

3 The Networked Enterprise

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3.1	Introduction	56
3.2	Business Networking Case Examples	57
3.2.1	Dell: Supply Chain Management and Customer Relationship Management	57
3.2.2	Amazon.com: Supply Chain Management and Customer Relationship Management	59
3.2.3	Avnet Marshall: Supply Chain Management and Customer Relationship Management	61
3.2.4	SAP: Customer Relationship Management	62
3.2.5	MarketSite.net: Procurement and Sales	63
3.2.6	UBS: Procurement	65
3.2.7	Migros Cooperative: Development	66
3.2.8	Commtech: Procurement, Finance, Real Estate and Taxes.....	67
3.3	Networked Business Processes	69
3.3.1	Networking Through Coordination	70
3.3.2	Collaborative Processes	71
3.4	Model of a Networked Enterprise	75
3.4.1	eServices.....	75
3.4.2	Standards	76
3.4.3	Model	76
3.5	Networkability as a Competitive Factor	77
3.5.1	Concept and Design Objects of Networkability.....	78
3.5.2	Approaches to Measuring Networkability	79
3.6	Consequences for Management: Design for Networkability	81
3.7	Conclusions	84

3.1 Introduction

“The revolution under way will be driven not by changes in production but by changes in coordination.” [Malone/Rockart 1991, 128] “The use of IT for coordination is more complex than much of the academic and practitioner literature suggests.” [Kling et al. 1999]

In the early 90s enterprises started to improve internal efficiency and customer responsiveness with aligning their organization along business processes. They realized, that business processes do not end at the boundaries of a cubicle, subsidiary or division. With the help of ERP systems as the main instrument for process integration, they teard down internal organizational walls and achieved remarkable results.

At the end of the 90s the next level of rationalization appeared at the horizon. New information systems, such as supply chain management or customer relationship management systems, helped enterprises to integrate business processes even across companies boundaries. Terms like eBusiness or Business Networking were born. Now enterprises are looking for design models for the engineering, implementation and further development of IT-supported business relationships.

This Chapter develops an approach which links process orientation and networking. The result is a model of a networked enterprise, that is an enterprise which sees itself as a node of several business networks.

Linking up businesses to form networks has been the object of numerous investigations in the fields of economics, sociology and informatics (cf. [Alstyne 1997], [Klein 1996], [Sydow 1992]). These investigations describe network phenomena and as a rule offer very abstract approaches to network classification and structure (cf. [Williamson 1991], [Snow et al. 1992]). Neither transaction cost theory, network theory, network economics nor any other of the theories examined provide comprehensive help in answering practical questions.

Network theory, for example, describes business networks as an organizational form between market and hierarchy, provides a comprehensive description model of the design areas of a network and considers the business unit¹ or the networked enterprise as the primary unit of reference. However, a finer degree of granularity is required for describing and ultimately for designing networks. Practice shows that as a rule businesses participate in several networks simultaneously. They take part in development and procurement communities at the same time, for instance, enter into strategic marketing partnerships and are involved in different value chains with different products and/or services. Thus they can be part of several internal, stable and dynamic networks all at once, and at the same time these net-

¹ Business units are economic units, such as e.g. corporations, divisions, national subsidiaries, profit centers or small and medium-sized enterprises.

works may mutually influence one another (cf. Figure 3-1). In the process, they use different information systems and information technologies, depending on the business processes to be coordinated.

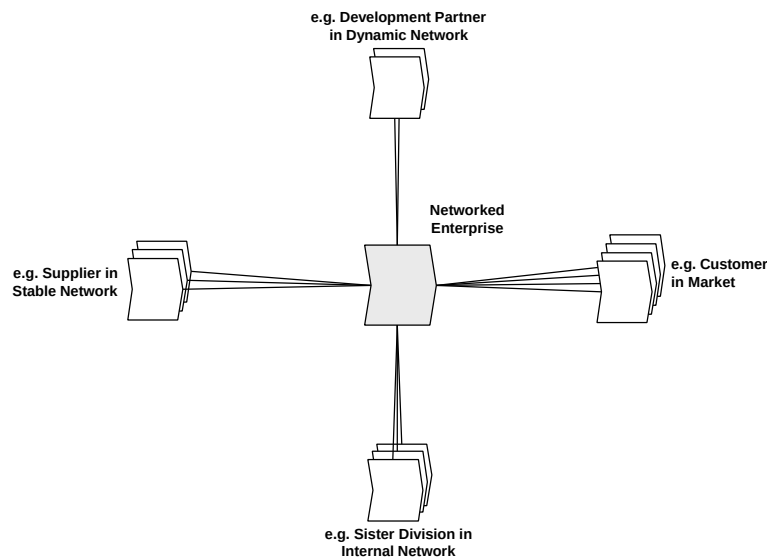


Figure 3-1: Networked Enterprise as Part of Various Networks

3.2 Business Networking Case Examples

Every interdependency between the business processes of different business units leads to networking. Based on this definition, there are a great many examples and variants of networking to be found in the real world. The case examples taken from business practice and described here help to illustrate the concrete organizational forms of inter-company coordination frequently encountered. The case examples represent part of the empirical basis for derivation of the model of a networked enterprise. They reflect a special view of the company presented and, as far as this Chapter is concerned, merely represent items of focus.

3.2.1 Dell: Supply Chain Management and Customer Relationship Management

Dell Computer Corporation, Round Rock (TX), USA, is a leading manufacturer of computer systems. With a workforce of 24,000 employees Dell achieves a sales

volume of USD 18.2 billion. Dell sells computer systems to a value of USD 14 million via the Internet on a daily basis. The corporation serves consumers (1/3 of sales) and companies (2/3 of sales) [cf. Dell 1999].

Dell's success is based on the two concepts of direct selling and build to order [Preisig 1999] which have been consistently incorporated in the sales and supply chain management systems (see Figure 3-2).

Dell uses its sales system to collect experience with each individual customer. The emphasis is on the creation of a *1:1 relationship* which is specific to the person or company. This individuality refers both to the products offered and to the additional services, i.e. to the entire value creation system. Every computer system purchased from Dell is specially configured and assembled to suit the specific customer. Even in the case of collective orders for e.g. 100 computer systems of the same kind, each system actually passes through Dell's complete supply chain individually as an order in its own right. *Individual additional services*, such as product catalogs specially geared to corporate clients (which only contain products approved by the customer), automatic individual pricing, a single contact point (account management), a special service arrangement provided locally by the manufacturer direct, or an online or telephone service tailored to the customer's computer system, form the basis for a partnership-oriented business relationship between Dell and its customers.

The creation of this radical 1:1 relationship is largely dependent on the *design of the supply chain* and its information systems. Dell manufactures each system to order and delivers within 12 days. This means that Dell operates with virtually no warehouse of its own. Its suppliers' warehouses are located within 15 minutes' drive of the production site. This allows the corporation to provide the high degree of innovation in its products which is in particularly strong demand in the computer sector.

Each customer has the possibility of tracking their order status online. This service is used approximately 20,000 times a day [Preisig 1999]. Dell exchanges *supply chain information*, such as capacity, inventory levels, cost structures, quality information, current forecasts, demand, market prices, with its suppliers in *real time*.

Dell estimates that by the year 2002, 50% of all its customer transactions will operate through the Internet sales system (www.dell.com). With its 'Dell Talk Forum' the corporation offers its customers a *platform for the exchange of experience*. Today, there are already 50,000 registered users who provide each other with mutual assistance in the use of Dell Computers, thus taking some of the load off Dell's personnel.

