**Raimo Hyötyläinen**

# Development mechanisms of strategic enterprise networks Learning and innovation in networks

QUASI-FIRM

**Network strategy**
Business plan

**Organization**

Management team:
network team
Network team leader

Development teams:
development groups

Support teams: coach teams
Operative teams: work pairs

| Company A | Company B | Company C | Company D |
|---|---|---|---|
| Strategy | Strategy | Strategy | Strategy |
| Organization | Organization | Organization | Organization |
| Activity mode | Activity mode | Activity mode | Activity mode |
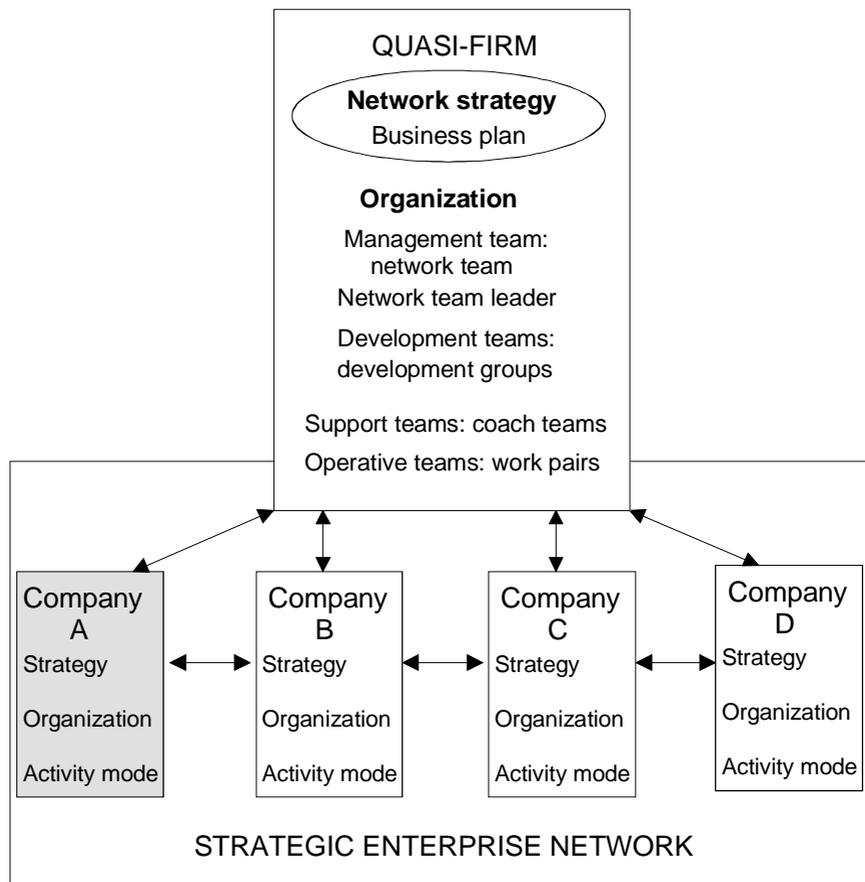
STRATEGIC ENTERPRISE NETWORK

# Development mechanisms of strategic enterprise networks
## Learning and innovation in networks

Raimo Hyötyläinen

VTT Automation

**VTT**

# Abstract

This study examines the developmental mechanisms of strategic enterprise networks, with a special emphasis on learning and innovation within networks. The aim of the study is to establish theoretical and practical bases for understanding and developing strategic enterprise networks. The study, carried out at VTT Automation using experimental development research methods, is based primarily on the analysis of case studies on the development of companies and enterprise networks. This research views the activities of companies and enterprise networks as activity systems. The developmental method demands that researchers use two "lenses".

