus here will be on the functions that need to be performed and not on the communications and information infrastructure.

Figure 1 below shows the formal and totally functional view of organizations. Divisions depict organizations that are focused on core competencies and that are involved in a virtual organization. Each Division has its own access to its relevant environment. Depending on the nature of the product or service, the coordination requirements vary. Whereas a highly standardized only project-based cooperation like a music tour (e.g. Voodoo-Lounge-Tour [Land94, 42f]) does not need an extensively elaborated ‘superstructure’, an open and unique interplay with evolving responsibilities and tasks like the development of a new communication tool or a software solution, will need to take this into account to increase the likelihood of success. The former being close to a consortium and the latter to an R&D joint-venture can still have characteristics of virtual organizing [HeVe96].

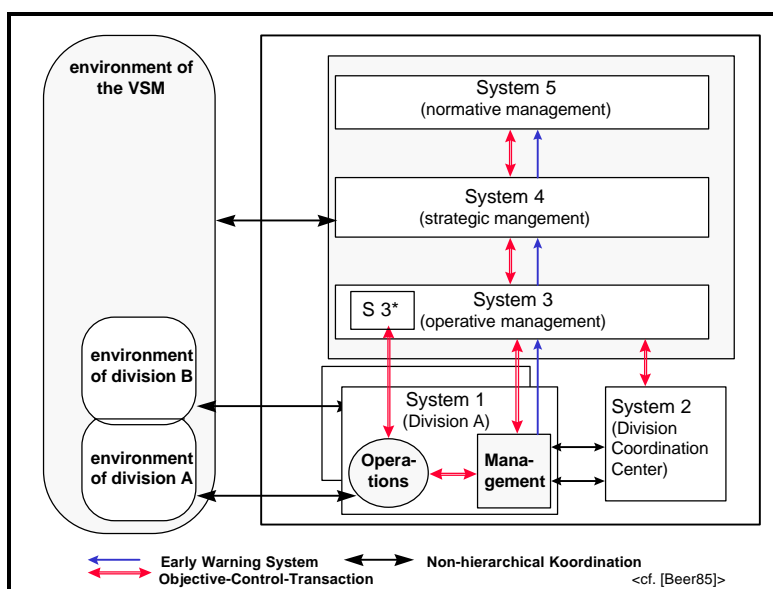


Fig. 0-1: General VSM-Model³

One of the key theoretical bases for the following is the promotor function or promotion. **Promotion** will be defined as a non-hierarchical coordination support function. It overcomes barriers [GeWa95, 974] and performs an information search, evaluation and distribution support function, that leads decision-makers to action [EcNo92].

The functional perspective on promotors serves two purposes:

- 1) it helps to identify necessary functions for collaborating organizations. This is highly relevant for companies which are not accustomed to the logic of cooperative work arrangements and therefore lack experience.

³ For a detailed description see [Beer79, Beer81, Beer85].

2) it can serve as a kind of check-list to alleviate the bargaining, contracting and operational phases in cooperation

The non-hierarchical orientation is fundamentally linked to the hierarchy evasive nature of virtual organizations and the high strive for autonomy in SME's. In general the promotor function serves the purpose of coping with the more complex coordination tasks on the recursion level of the virtual organization. It can be described as a pre-situative integration, situative coordination and post-situative adaptation [Beck95]. Pre-situative integration includes the support of the harmonization of objectives, plans, behaviour, interfaces, information and communications systems and infrastructures as well as innovation and information management. The situative coordination includes the moderation of meetings and conflict management. The post-situative adaptation focuses on the control of quality, cost and performance indicators for learning and improvement. The efficiency assumptions are based on their relative independence, trust-building capabilities [GeWa95] and a reward system based on the success of the virtual organization as a whole. From an human actor perspective the promotor should be based more on expert, referent and informal position power [HoMo91, 139f] to be accepted.

The last theoretical basis is the life-cycle of cooperations according to PAMPEL, which can be looked at from two different levels of abstraction [Pamp93, 78ff]. The first one is the **macro process**, which describes the building and disassembling phases of virtual organizations. It starts with the description of objectives and a strategy for partnering. Then it can be broken down into a partnering potential and process policy and the selection of partnering instruments. When supported by an analysis and evaluation of the partner's culture and partnering experience, a partner profile might evolve. In the second phase the initial selection of possible partners (initiating transaction) takes place [FeSi96]. The third phase involves the partnering contract (contracting transaction) and a broad agreement on the required steps to settle to system build-up phase. If all these steps are completed successfully the **micro process** comprises the detailed system build-up phase, the operational phase and the possible development phase of the partnership. The macro process closes with the dissolution of the partnership or the redefinition of the objectives and the start of a new shortened macro process.

The two basic classes of actors are buyers and sellers. In our case, sellers are individuals, workers and team members, offering their competencies on the market. But it can also be an aggregated entity such as a department or a firm offering a set of competencies. Buyers are accessing the market to find specific profiles and competencies in relation with their projects. As for any markets, a buyer can become seller and vice versa.

2 Promotor Functions in the Macro-Process of Virtual Organizations

The life-cycle is one of the major differences a virtual organization discerns from a classical and neo-classical contract based organization [PiReWi96, 51f] that is based on a going concern assumption.

The virtual organization begins with the idea, which can be produced by one or more independent companies. Another possibility would be a spin-off from existing business relationships or a 'quasi-internalization' [Sydo92] of former outsourcing contracts. The macro process starts with a creative and hard to specify function, which has been described as Network Architect

[MiSnCo92, 15]. This is often executed by a manager with position power⁴ [HoMo91, 142f] (e.g. Bill Epstein in [KaFa96,]) and cannot be considered as a promotor. Depending on the culture in the network it is not unthinkable that such a function can be performed by a promotor without decision⁵ power.

A possible function is the **Relationship Promotor** (initiating transaction) which facilitates innovation [GeWa95, 972ff]. The contribution of the promotor is for accessing and bringing together the relevant people, moderating fertile discussions and increasing trust and social relationships. The major function will be to initiate contacts, alleviate problem solving processes and establish a common understanding. In doing so, it helps to overcome barriers of 'not knowing each other', 'not able to collaborate' and 'not wanting to collaborate' [GeWa95, 974].

A **Bargaining Promotor** (contracting transaction) function is concerned with taxation and contract questions. This function helps to centralize the relevant information and build-up the expertise needed [MeFa97]. It also helps to articulate and specify objectives, serves as rough-cut planning and control system, and supports organizational design on an aggregated level. The **Information and Communication Systems (ICS) Design promotor** function analyses the status quo and development paths of the future partners and proposes possible ICS-infrastructure and ICS solutions to facilitate the micro process. The intensity of this function depends on the type of virtual organization and on the product or service it produces.

An supportive and phase independent function could be an **Online-Information-agent** [IFTF97, 40], which manages customer information at the level of the system 4⁶.

3 Promotor Functions in the Micro-Process of Virtual Organizations

In the micro-process the VSM serves as a basis to identify discrete functions which help to achieve the requisite variety.

The **Strategic Value-Creation Promotor (VCP)** (system 4) function comprises the internal recording and evaluation of core competencies of partner organizations. It is necessary to represent the virtual organisation as a whole from an internal and strategic perspective. The portfolio of core competencies can also be used as an external means of communication, to describe the possibly available range of products and services the virtual organization can offer.

The **Market Promotor** (system 4) function is mainly concerned with the strategic marketing for the virtual organization as a whole. Additionally it is used as a monitoring and screening function of the environment from the perspective of system 4. Product- and technology questions must be addressed simultaneously.

The strategic value-creation promotor and the strategic marketing promotor support the strategic and normative decision-making function through information supply from their perspective. They lay the foundations for a strategic opportunity and threat analysis, which can be initiated and moderated by these.

⁴ Position power does not only include the power formalized organizational structures but can also be located in network relationships [HoMo91, 142f]. Here it is mainly used to describe the formal power due to ownership and/or contract based decision responsibility.

⁵ It serves as an aggregate for traditional organizing logic based formal power. It includes position, reward and coercive power as well as legitimate power [HoMo91, 140ff].

⁶ It can also be used at system 1 level, if the divisions acquire customers through their divisions or run other businesses in parallel.

The **Audit Promotor** (system 3*) is according to BEER a very flexible, variety generating, ad-hoc and consensus oriented, task-force-like function, which can be interpreted as supporting the ‘here and now’ management [Beer85, 86] of the virtual organization. It must have deeper operational knowledge and information about predefined aspects of system 1. Besides monitoring and auditing functions, it conducts moderation activities, between operational management constituting managers.

The **Operative Value-Creation Promotor (VCP)** (System 2) serves as an anti-oscillatory function [Beer85, 66f]. It comprises for example production planning and control or arbitrator functions for the virtual organisation. While the system 3 is hierarchically responsible for the operations, system 2 provides supportive functions like standardizations. It is needed as an variety attenuator. A Subset of the operative VCP function can be an operative ICS promotor (System 2) function, which deals with the operation, maintenance and evolution of the ICS and ICS infrastructure, harmonizing the interfaces, evaluation and recommending an appropriate middleware in order to access the needed information will be major tasks of that function.

The Divisional Promotor (System 1) serves as an interface to handle the interaction with the partners of the virtual organization. It also can be seen as a communication channel for internal information exchange about the virtual organization.

The still necessary hierarchical decisions can be implemented through steering boards, which are constituted by members of the divisions (S1). The principle of recursion allows a fully participatory system, if implemented with that aim [Schw94, 55]. The adapted VSM is shown below (s. Fig. 2).

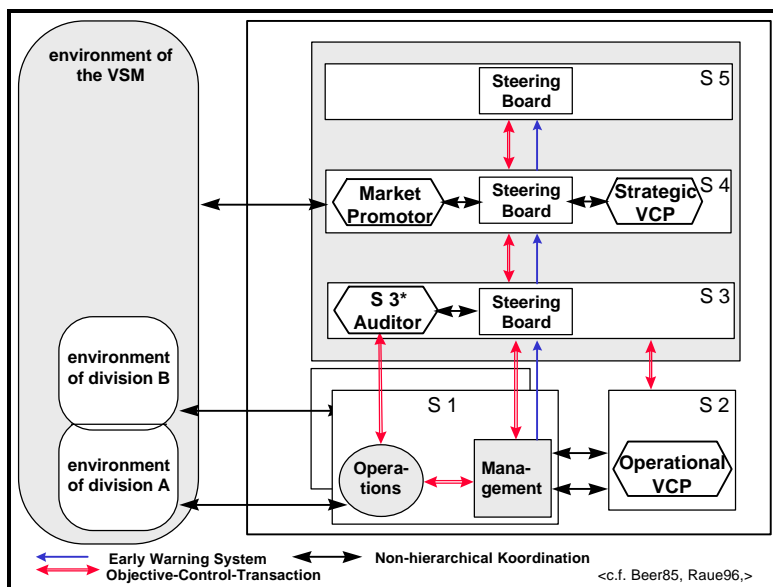


Fig. 0-2: Promotor functions in the VSM

It is not intended to make any general assumptions on what and how to institutionalize the functions identified above, as this depends on the situational configurations and context conditions. The nature of the product or service, capacity, qualification or power aspects may demand institutionalization [GeWa95, 980]⁷. However the underlying assumption is that service companies could evolve, which offer these functions as a professional service for inexperienced virtual or-

⁷ The more permanent and the more business and social critical the tasks are, the more attractive is an institutionalization in order to build up trust and personal relationships.

ganizations. Through promoters, which are tied to the success of the virtual organization as a whole, a better cohesion and coordination between the autonomous units may be achievable.

4 Summary and Outlook

Despite of the limits of the model like the ignorance of 'soft' factors and the high level of abstraction, it still seems to be useful as a general concept to base structural decisions relevant in the life-cycle of virtual organizations on a better foundation. The function of several promoters can be defined in the micro-process phase of virtual organizations according to the VSM.

The need for such a function has been addressed from academical perspective [FaBi96] and a more empirical perspective [ScKaEi97, 11]. Further elaboration and institutionalisation and empirical research results are needed.

High attention needs to be payed, when the function is institutionalized, since ICS like groupware or electronic markets offer a great opportunity to challenge the common assumptions. It seems to be possible to establish a more partner-partner oriented relationship between human and machine actors [FeSi96b], which exploits each actors strengths to a greater extent.

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Content Providers on the Internet: A Discussion Paper on Opportunities, Limits, and Impacts

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Abstract

This paper outlines ideas on the economic impacts on content providers on the Internet. Currently, especially small content providers, whose Internet activities are not their core business, often do not generate sufficient additional profit from offering content on the Web.

After describing the research background, this paper details four ways for companies to profit from providing content on the Internet. The paper then sets the above results into perspective in a broader research context including 'Information Technology', 'Electronic Commerce', and the 'Macroeconomic Business Impacts of the Internet'.

The paper aims to stimulate debate on the current hype of offering content on the Web without providing fully-fledged research yet.

1 Research Background

While many content providers, i.e. any Internet users who offer information (content) on the Internet, but whose Internet activities are *not* their core business, are excited about the new possibilities offered by the net, they still face the challenge to transform these opportunities into adequate profit [Jones and Navin-Chandra, 1995; Loebbecke, 1996; Loebbecke and Butzbach, 1996; Loebbecke and Trilling, 1997]. However, Internet-based commerce will only grow significantly in the near and medium-term, if it becomes attractive for all players.

Two content provider situations are to be distinguished:

- (1) The main product offered is material, not digitizable (cars, coffee, computers, books) and cannot be delivered via the Internet.
- (2) The product offered is information that can be transmitted digitally via the Internet (e.g., software, magazines, music, etc.). Full Internet commercialization would mean a closed business cycle from 'order' via 'payment' to 'product delivery and receipt' on the net. 'Virtual enterprises' could operate from anywhere on the globe where Internet access is available; the need for a physical presence at a certain location would be limited to legal requirements.

While the Internet is considered a valuable means of communication offering the enticing possibility of interaction (one-to-one communication, e-mail), for many people the Web has turned into a primary information resource (one-to-many communication, 'broadcasting').