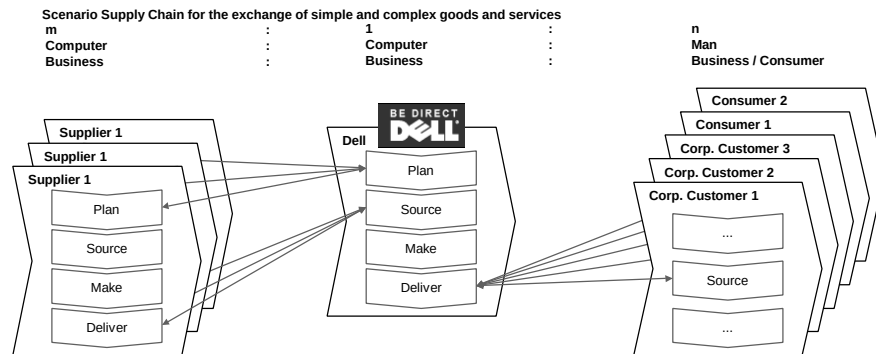


Figure 3-2: Networking at Dell

Dell coordinates with its corporate clients and consumers via the processes of sales and customer relationship management, with its suppliers via the process of the supply chain. The information system www.dell.com supports the processes of sales and customer relationship management² while a supply chain management system supports the processes of the supply chain. The example of Dell shows the relevance of the interaction between networking scenarios: here, the potential resulting from networking can only be realized with a combination of supply chain and customer relationship management.

3.2.2 Amazon.com: Supply Chain Management and Customer Relationship Management

Amazon.com, Seattle, WA, USA, is the leading online bookshop.³ With a workforce of some 2,100 staff (status 1998, [cf. Hoovers 1999a]), Amazon.com serves around eight million customers, 64% of whom are regular customers, and sells approx. 4.7 million different books, CDs, videos, games and gifts [Amazon 1999]. In 1998, Amazon.com recorded a sales volume of USD 610 million [cf. Hoovers 1999a].

² Manufacturers of such catalog systems include Netscape with Seller Xpert, Vision Factory with Cat@log, Microsoft with the MS Site Server and Intershop.

³ [Absatzwirtschaft 1995, 28] states that “trade in the institutional sense covers institutions whose economic activities can be assigned exclusively or primarily to trade in the functional sense. In official statistics, an enterprise is assigned to trade if the value creation resulting from its trading activities is higher than that obtained from a second or from several activities.” Trading companies take many different forms. [Müller-Hagedorn 1998, 31] defines the three most important *organization types* for trade as being that of the wholesaler, retailer and trade intermediary (cf. [Falk/Wolf 1992, 18], [Lerchenmüller 1998, 17], [Barth 1993, 81], [Becker/Schütte 1996]). When applying these criteria to define the organization types, Amazon.com can be classified as a retailer.

From the consumers' point of view, Amazon.com is characterized by the *user friendliness* of its Web presence [Keen/Ballance 1997, 267] and a visible orientation towards customer requirements. This takes place largely on the basis of the information collected during the relationship with the customer. After a customer has searched for a given book title A, for example, Amazon.com will propose alternative titles based on previous purchases: the consumer is given a list of all the books which other consumers have purchased along with title A.

The orientation towards customer requirements is also reflected in new *completeness* of the service. In the case of Amazon.com, a large part of the complete customer problem 'reading' is supported: from recommendations, reviews, bestseller lists to simple and transparent purchasing, payment and order tracking, through to the contribution of own reviews.

By processing information, Amazon.com also changes the *supply chain* from the publishers via the bookshops through to the consumers. Up to now, publishers have had up to 50% of the books they deliver returned as not sellable. The publishers have to foot the bill for lost profit and disposal.

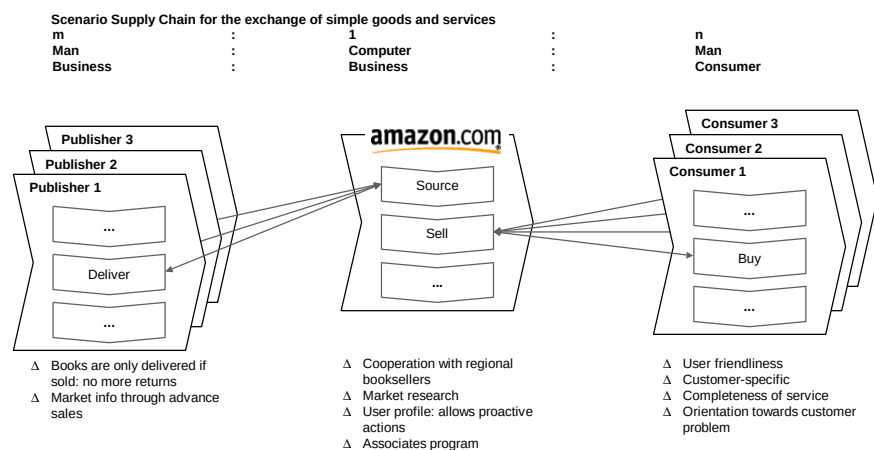


Figure 3-3: Networking at Amazon.com

Amazon.com only orders books from the publishers on the basis of confirmed orders received from consumers. The only books which Amazon.com stocks are the top 200 in the best seller list. This means that the publishers no longer have books returned. In addition, Amazon.com operates advance sales of books before they are published, thus passing on the obtained *market knowledge* to the publish-

ers.⁴ In order to reduce delivery times, Amazon.com includes regional booksellers in its logistics.

To promote rapid diffusion and thus receive more customer information, Amazon.com offers 5% to 15% commission on sales resulting from links established by associates in its *associates' program*. Associates currently include Yahoo!, Excite, AOL plus many small and medium-sized businesses.⁵

3.2.3 Avnet Marshall: Supply Chain Management and Customer Relationship Management

Avnet Marshall, El Monte (CA), USA ranks amongst the largest distributors of industrial electronic components and production supplies (cf. Chap. 2.3.6).⁶ Avnet Marshall's 2,300 staff supply 170,000 different products and services to approx. 40,000 customers, generating a sales volume of USD 1.4 billion (cf. [Avnet Marshall 1999] and [Hartman 1997]).

Amongst others, Avnet Marshall offers design, materials management, logistics and information system services. Avnet Marshall adds value to the products from its 150 suppliers for example by applying static methods of *quality control*, by testing components, by *mass customizing* and programming.

Global connection is the name of the trading system which Avnet Marshall uses to match customer requirements with supplier offerings. It offers customers and suppliers alike a *24-hour service* from any location in the world. Customers can track their orders right up to the time that the goods reach their own production units, obtain information regarding stock levels and calibrate their material consumption with forecasts.

The global connection system provides suppliers with a real-time feedback regarding *movements in the market* with the granularity of article numbers, region, USD or units. On this basis suppliers can then draw up their production plans, pricing structures and forecasts. In addition, they profit from Avnet Marshall's *marketing efforts*.

For Avnet Marshall, the introduction of global connection has meant being able to replace hand-written sales reports, paper-based catalogs, endless telephone calls between customers, salespersons and warehouses by digital information and information system functions. Global connection handles some 700,000 transactions

⁴ An analysis of the Amazon.com's competitor situation and pricing structure is to be found in [Downes/Mui 1998].

⁵ In March 1998, there were over 35,000 Amazon.com associates [cf. Shaprio/Varian 1999, 129].

⁶ Using the criteria which define organization types for trade according to [Müller-Hagedorn 1998, 31], Avnet Marshall can be classified as a wholesaler.

a day, which are used to develop *customer profiles*, for example. Today, it is first and foremost information which Avnet Marshall processes and sells.

With E.N.E.N. (the education news & entertainment network), Avnet Marshall offers its customers and in fact the entire electronics industry a comprehensive Internet service which supports a large number of its customers' *'life events'* with e.g. interactive live training courses, product announcements and technical descriptions via video.

3.2.4 SAP: Customer Relationship Management

Dell and Avnet Marshall already show examples of the formation of *customer communities*. The aim of communities is to achieve a customer relationship by increasing the customer's product competence (cf. [Belz et al. 1997], [Hagel/Amstrong 1997] and [Muther 1998, 73]). Communities generate greater customer loyalty, further tighten the customer relationship and provide more detailed insight into *customer requirements* through observation of communication processes.