The activity system, when used as the unit of analysis, projects two complementary views: the system view and the subject's view. On the one hand, the researchers construct the activity system as if looking at it from above, i.e. from the system viewpoint. Furthermore, researchers examine the case from the outside when analyzing the findings of the case study and writing the study report. On the other hand, the researchers work together with the subjects of the case study to identify the participants or multiple different groups of the local activity, through whose "eyes" and interpretations the activity systems are constructed and developed. Thus, the researchers are themselves actively involved in the activity of the social systems under investigation. The study of activity systems becomes a collective, multivoiced construction of the past, present, and future models for developmental activity. Furthermore, the researchers participate in the development activity itself, as well as in the planning and realization processes of new models in the activity systems under examination.

This study adopts *the system view*. The object of this study is the developmental processes within strategic enterprise networks and dilemmas of learning and

innovation connected to networks. An analysis of the developmental problems of Finnish enterprise networks forms the starting point of the study. Special emphasis is placed on the needs of small and medium-sized enterprises (SMEs). The analysis of models of enterprise networks forms the theoretical basis for the study. The outcome of this study is the elaboration of a model of strategic enterprise networks.

To understand the developmental mechanisms of strategic enterprise networks, it is necessary to analyze the activities and model of an individual network enterprise in terms of a model of a business activity system. By analyzing the model structure of thinking and activity within the multivoiced activity system of a company, it becomes possible to discover the development mechanisms of the organization.

The quasi-firm model is taken to model the governance system of the strategic enterprise network. A management model for the enterprise network is created based on an analysis of this quasi-firm model. The development model of the enterprise network projects an activity system whose development is a disruptive process where different views and interests of the companies and their actors collide. The real problems that are regarded as needing future solutions and new opportunities provide the impetus to form and experiment with new cooperation patterns in networks.

According to the quasi-firm model, strategy, organization and activity mode form the central elements of strategic enterprise networks and their activities. These elements are analyzed and modeled. The salient feature of the activities of strategic networks is multilateral activity among all companies belonging to the network. Work pair activities at different levels between companies are sites for operational cooperation in the network. The development of the way of acting in the network requires changes within the companies as well. The team and network organization of companies creates excellent preconditions for intensifying cooperation in the network.

The planning approaches to the development of different kinds of networks are analyzed. Then the construction and development phases of strategic enterprise networks are described and analyzed. The model of this study is based on experimental development research methodology.

Learning and innovation in strategic enterprise networks are then analyzed and modeled. This part of the study is based on the analysis and modeling presented in previous chapters of the study. Learning and innovation are analyzed in two connections with strategic networks. On the one hand, the building and development of networks requires learning and innovation within the network and its companies. On the other hand, activity within the strategic networks creates an environment for learning and innovating. In such environments learning and innovation processes are modeled and analyzed.

# Preface

Studying organizational change processes is a demanding task. Many varying approaches and methods are applied in organization research. In principle, research activity is a problem-solving activity; however, organizational change processes always invoke complex social, organizational, strategic, economic, and technical problems in the concrete context of organizations, enterprises and their coalitions. Therefore, it is natural that problems identified and examined in studies are essentially empirical problems involving the substantive domains of organizational life. Nevertheless, change processes do not directly or easily yield themselves to a study as empirical data. The world is perceived through the "lenses" of some conceptual apparatus. All empirical problems arise within a certain context of inquiry and are partially defined through that context (Laudan 1977; Sayer 1992).

Taking real steps and accumulating knowledge in organizational change process studies require research approaches and methods suitable for the selected research framework as well as for solving relevant problems within that context. Since 1985, the Production and Operation Management group of VTT Automation and the network factory team, in particular, has performed extensive research on organizational change processes. The group has developed its own approaches and development methods for mastering change processes, analyzing achieved results, and studying the development mechanisms in question. This method is called experimental development research, and its primary claim establishes the notion that researchers actively participate in change processes of organizations and initiate, direct, and maintain these processes together with the given organization's personnel. Over a period of time, the substantive domain of the study has grown from individual teams based on concepts of factory to concepts and models of enterprise networks and their building and development methods.