However, most of the information spread on the Web is either company- (public relations) or product-specific information (marketing) to increase awareness. As with traditional marketing media, such information is offered free of charge. In most companies, the cost of content provision on the Web is not covered by the contribution of Internet sales [Glossbrenner and Glossbrenner, 1995; Shah, 1995]. The driving force for Web presence is more the belief that the Internet will lead to competitive advantage, or will turn into a competitive necessity in the future [see also Bakos, 1991; Benjamin and Wigand 1995; Clemmons and McFarlan, 1990].

In this context, small and medium enterprises (SMEs) need to be distinguished from large companies. The latter can, mostly, follow a 'learning approach', being on the Web in order to 'be good at it when Web-based business really takes off'. SMEs, however, can hardly invest in using and learning to use a new technology for about one to three years. In the end, they may be good at exploiting new technologies, but in many cases they face the threat of bankruptcy before being able to harvest their new expertise [O'Connor and O'Keefe, 1997].

Internet-based commerce will only create additional profit in the near and medium-term, if the costs of Internet use, especially content provision, are exceeded by additional income, and thus it will become attractive for all.

2 Four Possibilities to Profit from Providing Content on the Web

Internet activities, and content provision on the Web as a special kind of Internet activities, can contribute to a company's performance in four ways [see Loebbecke 1996].

- (1) Larger number of units sold
- (2) Larger margin per unit sold
- (3) Provided content sold as stand-alone product
- (4) Advertising space offered on web pages

- (1) Larger number of units sold

Internet-based marketing and public relations aim at increasing awareness about a company and its product and service range. As with traditional marketing, this is costless for consumers; profit is made when the marketing costs are covered by additional sales. Currently the largest potential in Internet-based marketing is seen in attracting new customers world-wide and in establishing distant, long-term customer relationships [Cronin, 1995; Ellsworth and Ellsworth, 1996; Schmid, 1993].

In most instances it is difficult to discover how many additional units are sold because of a Web presence. Further, some of these may be substitutes for 'traditional' sales (internal channel cannibalization).

As long as overall world-wide or regional sales do not increase, but almost every book store and computer dealer, etc. is present on the Web (with rather different offers), it is not obvious how they all could increase their turnover. It seems to be more like a football league: every team strengthens themselves during the summer, but by the end of the following season, there are few 'winners', and there will always be some 'losers'.

- (2) Larger margin per unit sold

Larger margins per unit can be achieved (1) by lower costs (efficiency) or (2) by charging higher prices per unit.

Lower costs may be achieved by using the Web for various processes such as internal communications, receiving orders and payments, or providing customer service (process / business reengineering) [Cash and Konsynsky, 1985; Hammer and Champy, 1992]. Customers could, for instance, download information from the company's Web site and special requests could be answered via (automatic) e-mail.

Higher prices charged per unit need to be based on value-added for customers. This means that a particular book, computer or type of coffee that is advertised and sold via the Internet is *more* expensive than if it were sold via traditional marketing media and sales channels.

This notion is the reverse of the more popular idea of selling cheaper via the Internet due to economies of scales and fewer players in the value chain, (e.g. books to be found at www.amazon.com).

The only example of a product sold at higher prices because of a Web presence that the author is aware of is TV advertising minutes, the actual product sold by (private) TV stations to companies that place their commercials [Loebbecke and Trilling, 1997]

(3) Provided content sold as stand-alone product

While classic marketing content is not produced to be sold, companies are increasingly placing other forms of content on the Web - mainly to encourage customers to visit their sites and ultimately buy their products. They could profit from extending their 'traditional' product line to information-based products, e.g. providing access to a special database (new business opportunity) [Davenport, 1993; Venkatraman, 1991].

The most prominent examples are carefully maintained databases offered by book stores (with mixed commercial success) [e.g., Fillmore, 1997; Sieber and Studer, 1997]. Depending on the up-to-dateness and the content of such a database, its maintenance costs go far beyond 'putting a paper-based catalogue on the Web and just updating it quarterly'. More drastic examples can be found when visiting the content offered by TV stations (and newspapers) on the Web. News features as well as sports results go beyond what has traditionally been offered and need almost continuous updating (more than 75 % of sports updates have to be done between Friday 6pm and Sunday midnight).

These information resources are free for consumers, who, in turn, are by no means bound, maybe not even encouraged, to watch the respective TV program or to read the newspaper 'on paper'. Experience even shows that both the Web pages offered by TV stations and by newspapers are often accessed by those consumers who temporarily or generally do not watch / read the traditional medium.

Different approaches to selling such content offers are possible, the three most popular are: (1) charging per month, (2) charging per actual time visiting the site, and (3) charging per page accessed.

Whether such information-based products primarily reach the end-consumer directly from the company that 'has the content' or from intermediaries who repackage the content and maintain the actual sales channel on the Web, remains to be seen. Important is that whoever invests in building and maintaining the contents needs to be able to charge for it, regardless if end-consumers or intermediaries pay. If intermediaries collect information themselves, manufacturers / designers lose a business opportunity; but as long as it does not involve any expenses not covered by additional income, this goes along with the overwhelming trend of specialization and outsourcing (with specialized partners increasingly cooperating in a network or virtual organization).

(4) Advertising space offered on web pages

As time for commercials is the main 'product sold' by TV stations, the market for advertising space on the Web is also booming [e.g. Quelch and Klein, 1996]. Only those companies whose contents attracts a certain number of site visitors can sell additional space to

others who then place their ads. While this opportunity for profit is gaining importance, it is mainly suitable for those large companies whose sites are well-known and visited, e.g. TV stations, newspapers, magazines, etc. [e.g. Sterne, 1995]. It does not appear to be a feasible source of income for the millions of SMEs that also offer content on the Web.

3 Discussion Issues

3.1 Economic Value of IT Usage

The Internet, and specifically the Web, can be considered as a special form of information and communication technology. Therefore, a comparison of Web usage, specifically content provision on the Web, and IT usage seems appropriate.

For more than a decade, information systems and information technology have been considered as tools for transforming the way value activities are performed and for coordinating different activities [Porter and Millar, 1985].

A recent study [Hitt and Brynjolfsson, 1996] differentiates 'productivity', 'consumer value', and 'business profitability' as measures of information technology (IT) value. Findings from investigating 370 large firms suggest that IT increases 'productivity' and 'consumer value', but not 'business profitability'. Thus, there is no inherent contradiction in the idea that IT can create value but destroy profits [see also the literature on the 'productivity paradox', e.g., Brynjolfsson, 1993; Strassmann, 1990; Wigand 1995].

The similarity between these research results and empirical findings about the situation of content providers on the Web is remarkable. Without doubt, the Internet contributes to productivity in the context of coordination and customer involvement (especially in business networks and virtual organizations where the Internet is used for coordination) [e.g. Sydow, 1992]. Many of these phenomena, however, are taken as given by consumers or so widely applied that companies cannot adapt them to competitive advantages and additional profits.

3.2 Electronic Commerce

Electronic commerce is defined as any form of economic activity using electronic connections, spanning electronic markets, hierarchies and networks [Wigand, 1997]. Following this definition, companies' content provision on the Web represents a form of participation in electronic commerce.

A wide-spread perspective of electronic commerce is built on 'markets' and 'hierarchies' [Williamson, 1975] as the two basic concepts for controlling a flow of materials and services between the members of a supply chain or electronic network. In such a framework, 'doing commerce electronically' lowers the coordination costs in markets and supply chains [Malone et al., 1987], and hierarchies lead to strengthened commercial relationships between partners [Williamson 1975; Pisano, 1990; Steinfeld et al., 1995]. The traditional 'markets' and 'hierarchies' have been complemented by new organizational forms such as electronic networks, virtual organizations, strategic cooperations [Davidov and Malone, 1992; Hopland, 1995; Johnston and Vitale, 1988]. While the definitions of such terms vary, these concepts clearly suggest that technological infrastructures provide the opportunity for a broader range of intra- and inter-company business structures.

The current notion of enterprises engaged in the electronic marketplace [Rayport and Sviokla, 1994] focuses on achieving competitive advantage in the organization's internal network and ex-

ternal relationships [van Heck and van Bon, 1997]. "Components of business value of electronic commerce are related to (1) improvements of products /services for specified market segments; (2) new linking mechanisms to business partners using process and technological innovations; (3) linking external relationships with internal processes; (4) build upon a flexible, but robust telecommunication infrastructure." [van Heck and van Bon, 1997, p.211]

Norman and Ramirez (1993) state that successful business performance in an electronic commerce environment will not arise simply by adding value across a series of business activities in a supply chain, but by redefining a whole value proposition [see also Campbell and Mooney, 1997]. 'Redefining the whole value proposition' however, requires to have a value proposition, a competitive advantage which allows to sell products or services and thus to profit. Even in an electronic environment a company's offering ultimately becomes part of the end user's (or buyer's) value chain, a competitive advantage arises through differentiating the company's product or role in the supply chain [Porter 1985; Benjamin and Wigand, 1995].

The discussion about electronic commerce seems to follow these paradigms and to focus on coordination needs and business opportunities in electronic networks and virtual organizations. It neglects, however, the vast number of companies ('content providers' in the terminology here) who make the Web to what it is today and who pursue the use of the new infrastructure while (mainly) sticking to their conventional business.

In summary, content providers, as described in this paper, fit into the common definitions of electronic commerce; nevertheless, their issues and business needs are barely covered in the large amount of 'electronic commerce' research and publications, and even worse, the current hype about 'electronic commerce' seems to ignore the day-by-day business pressures of many players without whom the electronic marketplace would not be as it is.

The widespread reasoning that the business environment is developing so fast that any study would be outdated by the date of publication, is too simplistic and does not help SMEs to develop their business and Internet strategy in the near future.

3.3 Macroeconomic Business Impacts of the Internet

It is hard to predict how business on the Internet will develop once the technical prerequisites 'digital mini-payments' and 'content saleability' [Loebbecke, 1996] will be fully resolved. A vast increase in available information-based products and services, on average lower prices (including lower margins), and major shifts in industry structures as well as in intra-corporate value chains seem likely [Bakos, 1991; Benjamin and Wigand, 1995].

3.3.1 Increase in Available Information-Based Products and Services

The current Web hype is fostered by lower entrance barriers to business on the Internet. SMEs do not need the infrastructure of large companies anymore to market their products. In turn, this causes an enormous growth of information-based products and services, as well as to a tremendous increase in accessibility of material, not digitizable products.

3.3.2 Lower Prices (Including Lower Margins)

Market transparency of suppliers, customers, and products causes cost pressure for vendors. Offers from all over the world can be found online, locating and comparing potential suppliers of products or services on the Internet leads to lower transaction costs [Benjamin and Wigand, 1995; for a detailed discussion see Barua, Ravindran, and Whinston, 1995]. This transparency is further increased by the employment of search tools ('bargain finders') [e.g. Jaros-Sturhahn and Loeffler, 1995]. Altogether, competition leads to constant pressure on market prices and demands

for extra services to be delivered as 'add-on' to traditional service packages. For many suppliers, keeping up with market prices will mean sacrificing part of the margin [Barua, Ravindran, and Whinston, 1995].

3.3.3 Shifts in Industry Structures in Intra-Corporate Value Chains

The integration of the Internet, databases, CD-ROMs, etc. allows SMEs to have an edge over corporate giants, or at least offer them the chance to compete with big organizations. They can do research on new markets, test their ideas, build close ties to clients, and respond quickly to customers' needs without having to cover the overhead costs of a large corporation. In the new marketplace, some players, such as local retailers will be eliminated from traditional value chains, new ones, e.g. for local delivery, will enter the game.

4 Conclusions and Future Research

Electronic media enable organizations to deliver products and services more cost-effectively and efficiently [e.g. Campbell and Mooney, 1997]. In cases where the Internet is supposed to support the traditional business (e.g. book sales), the increasingly sophisticated services offered by such content providers go beyond pure marketing efforts. They provide additional value to 'customers'. While these services constitute extra costs for the content providers, they barely generate additional profits. Potential clients take advantage of these services (e.g. search the book store database) *without* actually becoming customers.

Involvement in Internet-based activities and increasingly also content provision on the Web seems to have become 'compulsory' in many industry sectors. If eventually all companies achieve significantly lower cost for customized product and service delivery, the result cannot be a competitive advantage, but lower margins for the 'average player' in the industry.

For commerce on the Internet, offering content on the Web has to be attractive for the providers in one of two ways: (1) strengthening a company's competitive position with respect to its traditional products (e.g. higher turnover as a consequence of Web activities), or (2) expanding towards additional, profitable product lines (e.g. selling information / content-based products and services).

Future research could pursue three dimensions:

- (1) Additional empirical investigations of 'companies on the Web' including their total Web-driven costs and revenues (in the short and, eventually, also in the medium term) would help to better understand the current business opportunities and needs in the 'real world'.
- (2) Further development of concepts and business strategies for SMEs on the Web taking into account the short and medium term financial constraints and the macroeconomic trend that increasingly companies will participate in electronic commerce.
- (3) Interdisciplinary integration of rather recent trends and findings stemming from the areas 'Internet-based business' and 'electronic commerce' with conventional IT and economics theories and research results.

'Providing content on the Web' and 'electronic commerce in general' offer outstanding opportunities to stay at the edge of business developments. After the first wave of fascination about the potential offered by the technologies, it becomes time to adapt business processes and calculations to its existence. In the medium and long run, the new infrastructures will provide support for a large range of traditional and innovative business ideas. Nevertheless, the business idea itself must be economically promising, the pure fact that a company engages in the electronic marketplace has not been and will not be sufficient.

This paper has attempted to raise issues in order to shift the overall Internet discussion to its true business implications. It cannot provide a theoretical framework or solid first-hand data, but it hopes to trigger some debate.

Discussion

Pascal Sieber (Questions)

Claudia Loebbecke (Answers)

PS: Companies do not yet earn money by providing content on the Internet. This is what we found too when we questioned Swiss Companies on the Internet and especially IT companies on the Internet. Your framework provides help to calculate the profitability of Internet use. Network effects in a technological and organizational sense are hardly calculable in this way (e.g. see Nohria/Eccles (1992) and Sydow (1992)). What other suggestions would you give to SMEs that are deciding whether they shall invest in Internet technologies or not?