SAP, Walldorf, Germany offers an impressive example of community building (cf. Chap. 3.2.4 and [Muther 1998]). In addition to a large number of user groups (SAP user groups) organized according to regions and business areas, SAP offers the following electronic tools to provide its customers with comprehensive solutions to their problems:

- *Information* on new releases, technical developments, contacts, etc. can be accessed by customers through the SAP WWW site.
- Customers can download *software updates* via the SAP Net, a web site accessible to a restricted circle of users, conduct technical discussions with other customers and SAP specialists, order or download *brochures* and register for SAP courses.
- The online service system offers, amongst other things, the latest information on the status of product development, an error database and *various trouble-shooting services*.
- In an *electronic discussion list* run by the Massachusetts Institute of Technology, customers exchange information on problems, developments and new features of SAP products by e-mail. Customers only receive e-mails concerning the subjects which interest them. 3,500 users currently benefit from this service [cf. Muther 1998, 21].
- With video conferences and remote log-in into the customer's SAP system, SAP operates *remote consulting* and trouble-shooting. The savings (time

savings, reduction in travelling costs) for customers amount to up to 15% of consulting costs [cf. Muther 1998, 21].

- The *documentation* for implementation, system management, database management, migration and operation of SAP products is supplied on CD-ROMs.
- With its international demonstration and education system (IDES), SAP offers a complete R/3 system for the purpose of *testing and demonstrating* R/3 functionality.
- 25 regional *helpdesks*, distributed across Europe, the USA and Asia, are available to all customers by telephone and fax 24 hours a day, 7 days a week.
- In Internet newsgroups customers discuss *any and all topics* related to SAP.

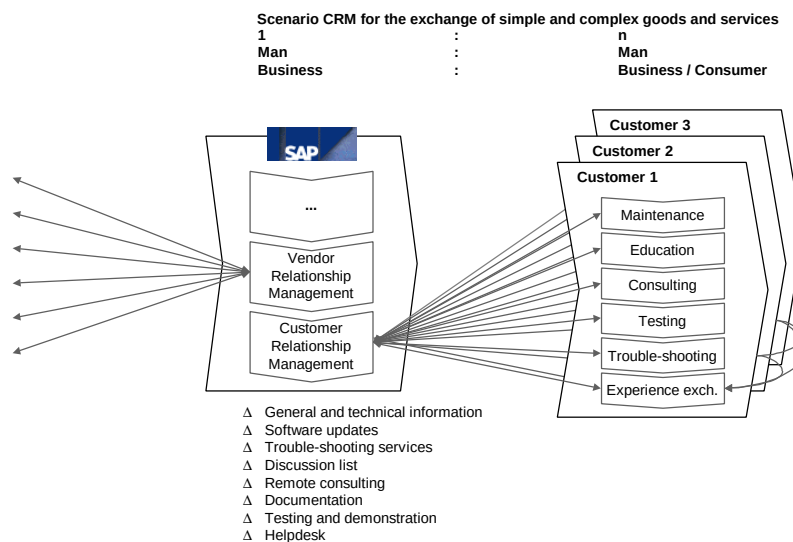


Figure 3-4: Networking at SAP

3.2.5 MarketSite.net: Procurement and Sales

Commerce One, Walnut Creek (CA), USA is in its own words the leading manufacturer of business-to-business purchasing systems and the founder of MarketSite.net, an electronic market for indirect products.⁷ Commerce One puts the purchasers of indirect goods in touch with suppliers. Together with three leading telecommunications companies, Commerce One first set up three independent eMarkets for indirect products: in the USA, Europe and Asia. In 1999 these three

⁷ Using the criteria which define organization types for trade according to [Müller-Hagedorn 1998, 31] MarketSite.net can be classified as a trade intermediary.

eMarkets now represent a *joint purchasing power* of USD 160 billion and are only in the early stages of their development [Commerce One 1999b].

Each marketplace supports a *large number of process and information standards*. A customer possessing the right standards is in a position to contact all the suppliers participating in the marketplace via its own purchasing system, just as if the processes, systems and data were individually coordinated with one another. Networking with MarketSite.net automatically gives vendors access to new markets.

By eliminating individual technological links between customer and supplier, *centralizing content and functions for the management of transactions*, MarketSite.net is attempting to exploit the benefits of the law of *increasing returns*⁸ through economies of scale. Over 5,000 suppliers now offer their products through MarketSite.net. As the number of customers who stand to gain high savings through the use of purchasing systems which are compatible with the standards of MarketSite.net, Ariba.com or MySap increases (cf. also [Aberdeen-Group 1999], [Dolmetsch et al. 1999] or [Ginsburg et al. 1999]), so too will the number of suppliers for whom MarketSite.net is of interest.

MarketSite.net offers purchasers *real-time access* to the most important information in respect of suppliers. Examples are prices, availability and order tracking. In addition, MarketSite.net incorporates support services, such as transport, payment, taxation and trust services plus basic services, such as directories.

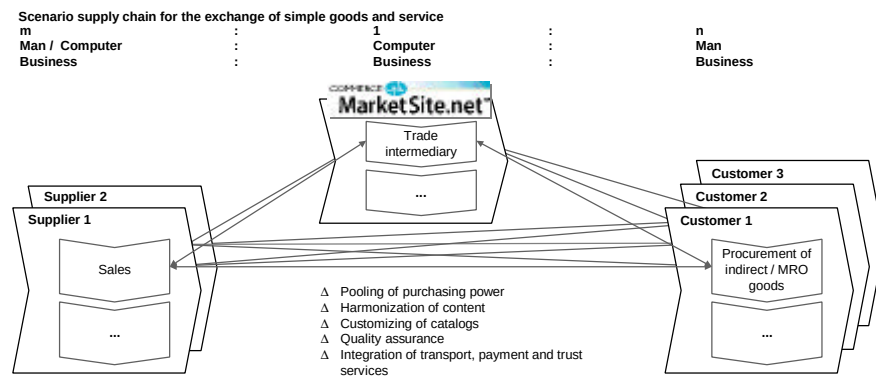


Figure 3-5: Networking at MarketSite.net

In the area of catalog content management, MarketSite.net depends on Commerce One transactive content management, for example. The most important tasks relating to catalog content management include quality and completeness checks on catalog data, standardization and addition by means of a metadata layer, mapping

⁸ A scientifically founded analysis of increasing returns and increasing economies of scale can be found in [Arthur 1989].

of the different classification schemes and the customizing of product catalogs [cf. Commerce One 1999a]. Other well-known trade intermediaries are Harbinger and Ariba.com (cf. Chap. 10) as well as mySap.com from SAP.

3.2.6 UBS: Procurement

UBS, Zürich, Switzerland, is Europe's biggest bank. Measured in terms of its turnover, UBS ranks amongst the world's big five. In 1997, UBS generated USD 19 billion with 27,600 employees at 500 branches in 40 countries [Hoovers 1999b].

Prior to 1999, UBS procured all indirect/MRO products via its legacy and ERP systems, and was thus confronted with high process and fixed costs in procurement. In the past many industrial corporations, like UBS, paid scant attention to their relationship with the suppliers of indirect/MRO products, i.e. products which are not used directly in the end product or, in the case of trading companies, which are not resold directly (cf. [Grieco 1997, 1], [Killen&Associates 1997, 1]). On the procurement side, greater attention was always paid to the direct area which is frequently supported by supply chain management concepts and EDI links [Dolmetsch 1999, 1]. The average process costs of a procurement operation for an indirect/MRO product show potential for rationalization, however: for Switzerland, [Dolmetsch 1999, 4] gives process costs of between CHF 80 and 180, while [Grieco 1997, 15], [Killen&Associates 1997, 13], [Laaper 1998, 6], [Margherito 1998], [Marks 1996] state USD 80 to 120 for US companies.

Today, UBS classifies its indirect/MRO products according to the groups A (1,900 different items of merchandise), B (approx. 4,200 stocked items) and C (800 consumer goods and 4,000 durable consumers)⁹.

3,800 authorized staff, referred to as 'purchase requisition creators', can order 100% of the standard products in the area of consumer goods in all three categories through a *shop system*. The shop system has been developed by UBS itself on the basis of the Internet transaction server, a new product in connection with SAP R/3. For category A products, UBS regularly receives an electronic catalog from a company called Gate, which is a joint venture between the suppliers Furer, Waser, Mühlebach and Serlog. The content of the catalog is defined by UBS in dialog with the Gate partners. UBS maintains the catalog for category B and C products and updates it after every procurement operation.