We have now studied enterprise networks and their development for several years. Many researchers have participated actively in our development projects and in forming new concepts within enterprise networks as well as within individual companies. I wish to mention especially Rauno Heinonen, PhD, the research manager of the Industrial Automation research area of VTT Automation and Magnus Simons, MSc, Arto Smolander, MSc, Markku Mikkola,

My role has been integral in these studies on networks as well as in the forming of new models for networks. This study analyzes the main issues of the development mechanisms of enterprise networks and the models of the strategic enterprise networks. The central claim of the study focuses on learning and innovation in networks. The aim of this study is to create a firm theoretical and practical basis for understanding and developing strategic enterprise networks.

Espoo, June 2000

Raimo Hyötyläinen

# Contents

# 1. Introduction

## 1.1 Towards strategic enterprise networks

The development of information technology, the globalization of the markets, and the networking of the economy have all contributed changes in the competitive and operational environment of companies. This is critical period in which new kinds of industrial structures and activity models are taking shape (Piore & Sabel 1984; Castells 1996; Pajarinen et al. 1998). Networking of companies has been attached as an organic element in the *new industrial activity mode*. Networking is seen as influencing material flows, companies' modes of cooperation and network structures, product concepts and cooperation in product developments, technological strategies, and information systems that support cooperation (Womack et al. 1990; Ollus et al. 1990; Clark & Fujimoto 1991; Lamming 1993; Jarillo 1993; Wheelwright & Clark 1992 and 1995; Womack & Jones 1994; Ollus et al. 1998a and b; Bidault et al. 1998; Hines et al. 2000).

Changes in production models and the emergence of new types of relationships between companies is viewed as part of a transformation, theoretically described as a paradigmatic change; previous "best practice" methods of production are rapidly evolving. This change has been conceptualized with the help of a "techno-economic paradigm" (Freeman & Perez 1988; Perez 1986; Dosi 1984), which is used in understanding the model of the most effective production organization. In one sense, the techno- economic paradigm specifies those technological and organizational problems, which will be the focus of each cost structure and economic period of development. These are the problems that companies strive to solve. Within the techno-economic paradigm, change has been seen to consist of combinations of radical product and process innovations in addition to revolutionary organization and management innovations; it has influenced several "new technological systems". Nowadays, the emergence and diffusion of "the paradigm of information technology" to different areas of production is ongoing (Freeman & Perez 1988; Castells 1996).

Enterprise networks and their operations and management can be seen as organization and management innovations of the new production paradigm that are closely connected to new information and communication technology tools (Freeman & Perez 1988; Castells 1996; Ranta 1988a and b; Sproull & Kiesler

1991). Cooperation between companies is reaching new and greater forms. *Partnership cooperation* has emerged as a central mode of thought and operation - it emphasizes relationships between two companies (Rackham et al. 1996; 1999; Nooteboom 1999). In partner - or partnership - cooperation, relationships between companies are undergoing significant changes. The development is transitioning to closer cooperation than ever before. This means that companies are becoming increasingly more involved with each other's strategic plans and development strategies. Cooperating companies will more and more pay attention to activity processes and associated communication links, implementation of quality assurance systems and their increasing participation in research and development work (Weimer 1992; Harrison 1994).

More than before the emergence of *strategic enterprise networks* is being discussed (Jarillo 1993; McHugh et al. 1995; Child & Faulkner 1998; Hines et al. 2000; Kuivanen & Hyötyläinen 1997). Companies form these enterprise networks which possess mutual development programs and a shared vision on product development. Innovative abilities, operational flexibility, and shared values are emphasized in the development of the enterprise network. At this level, cooperation goes beyond partner cooperation. There is a shift from bilateral partner relationship to multilateral cooperation (Jarillo 1993; Kuivanen & Hyötyläinen 1997; Hyötyläinen et al. 1997a and 1999; Kuitunen et al. 1999). This is when companies operating within a network develop into a strategic system with its own relationship network. Companies within the network plan business processes together. The network has objectives, organizational structures, and communication mechanisms (Lamming 1993; Hyötyläinen & Simons 1998a). The network is also characterized by a common culture of operation. As it is, it is still more of a theory than practical reality (Hines 1994). However, networks of this type certainly exist in the corporate world (see, e.g., Fruin 1997; Stuart et al. 1998; Hines et al. 2000).