CL: There is still quite a difference between just 'using' the Internet and 'providing content' on the Internet. In terms of general usage, my rule of thumb would be to invest on a low level to be 'in the game'. Larger investments going along with major changes in business processes should be fully calculated, but often look very promising (if ideas for new business processes exist).

Providing content often is a far-reaching issue. Here, we try to help calculating the profitability, but are already quite happy if we can increase the sensitivity for the cost/benefit calculations involved. It is the SMEs' own profit or loss that makes them happy, suffer, or even go out of business.

So far we have focused on offering content to (end-)consumers and not within a network of organizations as you describe it in your question. Not only this is most common when offering content on the Web, also, in practice, companies care about network effects primarily when they are 'translated' into a specific company's profit or loss. The profitability of providing content on the Web as a service to consumers can and should be calculated; and often - based on innovative business strategies - this can be a very promising business opportunity. This niche will develop fast and profitably in the near future! Just in case of unpleasant numbers a strategic decision for or against such an activity is needed.

The case of providing and exchanging content within a network is rather different, but even more challenging and important. Several new dimensions come into play. Unfortunately, we don't have any solid empirical data, but this topic (theoretically and empirically) will be the focus of our work in the next months.

PS: You talk about winners and losers and you use the metaphor of a football league. What are the most important success factors for online stores? (for information products and physical goods).

CL: Firstly, the metaphor of the football league basically implies that even if every player improves his performance by offering online services, there will be some losers in the end, not because the technology is not good or not used smartly, but because the overall demand

for a certain kind of product (computer, books, coffee) doesn't change due to the existence of a new channel.

As a consequence, the most important success factors to me are (1) to have a product for sale that can compete in the market regardless via which channel it is sold, (2) to be easily found and conveniently accessed on the Web, and (3) to realistically calculate the costs to deliver up-to-date, detailed information and fast responses to customers' requests, and then compare those costs with predicted benefits. Companies should not raise expectations that they cannot meet efficiently (e.g. rather no price list than an old one).

PS: The model of 'providing content as stand-alone product' seems to me very interesting: As Open Book Systems and also Amazon.com demonstrate, new mediators are paid for their services which basically consist of content-providing (see VoNet 1 (1997) 3). What do you think of this model? Does it revolutionize retail markets?

CL: By 'providing content as stand-alone product' we mean selling the information offered even if no other product is sold. Taking your Amazon.com example this would mean charging for accessing Amazon's web pages/information/database even if the customers doesn't buy any book.

These services will continuously grow on the Web, they will be successful if the information offered is worth something 'as a stand-alone product'. By itself this won't revolutionize the retail market in my eyes, but it establishes new business opportunities. Various experts foresee an increasing part of the GNP in industrialized countries to be spent on information-based products.

However, I do think that phenomena like Amazon.com will drastically change the retail market. The information Amazon.com offers theoretically needs to be on the Web only once, regardless if sold or offered for free. As successful as a company like Amazon.com is or will be, not many other book stores will be able follow their example; that is what I meant by the 'football league'. I would recommend hardly any book store in Switzerland or Germany to follow the 'Amazon.com path'; there will be only a few winners, much less than there were in the traditional book store market. Expanding existing business concepts to new regions is 'out' in the Internet era. The winners will be the ones with new business ideas, and fortunately, we have seen various examples recently!

PS: There is another interesting point in the behaviour of Online-Stores: Bookstores are paying about 10% of turnover to OBS in the case a customer buys a book after having read the information on OBS' site. This is the basic characteristic of the 'fourth model', i.e. 'providing content as stand-alone product'. Example of Amazon.com: With only a few mouse-clicks anybody can become a reseller of Amazon.com. The bookseller pays 8% of turnover for each book that is ordered via partners web sites. Everybody can become a virtual adviser in this industry and earn money because the distributor has no pre-sales costs. This is certainly not new. In the assurance industry for example the principle has a long tradition. But for the first time one can acquire a great number of agents for practically no costs. Does this revolutionize retail markets?

CL: These examples will certainly change the retail market drastically. OBS is a classical example of selling content as a stand-alone product, just that they don't sell out the end-consumers, but get paid by the book stores - a slightly different business process. Considering your Amazon.com example, of course, reselling for Amazon.com may turn into a nice

business opportunity. However, the 'fourth model' would only apply, if 'your' content/expertise was so interesting that end-consumers paid for it, not if they buy an 'Amazon.com' book via your page. In the latter case you are in the 'book business', and you need the content as a marketing tool to increase the number of units/books sold; but you don't sell content per se.

There is one more interesting thing. If the book costs the same via your page then buying directly from Amazon.com, this shows how large Amazon's margin is ... If the price for the book differs depending where one buys it, consumers will learn fast, and some people will quickly raise issues of ethics. Here the retail market will be revolutionized: very high market transparency, moving towards 'one price per product' regardless 'where' it is bought. It'll be interesting and challenging; and - actively shaping a revolution is certainly better than being revolutionized: let's get ready for a new, promising era!

Thank you, Claudia, for this insights.

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Modeling Organizational Forms of Virtual Enterprises The Use of CSCW Environments for a Team Based, Distributed Design of Virtual Organizations

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Abstract: This paper examines the notion of virtual organizations under the influence of traditional organization design aspects. It explores the view that the classical design of organizations remains a fundamental management task for virtual organizations, as well. It then looks closely at how traditional structural design processes are constructed and points out to their weaknesses. An evolutionary and distributed multiple level team-approach to design will be proposed. Furthermore, this paper introduces the CSCW oriented prototype environment GroupOrga for modeling and informing about the structures of new organizational forms. This concept's base, a comprehensive data model for enterprises, will be delineated and its prototype implementation will be described. Concluding, a graphical tool for design support will be introduced and the overall architecture will be pictured. An outlook on further conceptual ideas, such as an integration with the World Wide Web will be given.

1 Introduction

Conventional organization design variables have been used for hundreds of years and they have served organizations well. As competition becomes more intense, organizations will have to react more quickly to environmental change and to competitors. Harder rivalry, a worldwide supply of goods, globalization of the markets and higher expectations of customers put growing pressure on organizations. A major effect can be seen in the increasing speed of technological change which ordered the factors of competition in a new way: *Time* plays the dominant role in the markets.

Organization design that results in hierarchies, bureaucracies, and many levels of review and approval seem to be incapable of fast response. Information technology (IT) offers additional variables that, when combined with considerations of structure, people, and tasks, can help design more responsive organizations. In the area of *Computer Supported Cooperative Work* (CSCW) exist many approaches to overcome this problem. The notions of *Business Process Reengineering* (BPR) or *Workflow Management* discuss solutions which explicitly address the component *time*

and are aimed to reach an essential improvement in reaction to environmental changes. However, it will be difficult, and in some instances virtually impossible, to move a traditional organization to adopt new process structures without changing or dissolving the *underlying organizational structure*.

This paper defines a set of technology-based organization design variables. Some of these variables are similar to traditional design variables, while others are unique. The IT-enabled design variables allow to combine virtual organizational components, electronic messaging, and electronic workflows to name a few. It describes an environment to design the organizational structure of virtual enterprises as consisting more of knowledge nodes and inter-organizational networks than physical spaces. *Designing virtual organizations* might appear to be a contradiction in terms, but what is meant here is the indication of the bounds of action within the virtual infrastructures, leaving the detailing of the organization's structure to the choice of the knowledge workers.

2 Virtual Organizations and Organization Design - a Contradiction?

With information technology, the basic assumption of modern organization theory and practice such as the need to physically group people and units together to provide for coordination or supervision, or the need to choose between centralized or decentralized structure, are being increasingly invalidated. In the case of linking mechanisms for example, IT such as e-mail or groupware solutions may now play this role, making task forces or liaison agents unnecessary. In contrast to physical presence, IT design variables allow for virtual organization (VO) structures⁸. The VO had its beginning some years ago as people began to see the potentials of using information technology for work at distributed workplaces. For almost any organization that does not turn out a material, durable product, one possible form would be a combination of independent agents. In this scenario, with IT, there is no longer the need to generate an organization with conventional structures and the personal meetings that this entails.

The use of the term VO varies strongly in today's IT supported approaches to networked organizations. Literature proposes diverse interpretations of VOs and defines different emphasis: Davidow and Malone's "Virtual Corporation" for instance, refers only to the outer form or the organization itself when they describe virtual organization as an object without specific outline and with continuously changing interfaces between organization, supplier and customer [DM93, p. 15]. Other authors focus on different types of cooperation between the cooperating partners. A narrower concept is proposed by Byrne who states, that "... the virtual corporation is a temporary network of independent companies [...] linked by information technology to share skills, costs, and access to one another's markets" [Byrn93, p. 37]. Yet again other authors understand the idea of virtual organizations not only to explain the inter-organizational dependencies between partner organizations but also as an explanation of the intra-organizational principles. Arnold et al. [AFHS95] have examined the term *virtual organization* in detail. They have identified varying notions of virtual organizations and they have delimited this form of organization from other forms such as joint ventures, cartels, trusts, strategic alliances and the like. It is not the focus of this paper to give yet another overview of what virtual organizations are or how they can be iden-

⁸ The term "virtual" was first used with respect to IT for a virtually unlimited logical memory for computers. A program was split up into pages and only necessary ones are loaded into memory. A virtual organization uses IT to operate like a classical one.

tified or defined - this has been done sufficiently⁹. For our purpose, complying with the definitions given by [WP96, p.383] and [AFHS95, p. 10] we understand a VO as a

- voluntary cooperation of several legally independent performers of varying types (whole organizations, single departments, project groups, single persons, etc.),
- who produce an output based on a common understanding of their business rules.
- All cooperating partners provide their resources, core competencies or skills and know how in order to become quicker in reaction, more flexible and more international.
- At least one partner represents the VO to the external world (and most of the time has the structural responsibility, as well),
- and the partners are connected with each other by means of modern information and communication technology.

Based on this understanding, we still think that the classical design of organizations remains a fundamental management task for VOs, as well. Klein defines this design of an organizational architecture as an elementary management task: "Virtual, flexible organizations require a minimum of structure, too. Therefore basic organizational principles have to be determined and rights and responsibilities of organizational units and their agents have to be clarified" [Klei94, p. 313]. There are a large number of ways to divide labor and to coordinate tasks in the organization and there are also various design strategies and variables that can be used in the organizational design process. Surely the giving up of central management functions is one of the most marking characteristics of VOs, which distinguishes this form from other forms of cooperation. Many authors stress, that information technology supports communication processes and coordinates the tasks to be carried out in the network. The necessity of using information technology like the one conceptualized in this paper becomes very obvious under the notion which Gurbaxani and Whang emphasize: Virtual organizations can grow into a large scale organization with global reach, while the partner organizations remain relatively small themselves [GW91]. To the customer (as well as to the participating partners) the VO presents itself as a transparent organization of enormous size and complexity, which is why some organizational information system is inevitable.

Additionally, it still seems that people will be more comfortable in the immediate future with the familiar metaphor of a traditionally structured organization - even if it is in the virtual form. At present it is rather unlikely to have pure VOs, but rather a combination of real organizational structures plus some virtual components.

In the following chapter, a distributed, evolutionary design process of organizational structures will be formulated. It is a multiple layer design advance which involves all organizational members in an ongoing and evolutionary process.

Mertens and Faisst [MF95] name a palette of instruments from the field of computer science and business computing, which have not intentionally been invented for the use in VOs. Nevertheless, these instruments can prove to be advantageous for the design of VOs, as well. Chapter 4 describes a CSCW concept and prototype environment GroupOrga which addresses a critical factor in the design process of VOs: The provision of always updated knowledge about structure, processes, partners and persons, as well as skills, know-how and services provided by the individual partners in the network to the internal partakers or to external customers who want to make transactions with the VO.

⁹ Some references for further studies which give an overview and refer directly to the term virtual organization are [AFHS95], [Byrn93], [DM92], [Klei94], [Mert94], [MF95], [N.N.94], [Sieb95], [WP96]

3 An Evolutionary and Distributed Design of Organizational Structures

3.1 Traditional vs. Innovative Organization Design

The *traditional* approaches to organizational design show four major characteristics, which prevent from an evolutionary and constant change of potential VOs: They rely on the sole view of one particular person, they base on formal models and focus on explicit organizational roles and structures and they ignore processes. In contrast, an effective approach of structural design should be based on multiple, personal perspectives to match for the problem's complexity. Supporting this view, Eccles and Nolan "propose that only key, high level infrastructures can be explicitly designed by senior management" [EN93, p.63]. The design process should be an evolutionary, not rules based procedure which addresses informal roles and structures and does not ignore the processes undergone by VOs. In addition, arguments can be given for implementing the design process as a *group*-process: The problem is complex and all members and customers of a VO have considerable motives to solve the organizational problem efficiently. This process should be understood as evolutionary and never ending. Additionally, networked computers can be seen as standard and provide the technological means to support the team design¹⁰.

Traditional organization design	<ul style="list-style-type: none"> • relies on one person's expertise and view (generally an "organizer"), • is based on formal methods which are in existence for a long time already, • focuses on formal roles and structures which have been laid down long ago, • ignores existing everyday business processes which may change.
Effective organization design process	<ul style="list-style-type: none"> • relies on multiple views in order to cover the whole complex problem, • is an evolutionary and never-ending process involving all members, • includes formal and informal roles and structures, and • explicitly includes the day-to-day business processes in the design.
Organization design as a group-driven process	<ul style="list-style-type: none"> • supports solving the problem's complexity due to group communication, • allows internal members and external partners to get involved in the design, • supports the idea of an ongoing process due to multiple process drivers, and • will in the future be supported through varied computer technology.

Table 1: Weaknesses of traditional organizational design and new approaches, [Rei92]

3.2 A Team Design Process

In the concept of the presented approach, the team design process brings about virtual organizations which model themselves as self-organizing systems. It includes everybody in the organization, i.e. not only its management level, and is based on a continuous, computer-assisted arrangement about functions, activities, roles, positions and their interactions of all persons involved. The technology to promote this process is the computer-assisted groupware environment to be sketched in the following chapter. It enables the involved individuals to inform about their own roles and interactions. One major advantage is, that other people can watch changes and alterations in the VOs structure and set-up, they can understand the connections and thereby contribute to the process.