In the first months after going live in early 1999, some 2,400 items (55% category A, 42% B, and 3% C products) were handled daily via the shop system. In view of the high level of acceptance and the immediate cost savings of the shop system,

⁹ This case is described in detail by [Dolmetsch 1999].

UBS anticipates that the project will have paid for itself in far less than a year. The cost savings include:

- *Reduction in process costs.* UBS now pays invoices for category A products monthly on the basis of electronic bills which allow automatic allocation to the appropriate cost centers. The costly task of verifying invoices is replaced by plausibility checks on the part of the cost center manager once the cost center has been debited and/or by random checks by outsourcing management on the basis of the suppliers' records of electronic transactions.
- *Reduction in fixed costs.* For a large part of the indirect/MRO products, inventory was outsourced to the suppliers Mühlebach and Serlog. Today, orders and goods movement transactions are exchanged with all business partners by electronic means.

Major standard software suppliers in the area of desktop purchasing include Ariba Technologies with ORMS, Commerce One with BuySite / MarketSite, Netscape with the BuyerXpert, SAP with B2B Procurement [cf. Dolmetsch 1999, 141].

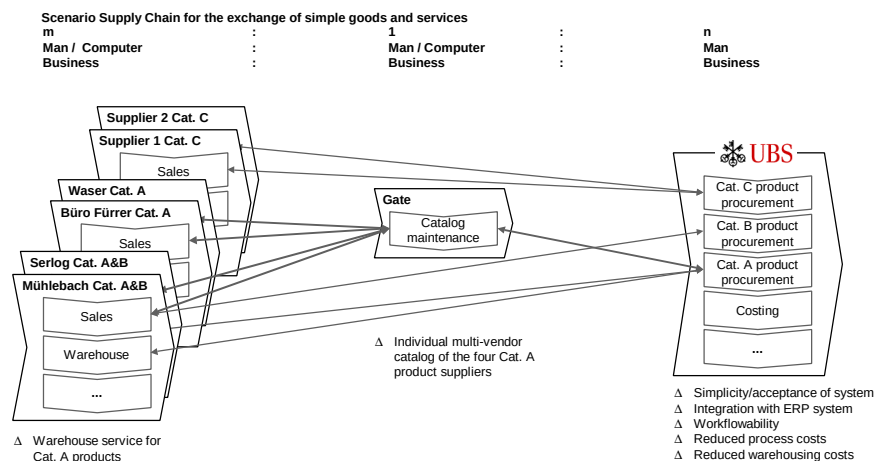


Figure 3-6: Networking at UBS

3.2.7 Migros Cooperative: Development

The Migros Cooperative (Migros) is Switzerland's largest retailing organization. With its 72,000 employees, Migros makes a turnover of USD 11.3 billion, almost 80% of that figure through its retail trading activities [Migros 1999]. Migros produces a large part of its own food products. These include bread and cakes, meat, preserved products and mineral water [cf. Benz 1999].

Migros is very much a decentralized organization. Ten largely independent cooperatives together own the Migros-Genossenschaftsbund (MGB - Migros Federation) which provides a whole series of services for the cooperatives, the production units and other Migros operations.

A large number of internal and external Migros business units are involved in the creation of food packaging. They include printers, packaging and multimedia companies, production units, design, translation and food analysis departments plus graphic designers. The MGB introduced a document flow application to coordinate the creation of food packaging. This is helping to limit the throughput time for design orders for individual articles to 30 days and for article groups to 60 days, thus radically reducing the time to market. The first priority was therefore to create regulated information flows and clear areas of responsibility. The system ensures joint order scheduling and deadline monitoring, and permits the joint processing of centrally stored order data and documents as well as notification of the next business unit in line when a task has been completed [cf. Benz 1999].

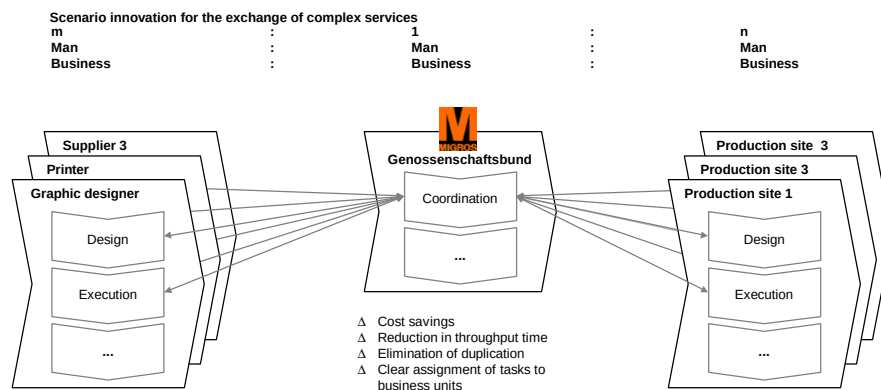


Figure 3-7: Networking at Migros

3.2.8 Commtech: Procurement, Finance, Real Estate and Taxes

Commtech¹⁰ is a globally active corporation in the communications sector, headquartered in North America. With a workforce of 130,000 employees, Commtech generates revenues of USD 23 billion. The corporation is divided into four business units and is spread over 45 countries. Its principal products are enterprise communication solutions, microelectronics for manufacturers of communications equipment and consumer products.

¹⁰ Name changed for the purposes of this book.

As a relatively young spin-off enterprise, Commtech had to reorganize its internal business network. Its management was pursuing two goals. On the one hand, largely autonomous business units were to improve the effectiveness and flexibility of the business processes in the scenarios innovation and customer relationship management. On the other hand, shared service centers were to pool services which were similar throughout the company and to exploit synergetic effects. The business units were thus responsible for the business processes sales, distribution, logistics, controlling, material management, quality management, service management and production planning. The shared service centers assigned to corporate management were responsible for the processes used jointly by all business units, such as finance, real estate, taxes and global procurement.

The CIO's greatest challenge was to design a generally acceptable application architecture which would permit and implement the new organization. In order to secure the coordination of the business units involved, processes and master data were standardized and/or homogenized and integration scenarios were defined. The application architecture made it possible to exploit the following potential:

- The implementation of finance as a shared service center had the effect of reducing finance-related costs from 2% to 1% of Commtech's revenue. Additional savings were made through improved functionality in the areas of accounts receivable and internal hedging and netting.
- The reorganization of real estate led to better use of the buildings and to a reduction in real estate-related costs from 6% to 3.5% of revenue.
- Greater reliability, visibility and real-time 'drill-down-transactions'¹¹ helped to save taxes amounting to 0.6% of Commtech's revenue.
- Global procurement reduced the purchasing costs for one third of all purchased products and services by 7.5%. This corresponds to a saving amounting to 0.6% of Commtech's revenue.

¹¹ Real-time 'drill-down transactions' allow a corporate management operative, for example, to break down a summary entry into its constituent parts, whereby the detailed entries are called up from the information systems of the business units in real time.

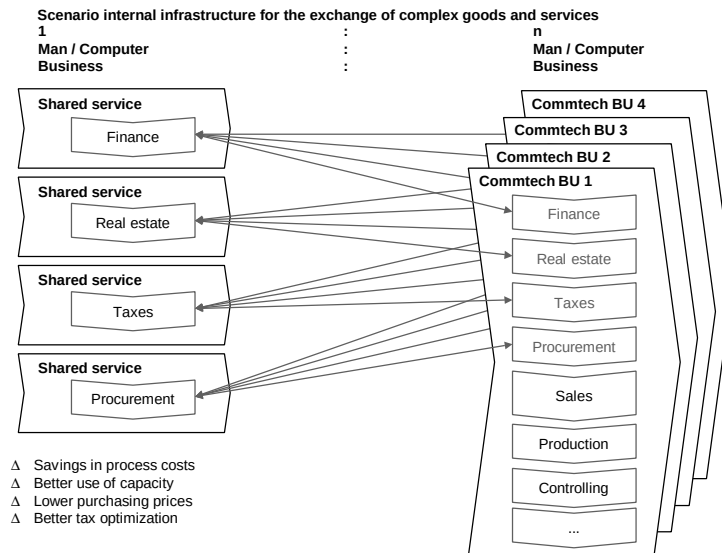


Figure 3-8: Networking at Commtech

Processes can be outsourced to external and internal business units or shared service centers [cf. Kris 1998]. Examples of external business units are companies, such as ADP [cf. ADP 1999], which now already perform payroll accounting for 10% of all US employees as an external service provider, or outsourcing partners, such as Andersen Consulting [cf. Barling/Stark 1998].