¹⁰ Further details on the problems of current organization design practices and their potential solutions can be found in [ON97]

The information base proposed in this paper is founded on a client server architecture with a distributed directory model. The distribution of directory information can be allowed onto a variable number of information systems (computers) within the virtual network which makes provision for an enormous scalability of the data model. Each node in this network can store an optional portion of the complete data set.

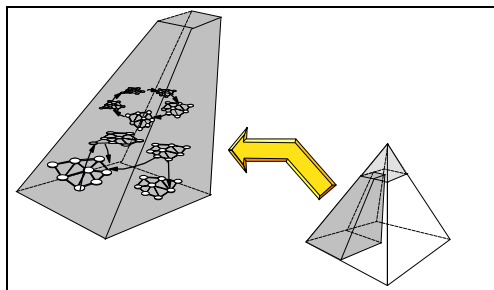


Figure 1: The top-level design and self-design

Through a specification of which partial information is stored on which node in the network, a distributed design and administration of the complete data set becomes possible. In this environment a central authority (possibly a *broker*) might be responsible for some coordinating, structural information while the decentralized partners in the VO with their respective information technology provide the detailed organizational structure information about their particular role. Bartlett and Goshal [BG89] accent the need for and evidence of new models of organization (e.g. VOs) in a similar way, except that they ignore the role of information technology. The central point in our approach is that managing a modern networked company requires at least two levels of organization design: The first level, which could be called top-level (or superordinate) design, is the responsibility of the coordinators in a virtual cooperation - in a *traditional* organization this group would be called *senior management*. This group is concerned with framing and constituting the infrastructure of assets, resources, hierarchies, and management practices. These structural elements will be utilized by the individual partners throughout the VO to perform the second level of design, which can be termed bottom-level design and which is a self-design process. Of course, this self-design must not be restricted to only one level below the structuring component. On multiple levels it might involve the individuals using the proposed infrastructure to shape their own working environments and organizational sub-structures. In the following, for simplicity reasons, we will focus on two levels only.

3.3 Top-level and Bottom-level Design Approaches

Each networked partner in this system models and discloses its own structures, competencies, roles and workgroups (as far as they are considered important for the joint project and not confidential) to help building the unique appearance towards the environment. By the extensive usage of communication and information technology such as the groupware environment, the information will be distributed to the partners in the network, who in turn designate process tasks to particular elements in the virtual structure.

In another context Nolan and Pollock described such a notion of two levels of design as a "network floating on top of a hierarchy" [NP88], but this picture serves well for describing the concept advocated here. On top of these functional hierarchies, or, more generally, initially designed infrastructures, individuals access other individuals and resources in the VO, which are, in a sense, held or stored in the underlying infrastructures.

Top-level organizational design

The *top-level organizational design* consists of establishing the major shared infrastructures and more or less hierarchical elements in which the organization will virtually operate. These infrastructures, although they must of course be flexible, are the points of stability in which the VO operates and by which the respective partners can effect outcomes. Using the term "*virtual*" in connection with "*design*" through an intermediary or broker seems to be a contradiction in itself. However, what is designed here are the rough bounds of the virtual infrastructures, while the detailed plan of the organization's structure itself will be done by the knowledge workers. To operate in an environment of high uncertainty, the VO must rely on innovation and continuous learning by the participating *real* organizations.

The broad structural outline of a VO exists primarily for organizing its human assets and may have very little to do with how work actually gets done in the network. This structural profile is the functional hierarchy on top of which exist the self-designed networks of relationships between the partner organizations. And although the mediator is not explicitly responsible for creating this structural basis, s/he may be responsible for providing tools like those delineated in this paper for doing so.

Bottom-level structuring processes

The multiple *bottom-level design* processes which actually define how the integral parts of the VO are structured in which the work gets done are performed by the workers which reside in the distributed organizations. The distinction between top-level and bottom-level design made here, should not be mistaken for the contrariety between centralized and decentralized performance of tasks. Top-level structuring is a superordinate task but its main purpose is to provide a framework for the necessary outcome to be achieved. Nor is bottom-level design *only* decentralized decision making - the purpose of self-design is to allow the knowledge workers to shape the surrounding environment in whatever form they find feasible for carrying out the tasks in the most beneficial manner. Organizational structure is the most apparent and most discussed variable in this report and the most popular term used, the *network* does not totally replace the hierarchy but operates of it. The network structure is designed by anyone who needs to get something done, whatever the designer's level in the functional hierarchy is. Because the overall network structure of the VO is the result of a collection of many distributed organizations, it may be extremely complex and constantly shifting. No one person, at any level in the VO, has a total picture of what the structure looks like, but nevertheless it is optimized due to the optimization of each organization's structure by the responsible knowledge workers.

4 A CSCW Environment for Modeling Virtual Organizations

The design process of VOs can be compared to the process of designing the internal structures of a traditional organization [MF95, p. 63], i.e. the design of business processes and underlying structures. Instead of having single persons in one organization performing the tasks to produce the outcome, in a VO the cooperating organizations perform these tasks. Nevertheless, processes and structures have to be laid out once in order to clarify each partner's responsibilities.

The environment to be described in this paper will be based on a comprehensive organizational data model, and a computerbased tool will be available to the partners to design the meta-structure of the VO cooperatively and to later refine each organization's contributing part in a distributed environment. In the idealistic form a complete picture of the organizational structure and its potential skills and know-how is available to everyone, afterwards. Moreover, the outcome of this evolutionary and ongoing process will be stored in an electronic organization handbook. It

will be available to every VO member and supplies with information about each partner's internal structure, its competencies and personal contacts. If such an electronic organization handbook is opened through the support of a standardized platform (such as the World Wide Web - W³), it can be developed into some type of on-line yellow pages where companies present themselves. Here they would inform about their core competencies and their main know-how, whereby such an environment would evolve into a virtual partner-organization catalogue.

4.1 An Organizational Data Model of Virtual Organizations?

In order to set up for such an integrated computer supported environment which aims at full integration with operative IT systems such as Workflow Management Systems (WfMS), a comprehensive and concrete data model for organizations is necessary. While previous work [Ott96] focused on all three submodels of a data model, here we will exclusively explain the appearance of the structural model, since it presents the basics of the electronic organizational handbook to be later focused on.

Data Entities for the Basic Design of Infrastructures

In VOs, conventional workgroups, units, divisions and enterprise sectors *reform themselves* as required. Tasks and influences change constantly and even the positions and competencies of organizational members shift in short periods (cp. [DM93, p.15]). However, despite the absence of hierarchy and organizational overhead, it is necessary to somehow document and model the existing virtual organizational structures at any time, in order to meet the thesis from chapter 0, that people are still more familiar with the metaphor of a structured organization.

In addition, the growing implementation of WfMS to control workflows within or across organizational borders, necessitates a means to model and illustrate the structures of VOs to assign process tasks to organizational elements (e.g. the 'virtual employees'). This aspect will be further delineated in chapter 0.

Complex processes and the large number of tasks which have to be carried out to complete a process need to be solved through the division of labor. The infrastructure model as a part of the data model describes the people who work at different locations in different departments of the VO, the resources (e.g. tools) they use to perform their tasks, the formal groups they belong to and the relations and formal communication paths between those groups. The infrastructure model uses various entities to model the organizational structure and determines their relations like subordination of units to other units and assignment of persons to units. This sub-model of the data model, which is based on research on various existing approaches of data and enterprise modeling¹¹, defines the structural components of an organization:

The entity **editor** summarizes the different entities that tasks of a common process may be assigned to. In the current data model an editor can be a person, a department (or unit), a post, a workgroup, a role, and a software agent.

Originally, organization directories were created to support messaging systems and thus their first and most important entity was that of a **person**. Addressing persons in (virtual) organizations through messaging systems is an important application field of directories, but recently messaging is also used by some WfMS to deliver work items to the appropriate user and for notifying users about their tasks. In addition to a mere listing of addresses, a directory needs to inform about an

¹¹ The data models used as reference have briefly been compared in [Ott96]

employee's preferred address at any point of time. The directory points potential communication partners to the appropriate address and, if a person is absent, **substitution rules**¹² will be applied.

To model an organization's departmental structure, it is not sufficient to simply add the **department** to which a user belongs as an attribute to the user's record. Since departments have their own attributes, such as their position in the organization chart, they need to be distinct entities. The department structure grows into a tree, in which each department resides higher than various other departments but has only one superordinated department. Besides these structural attributes, there are others like the manager, the secretary or equipment assigned to the department. A **post** is an abstract means that can optionally be used to model membership of persons to departments. Instead of assigning persons directly to departments, functions and tasks which are to be performed are defined in a post. A person fills a post and is thereby given authorities to hold a set of roles that are connected with that post. A post is filled by exactly one person and a person fills exactly one post. **Software agents** perform tasks instead of personal editors. Examples are database queries or automatic information retrieval, which may utilize external software resources.

To model modern process- and team-oriented VOs it is necessary to create additional views of the organization. **Workgroups** combine people that may belong to different departments or even to different organizations and that may work in separated locations. Workgroups may exist only for the duration of a particular project, as well as the whole VO may only exist through the presence of various interacting workgroups. The conception of workgroups will also be used to model multi-layered organization structures which are much more common for VOs than completely hierarchical approaches.

For building flexible and easily maintainable organizational structures for process enactment, it is crucial to keep the processes independent of the actual employees who finally complete the tasks. Assigning departments or workgroups to tasks may not be detailed enough, when particular skills are required - **roles** may be a first feasible means. Roles form a layer between the physical grouping concepts of departments and workgroups and the actual persons in an organization. In contrast to a post, a role describes a person's function within a process, whereas the former describes a person's place in the hierarchical context of an organization.

In addition to storing information about editors and the adequate organization structure, a directory can be used to control software and hardware **resources**. These resources can be assigned to tasks during process design in order to support users to complete the task. Moreover, the definition of resources in a directory can help members of VOs to identify who owns necessary resources and where to locate them in the network. Software resources, for instance application programs or databases, can be referenced in the directory by specifying their location and methods for their invocation. Furthermore, links to definite pieces of information such as databases, documents or web pages can be managed in the directory for the partner organizations. Similar concepts are valid for hardware resources, as well. Managing devices facilitates their use for the partners in the network and gives an overview over the equipment at disposal.

¹² Complex substitution rules of this data model are explained in [Ott96]

Classical and widely accepted and implemented	<ul style="list-style-type: none"> • department • unit • person 	<ul style="list-style-type: none"> • post • location • etc.
Less classical, yet currently disussed	<ul style="list-style-type: none"> • role • workgroup 	<ul style="list-style-type: none"> • competency • etc.
Currently rather unpopular	<ul style="list-style-type: none"> • skill • knowledge 	<ul style="list-style-type: none"> • capability • etc.

Table 2: Three classes of organizational entities in the current discussion on data models

Most of the data model entities which have been focused on so far remain absolutely necessary to design the basic infrastructure of a VO. Chapter 3 termed this basic design step the *top-level design*. Equivalently important but less concrete and less well know entities are some of those shown in **table 2**: While unit or department, person, post and sometimes workgroup or role are already widely accepted for describing organizational structures, the following chapter shows that in the future less definite organizational entities will be required in data models, as well.

Skills, Know-how and Core Competencies - The Qualities of Virtual Organizations

Know-how, the knowledge and skill required to do something correctly, is a critical factor in VOs. Expertise, mainly technical know-how, knowledge about customers and markets, as well as organizational and procedural acquired knowledge is a determinant which all partners contribute to the VO as their respective core competence¹³. The core competencies and the expertise on which they are built are the basis of an organization's involvement in a networked VO. Thus, each partner must focus on those competencies and must give a clear understanding of it to external partners in existing or new VOs. The optimized cooperation between the partners depends upon shared knowledge, some of which can be captured in information data. In a VO mechanisms must exist to capture the information about the *"where and who?"* of skills and knowledge in the geographically dispersed parts of the virtual company to be made available throughout the organization.

In order to supply with this information, the data model of the electronic handbook should be expanded with data model entities such as *know-how*, *skill* or *knowledge*. Information stored in these entities could answer simple informational requests such as "Who is capable of preparing a balance sheet?" or "Where can we get a partner that can give information on WWW security management?".

More significantly, these rather unprecedented entities should also be taken into account when automatically determining the performers of tasks in process or WfMS. I.e. as an alternative to designating persons or departmental members to tasks, an assignment of tasks to specifications like "Someone who can set up a balance", i.e. know-how, proves to be much more flexible. Such a possibility would allow to predefine processes for VOs without having to specify who has to carry out which of the distributed tasks - this would be done at runtime referring to the varying skill-specifications made in the organizational directory.

In order to give a complete overview of the modeling environment, the preceding definition of the data model, its entities and relations had to be only brief. A complete description of all relations

¹³ On the idea or core competencies see [PH90].

and possible exception leads to an extended infrastructure model which is described in detail in [Ott96].

4.2 An Information Base for the Virtual Broker

The knowledge representation about the organization's structure will be done in an information base for the broker as well as for all members of the organization. The current scenario of communication in distributed organizations and the information base developed through this project will be the focus of this chapter.

The Current Communication Scenario

Organizations are forced to improve or even optimize their business processes in cooperation with partners in order to reach a higher productivity or to gain competitiveness. A key factor for networked virtual organizations is a fast and easy communication, and the portion of electronic communication in this field rises quickly, which explains the great interest in electronic directories. The increasing use of electronic messaging is yet another factor and addresses like Manager(Marketing) are much more intuitive than SmithP@dian.thor.acme.com. Moreover in communication environments a vast variety of incompatible and partly paper based *directories* can be found and especially in a scenario where diverse partners get together in order to build a networked organization any of these assisting tools can be found: public telephone books and yellow pages, departmental telephone lists, personal computer software, pocket organizers, network user lists, human resource index card systems etc. Although any of these directories might carry valuable and possibly important information for the setting up of a VO, unfortunately these directories are bound to a distinctive locality and to a specific application software, they keep most likely redundant and inconsistent data and are administered by specific different but single persons in the same organization. This wide variety of information systems for organizational structure prevent from the quick use in VOs as information base on who can be helpful in a particular case in the business processes.

Within the subject of business communication the following changes can be recorded:

- organizations have to optimize business processes in order to reduce costs
- new types of organization layout with smaller independent units entail a growing external communication, i.e. communication across the borders of the own organizational unit
- trends to a growing interlocking of organizations require an increased inter-company communication
- an increasing portion of communication links (especially in virtual environments) is only short lived and is subject to permanent change of communication partners
- more and more communication partners are independent of place, which implies a need of information services on organization *structures*
- communication services are expected to be provided as complete services (rather than exclusive solutions for one application type)

The GroupOrga Organization Database on a Groupware Platform

In order to implement and represent the data model described in chapter 4.1 we introduce a Groupware database which holds all information about the model's entities. Although the used Groupware platform itself does not dictate a relational data model, it seems to be adequate to

stipulate a relational structure at least for the more common, hierarchical entities, such as departments, posts or persons. However, the use of a non-relational Groupware database enables for both, the design of strictly relational links and entities, as well as for a colloquial description of skills and knowledge. As chapter 4.1.2 showed, these less concrete assets of an organization will become more important for organization databases but they can hardly be squeezed into a rigid relational data model. **Figure 2** shows the user front-end from the prototype implementation of such an organization database.

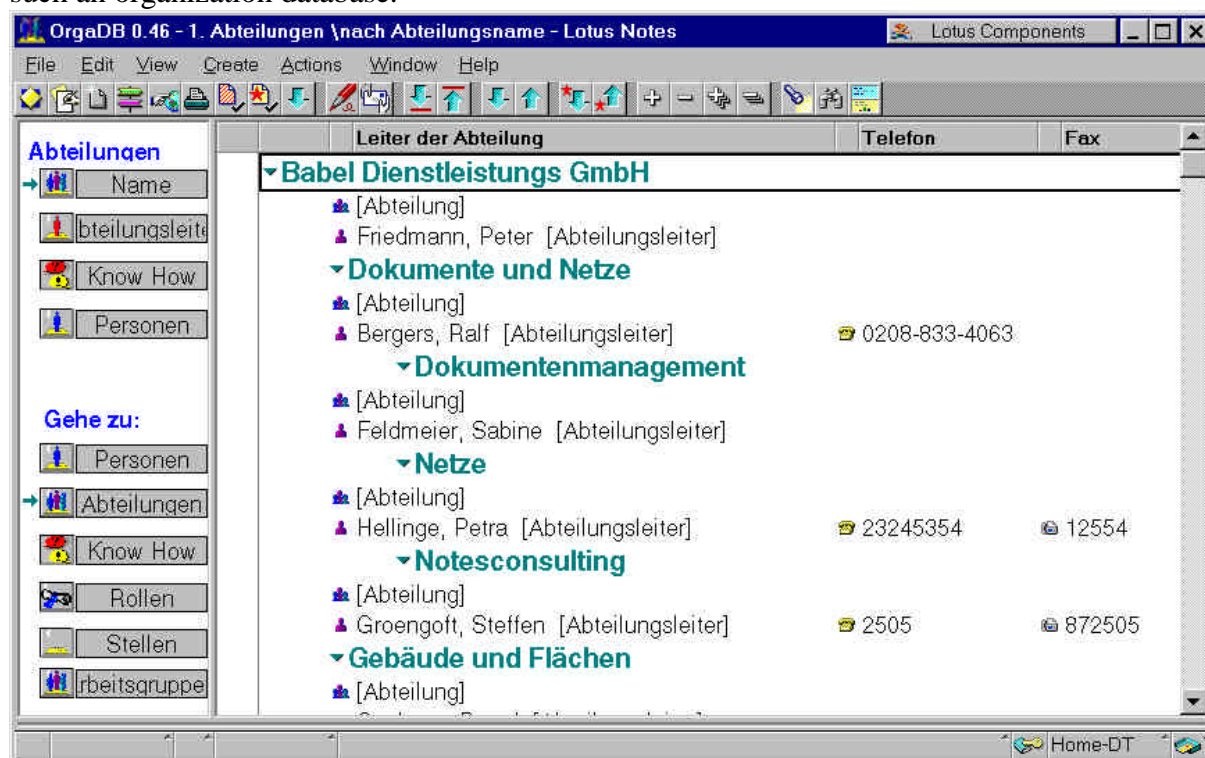


Figure 2: User front-end of the organization directory (German prototype)

Supporting distributed modeling of organizational structures requires scalability and the capability to share information from the directory. Thus confirming with the vision from chapter 3, a growing directory must be splittable into smaller, independent portions that can be administered separately. Nevertheless, this separation must be transparent for the user, i.e. a request that cannot be served by the local part of the directory must be handed over to the segment that contains the required information. The other way around, there must be an easy way to integrate several local directories into a large one. As outlined in the previous chapter, distributed organization modeling requires the option to delegate the administration of different parts of the directory to different authorities.

The organization database proposed in this paper is based on a Groupware platform, of which replication technology is an important feature for distribution of information. In order to realize the distributed organization handbook, identical replica copies of the same directory are held at different locations. This approach allows users to design and access information about the organization at several locations without being restricted to a central directory. The contents of replicas will be updated periodically due to a specific schedule or on request.

Protection of unauthorized access to distributed directory information is a feature which is supported by the access control management in the directory database. Likewise a secure, but yet flexible access control management ensures that only those contents can be modified, which a particular partner in the virtual network is allowed to change. I.e. layered authorization levels

distinguish the right to read entries, to modify them, to add new entries and to delete existing ones. The setup of this distributed Groupware platform would specify the extent to which information is being replicated. Thus, a *central*¹⁴ or main directory may store all available information and replicate specified parts to and from the partner's directories. Yet, this concept of centrality can be given up if wanted and the distributed directories would independently communicate with each other.

Advantages and Application Fields of an Organization Directory in VOs

Such a directory as proposed in the preceding chapters would be a standardized distributed information base for all possible entities within a VO. It would present a core component for the communication and the distributed workflow processes. In this respect it serves as an electronic information system or as an electronic navigator through the virtual entities of the respective organization, i.e. it provides with information about objects and potential partners in a distributed networked system. On the one hand, in technical terms such a directory is a data management system for a very large number of such information objects which are provided to all members involved in the virtually networked environment.

On the other hand it presents a "middleware layer" which is positioned between the actual task within a workflow and the respective task performer to be chosen from a number of potential members in a VO. Networks are less stable and more organic than functional hierarchies; during the process of accomplishing a shared purpose, workers in the network may change, and once a shared purpose is achieved, the network may be disbanded. New networks are regularly and instantaneously formed. In such an unsteady and unpredictable environment it is indispensable to be informed about who works with whom, since this is not prescribed by higher management. Instead, the partners seek out partners who have the relevant expertise and commitment to certain tasks with the support of a directory system. Thus the VO partners must know how to locate assets and skills, as through computerized organizational charts that contain information on workers' backgrounds and skills. They must also know who is available for how long, and under what terms. One could, for whatever job was to be done, quickly assemble a team by consulting this organization database of available skills and know-how. Although consulting and advertising firms do such things now, widespread networks will enable virtual teams to be assembled more quickly, for shorter projects, and from many different organizations. Additionally, as the next paragraph shows, this process of designating people to organization's real tasks could also be automated to a certain extent.

Not only can such an organization database be used as a pure information system for the individuals involved in the VO, but it can also serve as the base for the execution of partially automated workflows between the partners of a VO. In the actual work-process, WfMS would combine organizational components with process types via defined interfaces from the commonly created organizational database as illustrated in **figure 3**.

¹⁴ Since the term of a "center" does not exist for VOs, if at all, the broker or intermediary would administer such an all-embracing directory.

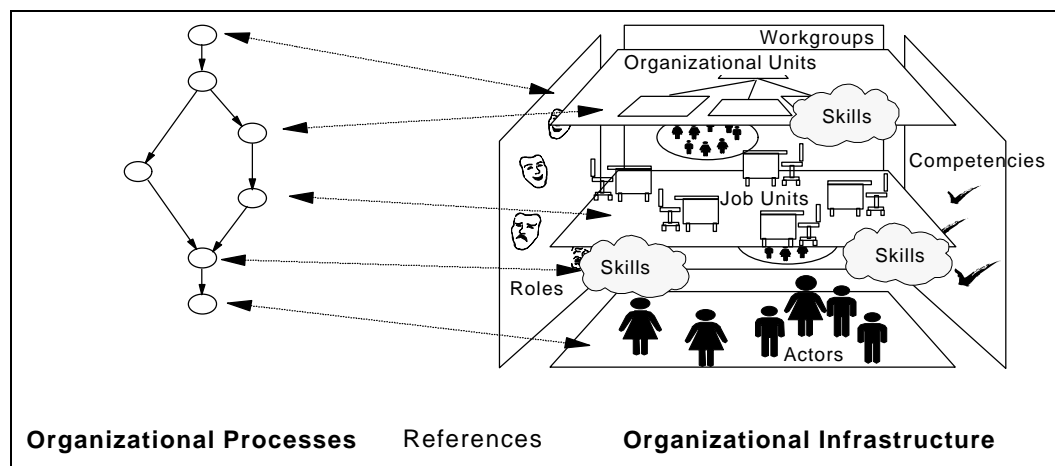


Figure 3: Assigning process tasks in workflows to elements of VOs

The current workflow management discussion stresses the ease-of-use of process management systems and demands flexibility and the possibility to perform ad-hoc changes in the process structure. As current approaches show¹⁵, the formulation of these requirements is not restricted to workflow management systems for local environments. It is also true for distributed, wide area workflow concepts which can be used for the support of processes in VOs, as well. With flexible concepts in the area of workflow management¹⁶ it is relatively easy to redraw the process diagrams and to change the way information flows between the collaborating partners. But unlike workflow support, organizational structure systems have been slow and difficult to change. In most applications for designing an organizational structure it is comparatively comfortable to rearrange the boxes in an organizational chart, but until the corresponding changes in information systems are carried out, a horde of specialized programmers working with large mainframe computers is required. By the time the information technology, such as workflow systems, is redesigned to reflect the altered underlying organizational structure, the latter has already been changed again, perhaps several times. A shared organization database architecture makes it possible for anyone who works with a workstation, to design and redesign the corresponding division of the VO.

Therefore, a necessity for the application and acceptance of a directory is its open interface to existing information systems such as WfMS. The directory service must offer an application programmers interface to enable office applications and WfMS to access directory information. This technology in combination with telecommunication networks permits to connect any individually generated process management system to the organizational database. Through this link each workflow will automatically base on always updated and optimized information about the organization's current structure and assets. With the availability of definitions of software resources, for example, WfMS may automatically use this information to launch an application or display a web page that is associated to a task.

Moreover, such an organization database can support a variety of applications since its advantage rises if it assists more than one application. Such a "multi-application" directory requires less resources and costs for its creation and maintenance and due to its common user interface, it can be used more easily than a single application directory. Two of these application fields, namely electronic know-how or skill directories and workflow processing, have previously been outlined in detail. Meyer proposes further important application fields of such directories [Meye93]:

¹⁵ Cp. [NR96]

¹⁶ Cp. [NH95]

- Office and telecommunication applications, such as e-mail or office automation packages
- Network and security management
- On-line information services such as yellow page services

4.3 GroupOrga Modeler - The Modeling Tool for Everybody

So far an abstract data model for design and administration of organization structures and its representation in a Groupware database has been introduced. In order to represent the organizational structure, however rigid or *soft* it may be, graphical on-screen illustrations are often more intuitive than the mere definition of it in any sort of programming language. Thus, we have developed an enduser environment which transforms the abstract definitions of entities and their relations into a visual illustration. The Groupware platform used in this environment does not have any graphical user interface available, which is one reason why we have supplemented the graphical tool shown in **figure 4**. For each entity from the data model a dialogue-window for setting the respective attributes will be made available

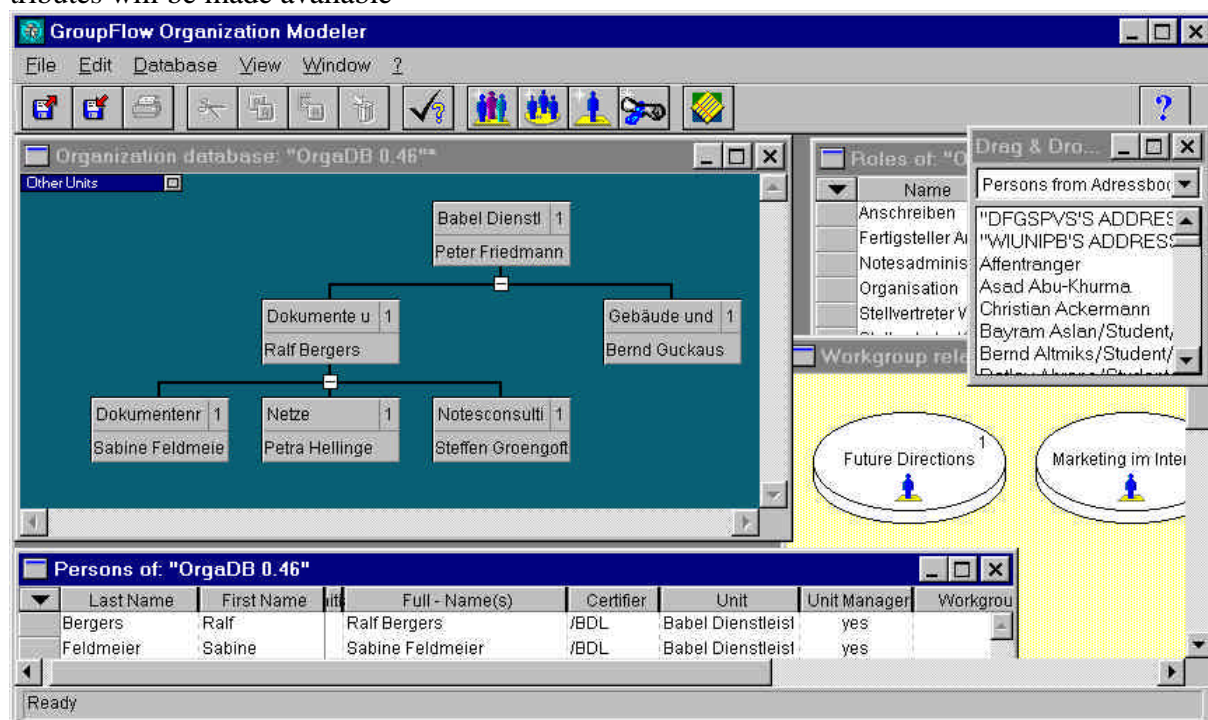


Figure 4: The GroupOrga modeler user interface

More importantly, we were forced to develop our own tool, since existing devices for graphical organization design do not support important features, such as API connectivity and distributed modeling; additionally, they rely on rather meager data models without innovative entities such as roles, workgroup, skills or know-how. Our prototype serves to discover improvements and additions for a final specification of a team-oriented graphical user interface.