3.3 Networked Business Processes

In literature with an economics slant, design recommendations are usually linked to the *business unit* as reference object. For the description of networks on a greater level of detail required for the deduction of concrete procedural instructions for designing and implementing networks, the granularity of a business unit would appear to be too coarse.

In real-world projects, the business process has proved itself to be a suitable reference object for the purposes of networking in addition to the business unit. Here, the focus is on the coordination of the cooperating business processes of different business units. We now introduce the process view in the context of networking business units in order to permit the subtle differentiation of conclusions required for the implementation.

3.3.1 Networking Through Coordination

The processes of the coordinating business partners, together with the outputs they produce, form the operative side of the business relationship. Figure 3-9 shows two business units - two 'average' industrial enterprises - along with their most important business processes. These processes are based on the process models of [SCOR 1998], [Teufel et al. 1999], [Boutellier et al. 1999], [Porter 1992b], [SAP 1998a] and [GPS 1997]. The networking of processes describes the organization of dependencies between the processes and/or tasks of the various network partners.

[Malone/Crowston 1994] define coordination as the 'management of dependent activities'. We define networking as coordination in networks. Along with his coordination theory [Malone 1988] provides a 'set of principles' for describing and solving dependencies (an up-to-date taxonomy can be found in [Crowston 1994b]). Tasks are then interdependent if they access the same resources. Tasks are performed by resources (e.g. personnel) on the one hand and consume resources on the other. According to [Crowston 1994b] resources are all subjects and/or objects which come into contact with a task. Examples of resources are machines, tools, storage spaces and employees.

The resource information takes on a special role in this Chapter. This is due to the fact that while it obeys the laws of information processing and thus, unlike raw materials for example, is reusable and divisible, it can also depict all other resources for coordination purposes. In Figure 3-9 the processes on both sides of the value chain rely on the same information and are therefore interdependent.

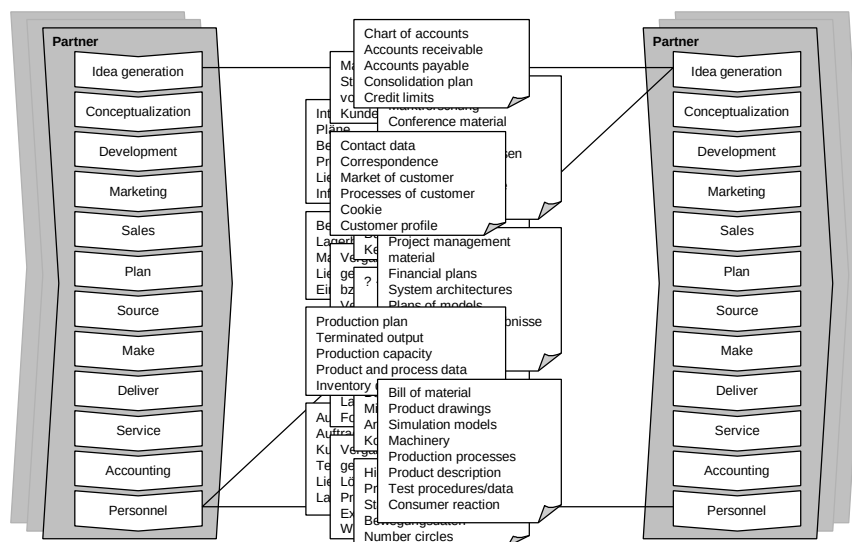


Figure 3-9: Coordination of Business Partners Through Shared Information

According to [Österle 1995] processes are coordinated exclusively by means of outputs. By virtue of this fact, coordination must therefore be an output or part of an output in the sense of the above definition. Consequently, the potential of inter-organizational networking lies in suitable design of the coordination capability (networkability) of outputs and all associated design areas such as process, IT, people, organization structure and culture [cf. Alt et al. 2000]. Business Process Redesign and integrated information systems have already shown how potentials arising from the organization of internal dependencies can be realized.

3.3.2 Collaborative Processes

Figure 3-9 illustrates the wide variety and great complexity of inter-organizational networking. However, network design requires a level of complexity which is manageable. In order to reduce complexity, areas are sought which show high dependencies. Based on the concept of integration areas [Österle et al. 1993], we refer to processes (of different business units) which are characterized by high dependency and therefore require a high degree of coordination as ‘coordination areas’. Areas are usefully delimited if the sum of all dependencies between the areas is low and the sum of all dependencies within the areas is high.

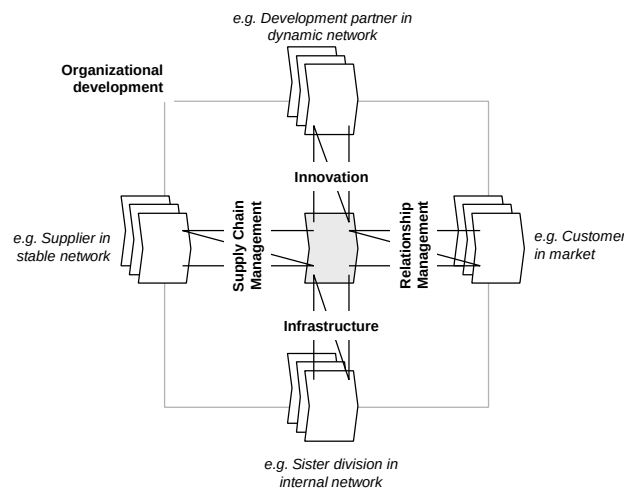


Figure 3-10: Coordination Areas

Integration areas and coordination areas both refer to processes and their tasks. The integration area pursues integration through integrated information processing, the coordination area pursues integration through the organization of dependencies. In addition to integrated information processing this includes for instance the modularization of outputs and the design of new incentive systems for em-

ployees. The criteria used for delimiting coordination areas include goal, culture, partners, form of coordination, coordinated processes, resources and information systems. By applying these criteria to the case studies we arrive at the five coordination areas Supply Chain Management, Relationship Management, Innovation, Infrastructure and Organization Development (see Figure 3-10 and Table 3-1).

- The goal of *supply chain management* is to handle operative planning and execution processes as efficiently as possible. Unlike innovation, supply chain management does not redesign anything but multiplies clearly defined outputs and tries to utilize the effects of economies of scale in order to achieve profit. As a rule, supply chain management realizes its attempts to achieve efficiency through a large integration depth in the coordination of its well-structured processes. High repeat numbers and integration depths require stable structures. Supply chain management prefers the forms of coordination of an internal and/or stable network.

Coordination Area	Goal/Culture	Coordinated Processes	Main Form of Coordination ¹²	Main Coordination Technology
Supply Chain Management	Efficiency through utilization of 'economies of scale', large integration depth	Planning, procurement, production distribution	Stable network	Supply chain planning systems; transaction-oriented electronic commerce systems
Customer Relationship Management	Effectiveness through utilization of 'economies of scope'	Marketing, sales, service	Market	Customer relationship management systems; document-oriented electronic commerce systems

¹² According to [Snow et al. 1992].