The organization modeler assigns functionality to each object and thereby supports interactive linking of entities. Relations can be specified through a listed approach or through mouse-driven actions with ease-of-use and intuitiveness as two main design principles. After having designed the necessary organizational relations and structures between the VOs partners, the partial model will be stored in the background database and if necessary be replicated into the network. Naturally, all security options provided by the underlying Groupware platform remain existent and modification can only be made to those parts of the model with adequate access rights. In the

conceptualization phase we attached great importance to a clear representation in order to address everybody in an organization for an independent and participate process, i.e. not only potential IT experts.

"Push-button" information needs	Occasional changes or adaptations	Regular departmental design and planning	Regular design, planning, analysis and reporting
← end-user			administrator →

Table 3: Varying requirements by different user type classes

Table 3 shows that the target group of this organization design process are all members of the VO, i.e. it ranges from people who only want to get informed to those who actively and regularly participate in the design.

Navigation in the graphical representation can be performed by means of tabular retrieval functions, as well as by navigating in the graphical illustration itself.

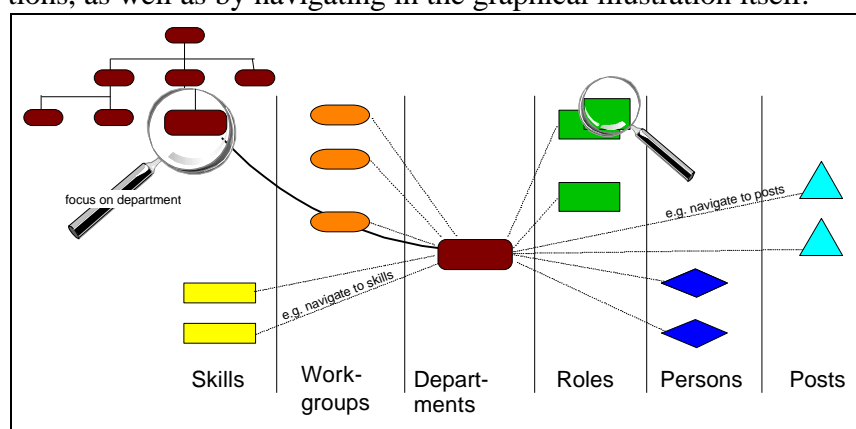


Figure 5: Procedure of navigation with the graphical tool

4.4 The Technical Perspective of the Current GroupOrga Architecture

Various technical requirements can be derived from these conceptional prerequisites. In the field of business *process* management there is first of all a great need for systems and platforms which deal with the actual control and management of workflows. A great number of concepts describe different approaches on a scale of workflow types, reaching from Groupware-based Workflow-Management¹⁷ over to team-based Workgroup-Computing platforms in the area of Office Systems¹⁸. These concepts will not be closer examined here.

Considering the aspect of the underlying organizational directory, concepts for the administration of *structural data* and their transformation into the respective workflow management systems are required. A further step should also discuss the auditing of structural or organizational data when very large organizations are concerned.

¹⁷ Cp. [NH95]

¹⁸ Cp. [NO96]

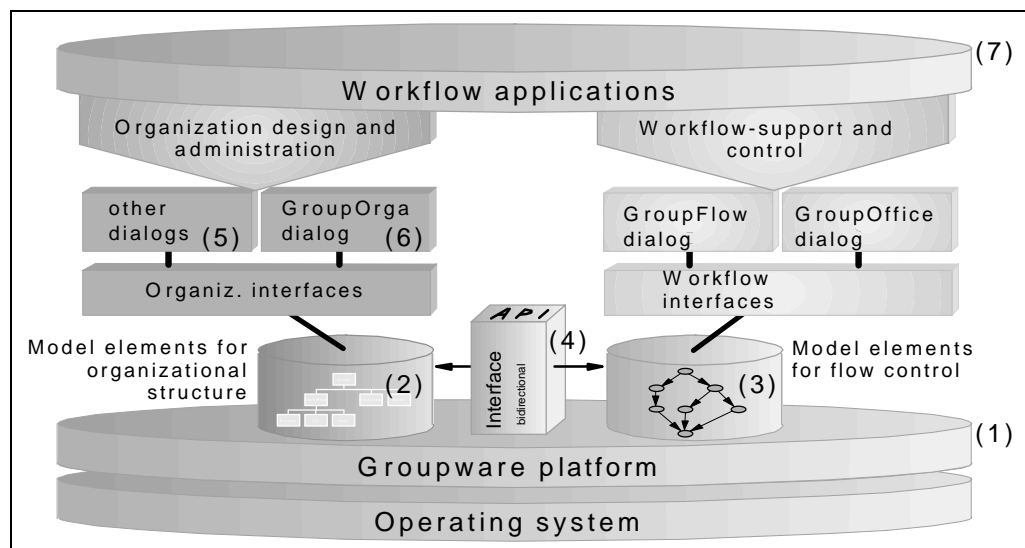


Figure 6: Schematic GroupOrga architecture

Figure 6 shows how the integral parts of the introduced CSCW environment interact and summarizes the respective goals: The Groupware platform (1) allows to administer the organizational information in a distributed manner and to constantly define and check access and security rights. Furthermore, the architecture consists of mutually consistent information bases on the one hand for the structural or organizational data (2), i.e. the electronic organization handbook, and on the other hand for the workflow runtime system (3), which manages and controls the processes.

In-between the API interface (4) would be placed which allows to transport organizational information directly from the directory to any operational system, e.g. a workflow management system. Modifications and updates to the organizational data must be definable through the easy-to-use graphical administration tool (5). The GroupOrga database front-end (6) serves well for simple information retrieval tasks. On top of these applications which are mainly focused at administrative tasks, the workflow applications can be found (7).

4.5 The next Step: Publishing the Organizational Handbook into the World Wide Web

Quite recently the architecture shown in **figure 6** has been enlarged by its integration into the World Wide Web. The underlying Groupware platform allows to easily publish any database into the W³ with the complete functionality available to the external user, as well. An open publication of information about an organization's assets, skills and know-how fosters the idea of a global virtual market where core competencies and main skills are offered by means of IT, and potential VOs would come into being for short periods, complete the joint task and dissolve, in order to rise again in a new structure and with changed partners. The more information is available about a potential partner, the better the outcome will hopefully be. Concluding, **figure 7** sketches the conception how such an organization directory would be seen and accessed from the W³.

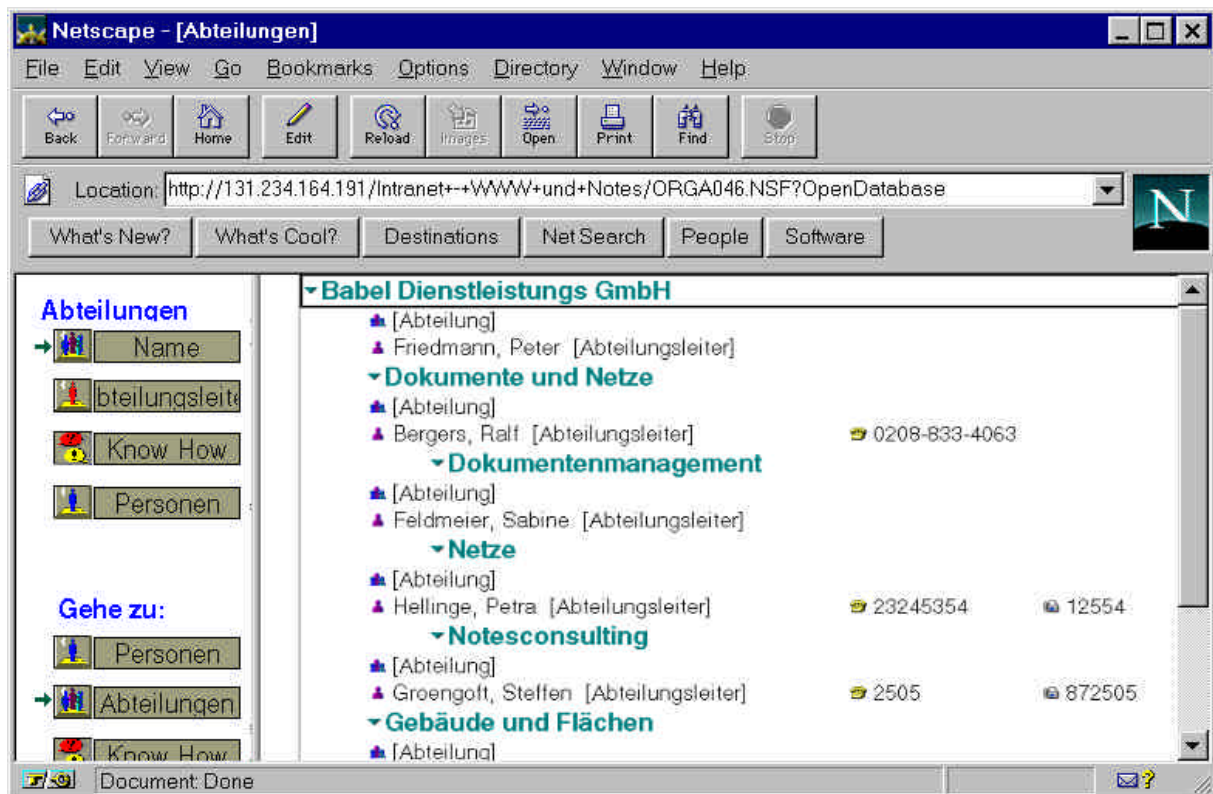


Figure 7: The organization directory for web users

5 Conclusion

Changes in technologies and market structures have shifted competition from a single organization's to a network scope, resulting in a need for new organizational strategies and structures. Traditional organizational designs, having evolved in response to a different set of competitive pressures, are generally not appropriate for these new strategies. New organizational structures, like those which are the main focus of this conference - the virtual organizations - need to achieve both flexibility and coordination among partner firms and their respective diverse activities in new international markets.

An evolutionary and distributed approach to design has been proposed. It has been shown that traditional design processes are no longer adequate for VOs and therefore a new multiple level team design process has been explained. Arguments have been given why such an advance serves today's requirements better than traditional procedures. Although we believe that both levels of design are necessary at present time, much current thinking argues that the hierarchical level might eventually be eliminated.

Furthermore, this paper has introduced a CSCW based environment for modeling the structures of these new organizational forms. It is a Groupware based organization concept which puts the conceptualized approach of distributed and intuitive structure design into action. This concept's base, a comprehensive data model for enterprises, has been delineated and its prototype implementation in a Groupware database has been described. Further, it has been shown that an organizational information base can be advantageous in various application fields. Concluding, a graphical tool for design support has been presented and the overall architecture has been pictured. An outlook on further conceptual ideas, such as an integration into the W³ has been given.

The authors recognize that knowledge of designing effective virtual organizations is in an early state. This composition showed that much has been said about what VOs are and how they should

be designed, but little is clear about how to operatively execute these ideas when it comes to the true and actual layout of a VO. The purpose of this paper is not to propose the way to design the virtual organization, but to put forward for consideration a first IT-supported design approach as an alternative to the traditional organizational design approach, which is proving to be inadequate to the task.

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Report on the International Workshop on Virtual Operations and Agile Organizations

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Proceedings are available at: <http://www.nectar.org/update/proceedings/97082101/index.htm>

The workshop took place on August 21st and August 22nd in Rotterdam, The Netherlands, and marked the endpoint of a one-month research period at Rotterdam with participants from the US and Europe. 24 participants from 7 countries attended and contributed to the results of the workshop. The event was jointly sponsored by the EU-TELEflow project, the EU Telematics Application Programme, the European Agility Forum, the CIMOSA Association, the Erasmus MBA/MBI Programs and the Center for Management of Co-operation at the Erasmus University. Dr. Kevin Crowston, Syracuse University, Dr. Bernhard Katzy, University St. Gallen, and Prof. Dr. Kuldeep Kumar, Erasmus University Rotterdam, moderated the meeting.

The results of the workshop can be summarized with three key findings.

1. The workshop made visible multi-faceted bottom-up approaches towards the virtual enterprise all over Europe. However, the co-operation among these still isolated activities could give a lever to this spreading new paradigm.
2. Behind the diversity of the approaches there was general agreement that the essence of the virtual enterprise is to manage change proactively. There is a need to develop the dynamic business models as well as the theoretical foundations of the virtual enterprise and metrics of change.
3. The third key finding is that virtual enterprises are contingent on their structural and cultural environment. This resulted from the intense discussion between participants from the US, Latin America and Europe on their experiences. An unambiguous message from this discussion is that Europe has to identify and develop its own approach(es) to the virtual enterprise that gives a competitive lever to its economic structure in the global economy.

Empirical cases

Most of the contributions to the workshop were based on empirical cases and ongoing projects including:

- **Global competence networks**, strategically lead by a focal company or by governmental agencies,
- **Co-operation of manufacturing suppliers in their regions** of Brabant, Scotland, Lake Constanze, Prato and Latin America,

- **Co-operation of companies in their industries** such as the environmental industry, the IT industry or the flower industry.

The cases showed different trajectories in the formation of the virtual enterprise.