Innovation	Rapid development of successful products, dynamic	Idea creation, concepts, development	Dynamic network	Information systems for distributed innovation [Boutellier et al. 1999]
Infrastructure	Efficiency through service culture	Accounts, asset management, master data management,	Internal and stable network	Distributed enterprise resource planning systems
Organization Development	Network-capable employees and partners	-	All forms of coordination	-

Table 3-1: Coordination Areas

- The goal of the coordination area *innovation* is the rapid creation of new products. In accordance with the ‘loose-tight’ hypothesis [Gassmann, 1997], innovation requires a dynamic environment in the early phases. As a project advances in maturity so the streamlining of the organization increases. In the case of innovation, a business unit will thus coordinate with a large number of different partners and, depending on the task in question, follow the rules of different forms of coordination.
- The area *infrastructure* distinguishes itself from supply chain management in terms of content (e.g. payroll accounting). In addition, this content does not necessarily show a high degree of repetition (e.g. preparation of a corporate balance sheet), and its transactions may be complex in nature (e.g. outsourcing of IT). As a rule, there is a high level of dependency between the infrastructure partners which calls for the relationship to be stable.
- *Organization development* secures the willingness of own employees and those of partners to cooperate. It employs special procedures for assessing and honoring performance, developing partnerships and winning partners.

Every business unit is always linked to other business units across all the coordination areas described in Table 3-1. The sector and the position in the network determine the priority with which business units approach the task of consistent network design.

The (inter-organizational) dependencies within areas are contrasted by the (intra-organizational) dependencies across areas. Both play a decisive role in the networkability structure of businesses (cf. Figure 3-11).

- (a) The goal of relationship management is to create a relationship with business partners such as customers or key suppliers which is as close, long-term and thus profitable as possible. The success of relationship management is dependent on the quality of supply chain management and vice versa. In the context of relationship management, businesses make information and capabilities available to their customers for example, which are generated in the area of supply chain management. This information includes things like availability checks or track & trace information in real time, capabilities include things like mass customizing.
On the other hand, supply chain management relies on relationship management information and capabilities. Examples here are correctly configured customer orders or current detailed information on payment terms and the customer's delivery address. A further indication of the interdependency of these two areas is provided by numerous case studies: as a rule, companies which consistently apply relationship management implement the complementary supply chain management at the same time.
- (b) Relationship management provides the area of innovation first and foremost with market analyses, competitor strategies and products and concrete customer requirements. At the same time, relationship management relies on the area of innovation for information on new products, for instance, or ongoing research projects with image value.
- (c) Innovation and supply chain management are connected via product design and the process required to produce it. Jointly used documents here include parts lists and production process descriptions.
- (d) The infrastructure area supplies the 'operating resource' information to all other areas. Relationship management, supply chain management and innovation rely on information from external and internal accounting as well as from data management.
- (e) Organization development forms the basis for all other coordination areas by ensuring suitable organization structures and/or cultural and political attitudes on the part of the organization units involved. The success of the operative coordination areas is dependent on organization development at both the intra-organizational and inter-organizational levels.

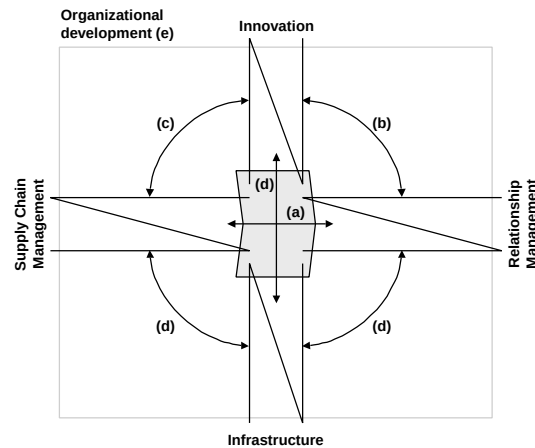


Figure 3-11: Inter-area Dependencies

3.4 Model of a Networked Enterprise

“Describing and categorizing organizational forms remains a central problem in organization theory” [Crowston 1994a, 2].

We know from the fifth phase of computerization (cf. Chap. 1.1.2) that cross-company business processes rely on a new infrastructure, also referred to as eServices (cf. Chap. 2.3.5), and new standards. Together with the coordination areas they form a basic model of the networked enterprise.

3.4.1 eServices

Decreasing coordination costs through the use of enterprise resource planning (ERP, supply chain planning (SCP), electronic commerce (EC) and enterprise application integration (EAI) systems are leading on the one hand to the *substitution* of IT-supported forms of integration for integration through employees. On the other, we see decreasing coordination costs through *demand elasticity* leading to an increasing number of economical transactions (e.g. small lot sizes, micropayments). Both effects favor the creation of coordination-intensive structures which include eServices [cf. Malone/Crowston 1994].

In this context, [Tapscott 1995, 55] expands by saying that: “Every economy needs a national information infrastructure. This is the utility of the twenty-first century - a broadband highway for a broadband, high-capacity economy. And

every organization needs to plug into this utility with an enterprise information infrastructure. The new infrastructure will change economic activity as significantly as did electrification. Just as business and wealth creation would be unthinkable today without electrification, so the new economy would be impossible without the power of information.“ Frederick W. Smith, Chairman, President and CEO, FDX Corporation, quoted in [Jones 1998], summarizes that: “Mastery of logistics is as vital to success in the digital economy as it was to the extraordinary success of the Roman Empire“.

New IT, such as e.g. the n:m trading systems are often the basis for new services. Every enterprise has the strategic option of offering a new service. Chapter 2.3.5 gives an overview of the new infrastructure and thus some of the strategic options.

3.4.2 Standards

Customers, suppliers and services which link customers with suppliers have to be able to ‘understand’ each other at many different levels of their relationship in order to be able to organize their interdependency. Standards make this ‘understanding’ possible. We define standards as objects which are accepted and shared within a community (cf. [Cargill 1989], [Buxmann 1996]). Objects are understood to mean hardware, software, processes, data, function, protocol, etc. Communities are e.g. business units, value chains, sectors or geographical regions. Bodies or enterprises within these communities commit themselves to disseminating the appropriate standards.

Standards are an integral part of the model of the networked enterprise. Just like the DIN standards in engineering (e.g. thread size M8, fit H7, steel grade ST37 or test procedure DIN 68858), they make it possible to realize economies of scale at the same time as individualization, and constitute a central coordination mechanism. Unlike the widely accepted standards in the engineering field, however, those for communication only apply to the technical and/or syntactical level. Standards for semantic and pragmatic integration remain a huge challenge for Business Networking.

3.4.3 Model

“For every problem there is a solution that is simple, neat ... and wrong“, H.L. Mencken, quoted in [Rodin 1999, 60].

The model derives from a process-oriented and enterprise-centered view of the networking of business units. We do not consider the topology of a network but the networking of partners from the point of view of the individual, ‘selfishly’ acting business unit. In Figure 3-12 a company to be analyzed can equally well

take on the role of supplier or that of the customer. It sees itself at the center of its networks and practices networking in order to strengthen its position and/or to improve its profit ratios.

Splitting networking into the four operative coordination areas of relationship management, supply chain management, innovation and infrastructure takes into account the complexity inherent in networking which is observable in practice. These four areas pursue different economic goals, implement different types of network, are characterized by widely divergent cultures, link different partners, have interdependencies based on different resources and use different information systems for coordination purposes. Each business unit must nevertheless be capable of developing all these relationships in the interests of their own business strategy, i.e. of adapting to the new demands of the information age.

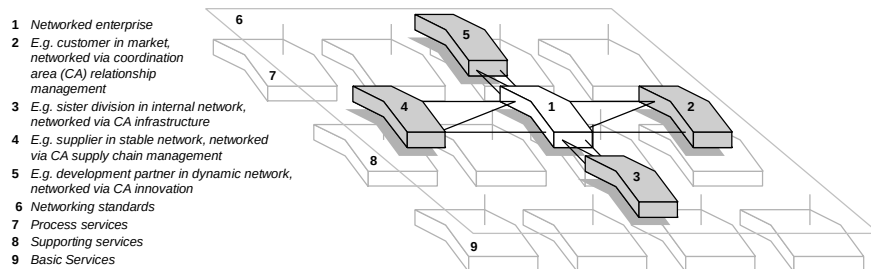


Figure 3-12: Networked Enterprise

Even if a business unit does not operate its own development or outsources every conceivable support process to suppliers, it must nevertheless be familiar with and actively maintain its relationships with partners, which according to [Hagel/Singer 1999] are customers, output integrators, innovators or infrastructure companies. The model of the networked business enterprise helps here by bringing together in a single architecture those design areas of a company which are most important from the networking point of view. On the one hand it provides an indication of how to usefully break down the networking problem, without neglecting the interdependencies of the delimited areas. On the other hand, the model serves as reference framework for deriving recommended action while taking into account the central role of IT, services and standards.

3.5 Networkability as a Competitive Factor

The objective of every networked enterprise is to increase competitiveness through higher networkability. This leads to increased process efficiency and opens up new business opportunities. The following subsections will provide you

with a framework for the consistent and practice-oriented design and implementation of networkability.

3.5.1 Concept and Design Objects of Networkability

Business networking tries to increase process efficiency and to enter new business segments by forming innovative networks of value creation. According to [Wigand et al. 1997, 11], new innovative strategies are based on three models: (1) forms of organization for rapid and permanent orientation to the market, (2) forms of personnel leadership for developing and utilizing employee potential, and (3) forms of networking for creating an internal and external ability to cooperate. The concept of networkability is developed in the following to take into account all the dimensions of business engineering in addition to the organizational ability to cooperate.

Networkability is the *internal and external ability to cooperate as well as the ability to rapidly and efficiently establish, conduct and develop IT-supported business relationships*. Corresponding to the dimensions of business engineering, networkability has different aspects or design objects. In the case of all design objects, there are relationships of dependence between the network partners, whereby networkability expresses the attribute needed for management of these relationships of dependence. Networkability is thus a continuation of coordination theory which sees coordination as the management of relationships of dependence [Malone/Crowston 1994, 90]. In relation to the design objects of networkability (see Figure 3-13), this means:

- *Products and services*. Networkable products and services can be altered quickly and inexpensively for specific partners or be integrated in other products. This includes the personalization of services, such as mySAP.com, and configurability regarding the information needed (e.g. status information, use of partners' article numbers).
- *Process*. Networkable processes can quickly and inexpensively establish and conduct a relationship of coordination with corresponding processes. Automatic requests for various catalogs or automatic orders when stock levels fall below an agreed safety level are examples of this.
- *Information systems*. Networkable information systems can be linked up to other IS quickly and inexpensively and support communication on the system level. This especially applies to setting up an EDI link with a business partner.
- *Employees*. Networkable employees are the essence of personal networks. They are oriented to the customer, understand the relevance of win-win situations and are also assessed according to the way in which they maintain and look after relationships between partners.

- *Organizational structure.* Networkable organizations can be adapted quickly and inexpensively to new market requirements. Examples of this are the rapid creation of temporary inter-company teams, the relocation of business processes or the joint execution of processes (formation of so-called shared services).
- *Company culture.* Networkable company cultures promote cooperation by being open to change and by basing cooperation between business partners on a relationship of trust instead of mutual checks (on costs).

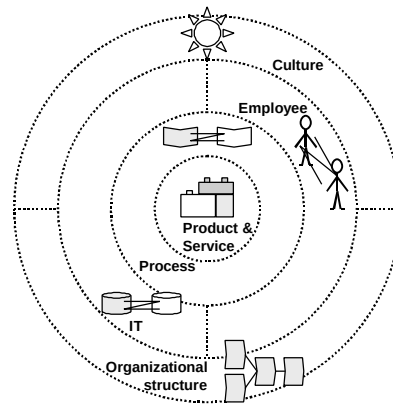


Figure 3-13: Design Objects of Networkability

3.5.2 Approaches to Measuring Networkability

A precondition for appropriately designing networkability, according to the management cycle of [Ulrich 1984, 54], is measurement and evaluation of the design objects. It is only when the existing nature of these objects and the required nature of these objects have been determined that concrete ideas to close a specific networkability gap can be obtained in relation to the design object. Above all, the requirements of the partners involved have to be carefully assessed since the goal is not to achieve maximum but appropriate modification of the design objects.¹³ For example, it would be inappropriate to implement an EDI link when the coordinated processes only involve infrequent transactions.

The correct estimation of appropriateness has a direct effect on the cost-benefit ratio of networks because measures for increasing networkability are usually asso-

¹³ For a definition of quality as the relation of performance to expected performance see [Fleisch/Wintersteiger 1999].

ciated with higher costs. In some circumstances, a company which wants to intensify its business relationship with n customers will outsource some services and products, adopt new products and services, adapt its information systems to new process and communication standards, introduce new information systems, redesign processes and re-train its employees. The basic criteria for measuring networkability are *time, costs and the quality of the change*. Table 3-2 shows some examples of criteria relating to the design objects. Networkability thus indicates what changes in business relationships a company can cope with and in what time and at what cost it can do so.

Design Object	Quantitative Change Criteria (Time/Cost)	Qualitative Change Criteria
Products and Services	Costs and duration of combining individualized products and services or integrating additional services, e.g. payment services.	Degree of modularization with regard to products and services Degree of specificity of the adaptations Degree of multiple use of products and services
Process	Costs and duration of adapting planning or handling processes to the processes of the partners (customers/suppliers) Costs of relocating a standardized process to a specialized service Expenditure for establishing cross-company controlling	Transparency of the process for the partners Openness of information exchange Existence of a conflict management system Interorganizational monitoring of processes Coordination scenarios employed
Information System	Costs and duration of automating an IT-supported business relationship, e.g. establishing of an link. Costs of data preparation or syntactical and semantical integration	Use of application and communication standards Form of IT integration (e.g. EDI, shared databases, remote log-in, ERP@Web) Security mechanisms, access rights
Employees	Costs and duration of employee replacement Time needed for building up personal basis for business relationships	Ability to look after and maintain personal networks Ability to organize oneself Degree of harmony of vision Ability to acquire information

Organizational Structure	Costs and duration of a decision-making process	Distribution of power
	Duration and costs of establishing new organizational structures, e.g. profit centers or a new regional company	Homogeneity of the organizational structures
	Duration and costs of establishing a new external symbiotic cooperative venture	Granularity and flexibility of the organizational units Number of internal and external partners
Culture	Costs and duration of information acquisition	Distribution of benefits between the partners (reciprocity)
	Costs and duration of training	Intensity of the exchange of knowledge and experience
		Lived openness Dealing with the question of trust

Table 3-2: Examples of Criteria for Networkability

3.6 Consequences for Management: Design for Networkability

Activities for designing a company's networkability have three basic effects: (1) Reduction of time and costs when new business relationships are established or when transactions are conducted, (2) reduction of the specificity of investments and increased flexibility of existing investments, and (3) improved opportunities for detecting and occupying new market segments at an early stage. These effects can be seen in various examples: the supply chain integration service of Riverwood International described above, the MarketSite.net procurement service of Commerce One (cf. Chap. 3.2.5), or the described services of GW.

Coordination theory is a useful tool which can be used to determine various possibilities of entrepreneurial action for increasing networkability (e.g. drawing up profiles of partners or designing application architectures) because coordination is a basic element for designing interorganizational relationships. Coordination theory regards coordination as the management of relationships of dependence and tries to identify generally applicable mechanisms for regulating these relationships [Malone/Crowston 1994]. When recommendations for action are formulated, *coordination mechanisms*, i.e. processes or rules which organize the relationships of dependence between tasks, are the starting point. In order to develop concrete

ideas on the action to be taken, we interpret the coordination mechanisms more broadly as *rules for objects with the property of networkability*.