- One group **represents networks that have been incited by University activities or governmental funds** with the objective to stimulate economic development. As the discussions showed, these networks face the challenge to generate sustainable commitment among the companies to continue the engagement after funding has expired.
- A second trajectory towards the development of networks is **the strategic intent of a focal company** to create the network and to intensify co-operation in the supplier network.
- If there is no strategic center, a third trajectory of network development was reported as **intensified co-operation of peer companies** with broad objectives.

Thriving on change is the essence of the virtual enterprise

The core issues of inter-organizational co-operation, building of networks and the creation of new markets and business, which have been raised throughout the contributions of the empirical cases, gave rise to intensive discussions. The essence of the virtual enterprise, the driving force to engage in new organizational forms has finally been stated to be the competence to manage change proactively. The virtual enterprise extends the mastering of change beyond traditional limits.

The virtual enterprise carries flexibility beyond mass customization of products to process re-configuration for market opportunities, which is based the entrepreneurial functions of the agile virtual enterprise.

Change processes are concurrently effective on the level of the network, the company, the team, and the individual. Change will affect the formation and re-formation of the network as well as the dynamic re-configuration of projects within the network. Learning Processes are interactive processes of mutual adaptation between individuals who co-operate in teams and the network they are embedded in.

Agility requires the competency of Introspection, which is the capability of the virtual enterprise to reflect on its dynamic change processes in order to manage change.

A US / European controversy revealed the embeddedness of the virtual enterprise in its structural and cultural settings

The American participants put forward the perspective that the ultimate form of business in the virtual enterprises would emerge spontaneously from encompassing markets. They expect incentives in the market to create win-win situations that, then, create the cohesiveness among the partners of the virtual enterprise. Market competition, for them, is an accepted selection mechanism between individuals to participate in the virtual enterprise. This cultural setting is complemented by economic structures, e.g. a case based economic law that easily adapts to innovative forms of business or a venture capital market that allows for high risk investments.

From a European perspective, in contrast, pre-existing structures in industrial districts have a high priority, both as an asset and as an object of management attendance. Therefore, methodologies to support strategic processes in the network are proposed. And operative support with tools for modeling and simulation are developed to support these processes.

Ongoing activities in Europe

The workshop created a strong motivation among the participants to intensify co-operation in this emerging community. Ongoing and future activities, which are open for participation, can be taken from the homepage.

<http://www.nectar.org/update/proceedings/97082101/index.htm>

Proceedings are online available, including a summary of the workshop. A preliminary list of future research topics will be refined by the European concertation workshop on virtual organization. This workshop will publish its findings at the European Conference on Digital Commerce, Genoa 1998.

Current Research Project

Production Planning and Management in an Extended Enterprise

PRODNET-II aims to design and develop an open platform and the IT protocols and mechanisms needed to support virtual industrial enterprises. The architecture will employ new emerging standards and advanced technologies in communication, cooperative information management, and distributed decision making. PRODNET-II will address several virtual enterprise environment requirements and necessary steps, i.e.:

- to improve the understanding of the nature and structure of the business data and the information that needs to be communicated between partners in a virtual industrial enterprise, with a particular emphasis on business flexibility and specific aspects relevant to SMEs;
- to design and develop a software infrastructure to provide an environment for this data and information to be exchanged, shared and managed in the virtual industrial network, unlike the present integration mechanisms that are typically closed and proprietary;
- to promote the utilisation of international standards such as STEP, EDIFACT, Internet computing/Java, ISO 9000 etc. to assist SMEs to maintain and improve their competitiveness in the European and world-wide market;
- to speed up and support the implementation of open, standard software components, that are easy to use, low in cost and provide a high value-added benefit, which are required by SMEs; and
- to provide the opportunity for the IT vendors to support many requirements set by the SMEs, and to implement new products taking advantage of an emerging market which will be global in its nature by the year 2000.

In addition to supporting the main virtual enterprise environment requirements mentioned above, a number of specific functionalities are supported by the proposed PRODNET-II system, that include:

- Efficiency of orders flow, namely by the combination of EDI and STEP;
- Support for follow-up of order status along the network
- Distributed and dynamic scheduling;

- Incomplete and imprecise orders acceptance and management;
- Network-wide workload optimisation;
- Open communication of total product data.

Also, in PRODNET-II, an open reference architecture with well defined interface specifications, will allow other software companies to develop compatible products. An operational demonstrator involving PRODNET-II end-user nodes, partly in Europe and partly in Brazil is planned. Compared to other world-wide R&D activities, PRODNET-II shows a number of advantages and innovative factors.

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Portugal

Participants

Country

Role

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CADDETC

UK

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MIRALGO SA

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Universidade Nova de Lisboa

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Universiteit van Amsterdam

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ESTEC Ltd.

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Universidade Federal de Santa Catarina

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Fred Jung

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Uninova

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Start Date

Duration

01 October 1996

36 months

Recent Publications

compiled & edited by Nicole Strausak, Benno Suter & Thomas Studer.

Recent Articles

Bollinger, T.: Neue Anforderungen an das Outsourcing, in: IO Management 66 (1997) 7/8, p. 22-25.

Fleischmann, F.: Räumlich getrennt-sachlich vereint, in: Office Management 45 (1997) 5, p. 47-49.

Franck, E.P.: Über die raum-zeitliche und institutionelle Entkoppelung von Arbeits-prozessen durch Informations- und Kommunikationstechnik, in: Information Management 12 (1997) 2, p. 6-16.

In the ongoing discussion of the interplay between information & communication technologies and forms of organization, the article focuses on an aspect which is given much attention at this time: The institutional separation of work processes and their disconnection in terms of space and time by means of information/communication technologies. The discussion systemizes and analyzes in detail the dissolution of boundaries of space and time, the overcoming of institutional boundaries of organizations, the conditions for time/spatial disintegration, as well as forces provoking disintegration from the perspective of the New Institutional Economics.

Gerard, P.; König, W.: Netze und elektronische Märkte, in: Wirtschaftsinformatik 39 (1997) 3, p. 215-216.

Gruhn, V.: Elektronischer Datenaustausch in zwischenbetrieblichen Geschäftsprozessen, in: Wirtschaftsinformatik 39 (1997) 3, p. 225-230.

Business process (re-)engineering and workflow management are important techniques to improve quality and productivity. But often the redesign of business processes only occurs within a company. Opportunities resulting from a redesign of interfaces between companies remain unexploited. In contrast, Electronic Data Interchange (EDI) is a means to improve communication between several companies, however without addressing a reorganization of the internal business processes. This article presents the use of EDI in the course of designing interorganizational business processes. This approach is based on organizational charts, role models, FUNSOFT nets, and extended entity-relationship models.

Gudehus, T.; Brandes, T.: Logistik: Kernkompetenz des Handels, in: Dynamik im Handel (1997) 1, p. 71-72.

Giesen, K.: TEAM: Stark durch Partnerschaft, in: Information Management 12 (1997) 2, p. 76-77.

International forwarders and carriers are increasingly forced to adapt their businesses to the global strategies of their customers. This article describes the case of Thyssen Haniel Logistic GmbH (THL), which founded the strategic alliance called TEAM (Trans European Alliance Member) together with five other european forwarders and carriers in order to offer an european-wide network of 251 sites.

Gugler, P.; Pasquier, M.: Strategic Alliances of Swiss Firms - Cooperative corporate strategies in the global race, in: Die Unternehmung 51 (1997) 2, p. 133-144.

Since the beginning of the 80s, strategic alliances have become one of the major strategies implemented by firms in order to face the new challenges of market globalization. Swiss firms, whose activities are highly internationalized in comparison with foreign firms, are very busy operating national and international strategies such as mergers, acquisitions and strategic alliances. The purpose of this article is to analyze strategic alliances concluded by Swiss firms during recent years in the context of market globalization and increased competition.

Hamilton, S.: E-Commerce for the 21st Century, in: Computer (1997) 5, p. 44-47.

If CommerceNet, a non-profit organization that is intended to foster Electronic Commerce, manages to realize its vision, we might well see a new „ecology“ of global Internet commerce, with buyers, sellers, and intermediaries forming extended trading communities. This article describes the Internet commerce of tomorrow in bringing up three main barriers such as content, convenience and confidence.

Heck, A.: Strategische Allianzen - Wie Sie die Herausforderung der operativen Umsetzung meistern, in: Kompetenz, (1997) 1, p. 22-28.

Herrmann, W.: Der virtuelle Vertrieb bleibt vorerst ein Wunschtraum, in: Computerwoche 24 (1997) 27, p. 9-10.

Software producer and analysts predict the growing of a huge market in the field of Computer Aided Selling (CAS). These tools intend to enhance productivity among enterprises and thus to become a competitive advantage. But so far, a lot of these Sales-Force-Automation-Tools did not work well in practice, which is not due to the used Software but rather due to mistakes done in the management and organization. It shows that most organizations are still at the beginning on their way to virtual distribution.

Holland, C.P.: The evolution of electronic hierarchies in business markets, in: Wirtschaftsinformatik 39 (1997) 3, p. 245-253.

Jarillo, J.C.: Strategic Networks: The Key Points for Success, in: Manager Bilanz, (1997) 7, p. 24-27.

Kambil, A.: Doing Business in the Wired World, in: Computer (1997) 5, p. 56-61.

Electronic commerce promises to radically transform business. To stay competitive, firms must understand the implications of the information-rich infrastructure the Internet provides. To effectively compete, Managers will have to invent new business models that re-emphasize scale, differentiation, and brands. They will also have to spend substantial time redesigning transaction processes. Effectively implementing these strategies and simultaneously reconciling new and existing business models will be the key to a firm's success.

Lederer, A.: Dezentrale Arbeitsplätze - ein Modell mit Perspektiven, in: DV-Management (1997) 1, p. 34-37.

Information and communication technologies will permit the handling, storage and transmission of all kind of information. This enables job-relevant work to be done at home on a computer even out of regular office hours. Competitive advantage now lies in the use of information and communication technologies in order to support much more flexible and decentralized business organizations. Nevertheless, a critical factor is to keep up the communication among employees. Appropriate models show that it works well.

Liegle, J.O.; Bodnovich, T.A. (1997): Information Technology in Virtual Organizations: A Needs Assessment from the Perspective of Human Resource Management, in: Gupta, J. (Ed.): Proceedings of the Association for information systems 1997 americas conference, Indianapolis, 15.-17. August 1997.

(see <http://hsb.baylor.edu/ramsower/ais.ac.97/program.html>)

The paper uses three models of virtual organizations to ask questions about human resources management: (1) telecommuting companies, (2) companies that outsource all non-core competencies, and (3) completely virtual companies. According to the authors, information technology plays a vital role in supporting the human resource management needs in such companies. In the personnel planning phase, the role of IT will shift from supporting task and process oriented activities, such as forecasting the demand for employees, to supporting result oriented activities, such as closely monitoring project progress. Since managers may no longer be able to directly observe employees, IT can support compensation activities by providing results oriented feedback. IT can even help to foster a company culture in the VO, by linking geographically distant employees. In the area of personnel development, information technologies such as video conferencing and Web-Based Training will allow interactive education for even the most remote employees. Supporting all of these IT human resource activities will require a globally secure, yet flexible IT infrastructure. To verify the effectiveness of new technologies like Web-Based Training, virtual meeting places, and other informal electronic communication systems the authors suggest to conduct further research.

Lorenz, W.-D.: Kompetenzzentrum für Kooperation, in: Information Management 12 (1997) 2, p. 74-75.

In order to foster the small to medium-sized IT business sector in Berlin-Brandenburg, an internetbased competence center for cooperation was founded. This so-called "Virtual Software House" serves as an information, communication and cooperation platform by offering various services.

(see <http://www.softwarehaus-bb.de/>)

Materna, W.: Informations-Highway begünstigt die Bildung virtueller Unternehmen, in: Information Management 12 (1997) 2, p. 72-74.

The author summarizes the main characteristics of Virtual Organizations and therefore gives some examples.

McKinney, V.; Gerloff, E. (1997): Interorganizational Systems Partnership Effectiveness, in: Gupta, J. (Ed.): Proceedings of the Association for information systems 1997 americas conference, Indianapolis, 15.-17. August 1997.

(see <http://hsb.baylor.edu/ramsower/ais.ac.97/program.html>)

This paper focuses on Interorganizational systems (IOS) and their role in the partner relationship as well as the establishment of trust between the partners of an IOS. Using organizational theory as a foundation, it takes a macro approach in exploring the nature of the various IOS roles and discusses the significance of uncertainty, trust and communication on these roles. The authors make 5 propositions to illuminate the changing amount of uncertainty and equivocality when the role of IOS changes from a transactional to a knowledge-based one.

Nilsson, R.: Multimedia im Handel - Strategische Ansätze und erste Erfahrungen im Karstadt-Konzern, in: DV-Management (1997) 1, p. 9-12.

Talking about Multimedia, the information manager of the Karstadt-Group rather emphasizes the philosophy and the conception than the used technology and tools that stand behind this term. Multimedia has also implications on the value chain of distribution. Therefore, the Karstadt-Group concerns itself with the virtual mall of the future. In a virtual mall a wide range of products and services of different industries are offered. This article describes the virtual mall „my world“ and its components.

Palmer, J.W.; Speier C. (1997): A Typology of virtual Organizations: An Empirical Study, in: Gupta, J. (Ed.): Proceedings of the Association for information systems 1997 americas conference, Indianapolis, 15.-17. August 1997.

(see http://hsb.baylor.edu/ramsower/ais.ac.97/papers/palm_spe.htm)

Palmer and Speier suggest four types of Virtual Organizations: (1) Permanent Virtual Organizations, (2) Virtual Teams, (3) Virtual Projects and (4) temporary Virtual Organizations. They conducted a survey with 55 companies. The answers show that there are significant differences in the use of IT in these four different types: While (1) uses EDI and (2) Groupware, the more temporary and project oriented forms rely on older technologies like fax and e-mail. One other interesting finding of the study is that 93% of the companies use Internet as communication medium to support coordination tasks. The paper concludes with the question whether EDI and Groupware have to be integrated into the Internet to best support different forms of Virtual Organizations.

Philipps, A.; Klein, T.: Strategische Unternehmensführung: Warum das Konzept des Kernkompetenz-Management mehr ist als eine Modeerscheinung, in: Kompetenz, (1997) 1, p. 4-12.

Romm, C.; Pliskin, N.; Clarke, R.: Virtual Communities and Society - Toward an Integrative Three Phase Model, in: Information Management 17 (1997) 4, p. 261-270.

The relatively new phenomenon called virtual community aggregates members, content, and member profiles through electronic media. Despite the short time of their existence, they have been attracting much attention by researchers. The purpose of this paper is to review the theoretical and empirical work that has been conducted in relation to virtual communities in society, using it as a basis for an integrative three-phase-model that represents virtual communities in society. Following a short introduction which deals with some issues of categorization and definition, the paper proceeds to discuss the three building blocks of the proposed model.

Sachs, S.: Evolutionäre Organisationstheorie, in: Die Unternehmung 51 (1997) 2, p. 91-104.

The increasing dynamics and complexity of today's competition raises the question how well enterprises still can be organized respectively which role rationality plays for managing enterprises. So far, this question was primarily treated from a sociological respectively economical perspective. This article concentrates on an evolutionary view by presenting modern Theory of Evolution and its use of today. By means of fundamental evolutionary principles, an integrated understanding of rationality is developed, which enlarges the manager's room for manoeuvre.

Savolainen, V.; You, Y.; Zhang, Zh.: Virtual Teamwork Environment - A Web-Based Conical Administration Framework for MNC, in: Gupta, J. (Ed.): Proceedings of the Association for information systems 1997 americas conference, Indianapolis, 15.-17. August 1997.

(see <http://hsb.baylor.edu/ramsower/ais.ac.97/papers/savol.htm>)

This paper discusses the IT support of virtual team arrangements. It suggests a conical structure of virtual teamwork environment for MNC over Internet and focuses on the system structure and some design aspects. The Authors expected some characteristics of such a system:

- Support to product exhibitions and problem solving (opened/half-opened),
- Support to asynchronous/synchronous communication,
- Support to team meetings and conferences (opened or confidential),
- Support planning scenario development and decision making,
- Support highly compatible features with other teamwork tools or groupware, and
- Support awareness in team workers and projects.

Schneider, V.: Virtuelle Banken im internationalen Vergleich: Analyse und Klassifikation, in: Bank und Markt (1997) 3, p. 21-25.

Sieber, P.; Griese, J.: Virtuelle Unternehmen in der DV Branche, in: Information Management, 12 (1997) 2, p. 17-27.

Steininger, H.; Heinrich, R.: Deutsch-japanische Teamarbeit, in: FB/ IE 46 (1997) 2, p. 72-75.

Svoboda, B.: Neuere Ansätze des Convenience-Shopping im Einzelhandel, in: DV-Management (1997) 1, p. 3-8.

Today, an increasing number of profitable Multimedia applications are offered in the market. Besides the CD-Rom and the Internet, there is a great potential for these applications at the Point-of-Sale. These information systems inform consumers about the current product range and enables them to compare products and prices, which might lead to an increased shopping-convenience. This thesis is tested by an empirical study, whose results are presented in this article.

Swoboda, B.: Kooperative Wertschöpfungspartnerschaften - Barrieren und Erfolgsfaktoren des Efficient Consumer Response Managements, in: Information Management 12 (1997) 2, p. 36-42.

The idea of a cooperative optimization of the value chains in industry and trade are a major concern of the consumer goods industry. According to empirical studies, connecting through the line from producers via retailers to consumers, which is called Efficient Consumer Response Management, offers extraordinary potential to optimize efficiency. As implementing ECR meets with various practical problems, it seems indispensable to ask which are the factors that enhance its successful implementation. Here, the author deals with recent trends in cooperative value chains and analyzes their problems and conditions of success from an empirical point of view.

Travica, B.: The Design of the Virtual Organization: A Research Model, in: Gupta, J. (Ed.): Proceedings of the Association for information systems 1997 americas conference, Indianapolis, 15.-17. August 1997.

(see <http://hsb.baylor.edu/ramsower/ais.ac.97/papers/travica.htm>)

Travica suggests a working definition of Virtual Organizations to concentrate further research. Not like for example Venkatraman and Henderson (see <http://management.bu.edu/research/scriprojlist.html>) he describes a new and distinct form: „VO refers to a temporary or permanent collection of geographically dispersed individuals, groups, organizational units - which do or do not belong to the same organization - or entire organizations that depend on electronic linking in order to complete the production process.“ The two basic structural conditions for VO are (1) geographical dispersion of organizational units and (2) electronic linking of production process.

Von Kortzfleisch, H.F.O.; Winand, U.: Kooperieren und Lernen im Intranet, in: Information Management 12 (1997) 2, p. 28-35.

Cooperation and Learning become strategic successfactors for companies. In order to design cooperative relationships and organizational learning efficiently and effectively, there is a need for a related information management and knowledge management, and for belonging management concepts, as well. Intranets are able to support information management and knowledge management and the belonging management concepts - to implement them will offer cost benefits, time benefits, and quality benefits. At the time, the use of intranets is based on an understanding of information management and knowledge management and the belonging management concepts that focusses on technical aspects and the aspect of information supply. From the perspective of business informatics, however this understanding has to be supplemented.

Wehrli H.P.; Krick M.: Strategische Netzwerke - mit Kooperation zum Erfolg, in: Manager Bilanz, (1997) 7, p. 19-23.

Weigle, J.; Schwarzer, B.; Krcmar, H.: Die Rolle der Informations- und Kommunikationstechnologie in zwischenbetrieblichen Kooperationen der Multimedia-Branche, in: *Information Management* 12 (1997) 2, p. 43-48.

The necessity of change in economic life resulting from the potential of information technology (IT) seems stronger than ever before. Particularly the field of interorganizational cooperation offers several possibilities for IT-support. To obtain a better understanding of the role of IT in interorganizational cooperation, this article describes a cooperation to produce a multimedial Compact Disc Interactive (CDI) by focussing on the IT used for coordination, on shared material and on the role of mutual trust between partners in cooperation. The authors conclude that despite the frequent use of IT, the technical potential was not fully exploited. They claim that in the selection process of cooperation partners mutual trust plays an essential role. Therefore, IT complements rather than enables the forming of a cooperation network.

Wigand, R.: Virtual Organization: Enablers and boundaries of an Emerging Organizational Form, in: Gupta, J. (Ed.): *Proceedings of the Association for information systems 1997 americas conference*, Indianapolis, 15.-17. August 1997.

(see <http://hsb.baylor.edu/ramsower/ais.ac.97/program.html>)

The paper outlines that the virtual organization has become popular with the rapid growth of electronic commerce and is regarded as one of the promising new organizational forms of the future. But it also takes a cautious perspective and deliberates that the jury is still out whether virtual organizations work well in all business settings. They discern that virtual organizations manifest themselves across many boundaries: time and space, as well as legal definitions. Improved support of economic activities via modern information systems is a promising strategy for the expansion of human performance limits. Trust counts as a decisive coordination mechanism for virtual organizations. Conversely, opportunistic human behavior, in the sense of pursuing self-interests at another person's expense, causes risks. Several limitations, however, can be recognized, including the technical infrastructure, as well as human behavioral patterns imposed on institutions.

Yager, S.E.: The Role of Information Technology Support Mechanisms in coordination Management for Virtual Organizations, in: Gupta, J. (Ed.): *Proceedings of the Association for information systems 1997 americas conference*, Indianapolis, 15.-17. August 1997.

(see <http://hsb.baylor.edu/ramsower/ais.ac.97/papers/yager.htm>)

Yager describes forthcoming research activities in which she will concentrate on coordination enabled by IT. She argues that companies to remain competitive in today's business environment require new levels of cooperation and coordination of both intra- and inter-organizational systems. Yager uses the model of DeSanctis and Jackson (1994) who explored three major mechanisms for facilitating interunit coordination of IT management: structural design approaches, functional coordination modes, and computer-based communication systems. The authors presented a three-dimensional model consisting of: Coordination Structures (cross-functional teams, task forces, designated liaison roles, direct contact, reporting requirements), Coordination Modes (information sharing, procedural, structural, task outputs, task dialogue), and IT Support Mechanisms (document sharing, bulletin boards/E-Mail, computer conferencing, electronic meeting software, discussion databases).

Zelewski, S.: Elektronische Märkte zur Prozesskoordinierung in Produktionsnetzwerken, in: Wirtschaftsinformatik 39 (1997) 3, p. 231-243.

Production networks attain increasing regard, e.g. as flexible manufacturing systems, supplier networks, as an aspect of global manufacturing, and also as virtual enterprises. It is explored, in which way electronic markets are applicable to the coordination of production processes in such networks. For this purpose, a particular type of multi agents systems is considered, namely contract net systems. Auction mechanisms, which allow a market-like design of process coordination, are especially discussed. A Petri net based model of such a flexible manufacturing system is implemented, using the Vickrey auction. Specific difficulties and perspectives of further development are pointed out.

Recent Books

Becker, R.: Kunden-Fokus-Teams: Erfolg durch teamorientiertes Netzwerkmanagement, Gabler, 1997. (ISBN: 3-409-18746-4).

Fischer, P.: Arbeiten im virtuellen Zeitalter: Den Arbeitsplatz neu denken, Gabler, 1997. (ISBN: 3-409-18936-X).

Fukuyama, F. et al.: The "Virtual Corporation" and Army Organization, Rand Corp., July 1997. (ISBN: 0833025325).

Hale, R.; Whitlam, P.: Towards the Virtual Organization, McGraw, April 1997.

Hedberg, B.: Virtual Organizations and Beyond (Wiley Series in Practical Strategy), John Wiley & Sons, October 1997. (ISBN: 0471974935). Not yet published.

Henry, J.E., Hartzler, M.: Tools for Virtual Teams: A Team Fitness Companion, Amer Society for Quality, July 1997. (ISBN: 0873893816).

Hinterhuber, H.H.; Handlbauer G.; Matzler, K.: Kundenzufriedenheit durch Kernkompetenzen, Hanser, C /VM, 1997. (ISBN: 3-446-18775-8).

Linde, F.: Virtualisierung von Unternehmen: Wettbewerbspolitische Implikationen, Gabler Edition Wissenschaft, 1997. (ISBN: 3-8244-6528-0).

MacNamara, T.; Seel, R. (Ed.): AMED R&D Conference, Pt.2: Virtual and Flexible Organisation, AMED, May 1997.

Picot, A.; Dietl, H.; Franck, E.: Organisation - eine ökonomische Perspektive, Schaeffer-Poeschel, 1997. (ISBN: 3-7910-1214-2).

Schank, R.C.: Virtual Learning: Revolutionary Approach to Building a Highly Skilled, Irwin Professional Publishing, July 1997. (ISBN: 0786311487).

Schäper, C.: Entstehung und Erfolg zwischenbetrieblicher Kooperationen, Deutscher Universitätsverlag, 1997. (ISBN: 3-8244-6427-6).

Call for Papers

Concerning the following issues, there will not be any restrictions on topics. Every research paper relating to the topic of Virtual Organizations will be appreciated and taken into consideration for being published in our newsletter, no matter if it relates to the industrial or the service sector. Of course, we will also appreciate grounded descriptions of practitioners about their experience in virtual organizing.

If you would like to contribute a research paper to the fifth issue, please send it to Pascal Sieber before November 15, 1997. Submitted research papers should be original and preferably between 400-5'000 words in length.

Sources of Research

Articles

Databases on the Internet:

- ProQuest ABJ/INFORM, Global Edition: <http://www.umi.com>
- SWEETSCAN: <http://www.swets.nl/cgi-bin/strt-cgi>

Databases on CD-ROM:

- BLISS - Betriebswirtschaftliche Literatur (Literature of Business Economics)
- SOLIS - Sozialwissenschaftliche Literatur (Literature of Social Sciences)
- HWWA - Volkswirtschaftliche Literatur (Literature of Economics)

The databases SOLIS, HWWA and BLISS are published by the „Gesellschaft für betriebswirtschaftliche Information“ (GBI) in Germany. For details, please have a look at <http://www.gbi.de/>.

The following magazines are not contained in the databases listed above:

- Computer Forum
- Computer Literatur Index
- Data Resource Management (drm)
- Forschung und Lehre
- GI Emisa Forum
- GI MobIS: Architekturen
- GI Softwaretechnik-Trends
- GMD Spiegel
- Graphic News
- Gupta Focus
- IHA-GfM News
- Informatik/Informatique
- International Journal of CIM
- io Management (Industrielle Organisation)
- Journal of Global Information Management
- Journal of Information Systems
- Kommunale Beschaffung und EDV
- Kompetenz
- Objekt Spektrum
- Page
- Polyscope
- Software Report
- Speedup
- Telematik Spektrum
- Windows Guide Schweiz
- Zuliefer-Markt (ZM)

Books

- ABC Bücherdienst: <http://www.telebuch.com/>
 - Amazon: <http://www.amazon.com/>
 - Business-Savvy: <http://business-savvy.ms.wwa.com/>
 - GBM - Onlinedatenbank Deutscher Verlage und Buchhandlungen (Verzeichnis der lieferbaren Bücher): <http://www.buchhandel.de/>
 - Internet Book Shop (IBS): <http://www.bookshop.co.uk>
 - KNO-K&V Buchkatalog: <http://www.buchkatalog.de/>
 - Lehmanns Online Bookshop: <http://www.lob.de/>
 - Opamp Catalog: <http://www.opampbooks.com/>
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About the Newsletter

This Newsletter is a quarterly publication of the Institute of Information Systems (Department of Information Management, University of Berne) edited by Joachim Griese & Pascal Sieber. Our goal is to provide up-to-date information on the developing field of Virtual Corporations.

Contributions: Those wishing to submit articles, comments or reviews should contact Pascal Sieber, Institute of Information Systems, Department of Information Management, University of Berne, CH-3012 Berne. Tel: +41-(31)-631 47 85, Email: Pascal.Sieber@virtual-organization.net

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The Newsletter @ <http://www.virtual-organization.net>, Vol. (Year) No.