Different coordination mechanisms can be defined for each design object and these mechanisms form the basis for various alternatives of action. The following alternatives of action can be derived (see Table 3-3):

- *Design of products and services.* [Austin et al. 1997, 11] see the design of products as a very powerful but, up to now, rarely considered alternative of action for integrating value creation in networks. The most important coordination mechanisms include modularization, standardization and digitalization of products and services. For example, modularized, standardized and digitalized products and services enable rapid and efficient bundling to create comprehensive products and services which can be directed at solving specific customer problems (mass customization). Concerning physical products, the coordination mechanisms of standardization and modularization allow considerable postponement of the time when a product receives customer-specific modifications.
- *Design of processes.* Process coordination describes the consistent design of interorganizational processes of planning and implementation. The coordination mechanisms include process standards and the form of process integration. Standardized processes, such as those developed by OBI or CPFR, reduce the effort involved in coordination and, in the ideal case, lead to integration on a pragmatic level or electronic workflows between anonymous partners. Principle mechanisms of process integration are loose and close links of processes. The first, for example, is known in the area of indirect procurement (so-called MRO procurement [cf. Chaps. 10.1 and 14.2.2]) and allows an appropriate degree of flexibility by means of catalog solutions (e.g. rapid addition of suppliers). Close process links, for example, can be encountered in supply chain management and allow coordinated and completely automated processes in real time (e.g. strategies of automatic stock-keeping).
- *Design of information systems.* The networking of IS is the basis for designing new products/services and new business relationships. Products and services, processes and organizational structures thus depend on the networkability of the 'basis-forming' IS [Schmid 1997]. The most important mechanisms for increasing the networkability of IS are communication and data standards as well as the integration of internal information systems. Templates, for example, use the same type of configuration for distributed ERP systems to solve the problem of standardizing data and messages and thus achieve integration on the semantic level (cf. Chap. 11). At the same time, they are the starting point for linking partners according to the same pattern. Finally, system integration allows a high quality of data and real-time processing of this data.

- *Design of organizational structure.* The organizational structure in the sense of the network topology describes the individual business units in a network. The coordination mechanisms of virtualization, modularization [Wigand et al. 1997] and distributed responsibilities are used for designing different networking structures, e.g. dynamic, stable or internal networks [Snow et al. 1992]. For example, in dynamic networks, several small (modularization) companies cooperate to pursue shared business goals (virtualization) with each participating company being responsible for their own business (distributed responsibility).
- *Design of people's roles and company culture.* The role of the employees and managers in networks is distinguished from the roles found in classical hierarchies mainly by "an increase in the requirements for an ability to make decisions and assume responsibility for complete, customer-oriented processes as well as the capacity for teamwork, communication and innovation [...]". [Wigand et al. 1997, 459]. The important coordination mechanisms are openness, the identification and control of goal-conflicts as well as trust-creating measures [cf. Hilb 1997]. For example, openness and trust-creating measures enable to establish and maintain personal networks.

Design Object	Networkability of Design Object	Coordination Mechanisms	Objectives of Networkability
Products and Services	Rapid and inexpensive individualization of products or services	Modularization Standardization Digitalization	Mass customization [Klaus/Krieger 1998, 344] Postponement [Klaus/Krieger 1998, 380]
Process	Rapid and flexible establishment and use of appropriately coordinated processes	Process standardization Process integration	Pragmatic integration Real-time coordination Appropriate flexibility
Information System	Rapid and inexpensive establishment of an individual communications link between information systems	Communication standards and data standards System integration	Semantic integration Making information externally available High data quality Real-time data processing

Organi- zational Structure	Flexible organizational structures which enable participation in several different networks	Virtualization Modularization Distributed responsibilities	Internal networks Stable networks Dynamic networks
Culture and Em- ployees	Cooperation-promoting company culture and employees with the capacity for internal and external cooperation	Relative openness Identification and control of goal-conflicts Trust-creating measures	Autonomy Communicative competence Information acquisition Establishing and maintaining personal networks

Table 3-3: Approaches for Designing Networkability

The design areas are closely interlinked. Provision of a service or product for the customer, for instance, depends on numerous processes which, in turn, depend on the abilities of the people and IS involved. In addition, the modular design of products and services only leads to an increase in competitiveness if processes and IS support this modularization. The challenges encountered in the formulation of concrete alternatives of action for increasing networkability therefore are in the simultaneous coordination of several objects according to the method of concurrent engineering.

3.7 Conclusions

Business engineering enables the transformation of companies to adopt business networking strategies, business models and the ‘underlying’ information systems. The starting point is always a specific company which appropriately creates its customer and supplier network. This involves the exploitation of process efficiencies by means of electronic information exchange between partners (e.g. electronic order entry, exchange of planning data) and the development of new processes and roles (e.g. gateways, auctions, multi-vendor catalogs).

Model of a Networked Enterprise

The proposed model of a networked enterprise combines a company’s position being part of several business networks with its needs to organize along cross-company business processes. It helps businesses to identify the importance of processes in the network and to split the networking problem into five clear areas,

each of which is homogeneous in itself. At the same time, it shows the connection between the individual areas. Describing networking with the aid of coordination areas allows a networked enterprise to consistently orient itself towards the processes of its partners, in particular those of its customers. The model of a networked enterprise thus provides:

- *An orientation aid for potential analysis.* Networked enterprises can orient themselves towards the discussed potentials of the individual coordination areas when evaluating their coordination strategies. This Chapter distinguishes between potentials derived from (a) process efficiency through networking, (b) enhanced customer benefits and (c) new business opportunities.
- *An orientation aid for strategy evaluation.* Experience has shown that networked enterprises sometimes have a tendency not to devote enough attention to dependencies between coordination areas. They try to coordinate sales processes within an internal network, for example, and neglect the fact that the organization of master data is a prerequisite for a 'global' process network. The model lists the major dependencies between coordination areas and can thus serve as the basis for strategy evaluation.
- *An orientation aid to increase networking manageability.* By splitting up the networking problem into coordination areas, the model of a networked enterprise creates domains which differ in terms of culture, employees, processes and information systems and which consequently the management of networked enterprises can design and run as one unit. At the same time, the model identifies the most important dependencies between the coordination areas and thus creates the right conditions for inter-area management, e.g. for the required calibration of the coordination areas supply chain management, relationship management and infrastructure.
- *A means of deriving management tasks for inter-company coordination.* The model of a networked enterprise supports the derivation of management tasks in a networked enterprise. The most important tasks in connection with networking include (a) strategic positioning of the networked enterprise in the various networks, (b) organization of the coordination areas relationship management, innovation, supply chain management, infrastructure and organization development, (c) organization of internal integration of the coordination areas and (d) organization of IT, standards and services, on which the coordination is built.
- *Infrastructure positioning from the business point of view.* Supply chain management, relationship management and innovation are immediately dependent on the coordination area infrastructure. While most companies recognize this connection, the infrastructure area, in particular data management, is underdeveloped. Companies usually lack the business arguments to support the time and cost-intensive harmonization and networking projects. The model of a networked enterprise establishes the link between the supply chain, relation-

ship management and innovation processes, which are considered to be strategic, and the supporting infrastructure processes, thus simplifying the business argumentation for infrastructure projects.

- *Positioning of standards and services.* The most powerful elementary goal of networking is the m:n capability. This permits the automation of new business functions and at the same time makes it possible to exploit the effects of economies of scope (n customers generate a demand for individual, comprehensive output systems which can be configured from standardized outputs) and economies of scale (m suppliers specialized in individual outputs). Standards and services are the central mechanisms which permit an m:n network. The model of a networked enterprise positions them accordingly and thus shows the increasing significance of and necessity for a well-founded evaluation process for the selection of standards and services.

Networkability Framework

To show and support the path towards a networked enterprise, the networkability concept has been formulated as a management variable in which several business engineering dimensions are combined as design objects. For increasing networkability, there are various alternatives of action, starting from the design objects. These alternatives depend on different coordination mechanisms. Two factors are especially relevant to management:

- The goal of networkability is to arrive at appropriate solutions so that the benefits of networking exceed the costs involved. Different criteria can be identified for assessing these solutions.
- Human resources are at the center of new networked products/services, processes, information systems and organizational structures. It is on the individual person that the quality and feasibility of the new solutions depend.

Whereas, today, only innovative companies possess a networkability which contributes to their competitiveness, the cost efficiency of Internet technologies as well as increasing standardization will lead to a general increase of networkability. Networkability will be incorporated in companies' strategies for achieving their objectives, in the development of project methods and in the operative controlling of projects and transactions. The criteria, objectives and coordination mechanisms will be developed further as business networking spreads. In the future, the challenges to be faced will not just be encountered in the management of networking between organizations and processes but in the networking of everyday goods (consumer goods, raw materials etc.) that are equipped with chips.