## 1.2 Development process of enterprise networks: dilemma of learning and innovation

Concepts and perspectives on *learning and innovation* have also emerged in connection with the discussion on enterprise networks and, in particular, strategic networks (Powell & Brantley 1992; Child & Faulkner 1998). In general, the concepts of innovation and learning organization have become

commonly used in the 1990's (see, e.g., Senge 1990; Argyris 1992; Garvin 1993; Leonard 1995; Krogh et al. 1998; Tuomi 1999; Easterby-Smith et al. 1999). Innovation research has, however, focused on the description and analysis of the creation and marketing of individual successful innovative products (Miettinen et al. 1999), development mechanisms of technological changes (Sahal 1981; Kuitunen 1991), the level of areas or clusters and factors supporting their innovativeness (Porter 1990; Hernesniemi et al. 1996) or national innovation systems and their importance (Lundvall 1992; Nelson 1993). The role and significance of the structures of companies and internal operations for learning and innovation processes taking place in enterprises have, however, not formed the primary viewpoint of innovation research (cf. Nonaka & Takeuchi 1995; Burgelman & Sayles 1988; Drucker 1985).

The emergence of cooperation forms and networks between companies has brought new challenges for the companies and for the management of their learning and innovation processes. Traditionally, companies have lacked models, methods and tools suitable for supporting and furthering the learning and innovation processing taking place at varying levels; therefore, companies have not fully utilized these models, methods and tools in the reshaping of the companies, operations and products (see Kanter 1983; Burgelman & Sayles 1988; Nonaka & Takeuchi 1995; Dixon 1999). This problem is further escalated by networking (Child & Faulkner 1998). For the needs of corporate operations in action, there are no applicable models, methods or tools for building networks (see Kuitunen et al. 1999; Hyötyläinen et al. 1999). The issue is even more problematic when the objective is to create strategic enterprise networks followed by the consequent emergence of innovation and expertise centers, which will advance corporate growth and globalization.

Figure 1 illustrates the mechanisms of enterprise network development. This development can be examined and measured through the resource configuration process and the learning and innovation process (cf. Nooteboom 1999).

Generally, the premise for network development is that a company seeks from other companies certain *resources* that it does not already have but which are essential for production and supply to the market. The central idea of networking is that a company recognizes its area of expertise, and relying on this specialty, seeks to cooperate with other companies. A company's specialty forms only one

part of an advanced product or service, and so the expertise of other companies is needed as well. Companies form networks because joining resources solely through the markets does not meet the needs of the demanding and rapidly changing markets (see Casson & Cox 1997; Nooteboom 1999).

The horizontal axis of Figure 1 represents *the resource configuration process* that occurs in enterprise networks. Companies cooperatively join different areas of expertise and resources resulting in a network. The figure illustrates that the resource configuration process occurring in networks is by nature the kind of activity that leads to *static efficiency*. By resource joining and configuration, companies aim to succeed in the market. Static efficiency can be seen as measurement for how competitive the companies' resource synthesis is within a given product and service market (cf. Quelin 1997).

It is presumable that by merely joining existing resources, the ability of an enterprise network to achieve success in static efficiency is limited. The premise of network development can be seen as the company's intentions to acquire new expertise and know-how. Successful cooperation requires that companies in the network go through a learning process (see Child & Faulkner 1998; Vesalainen & Strömmer 1999). The vertical axis of Figure 1 illustrates *the learning and innovation process*.
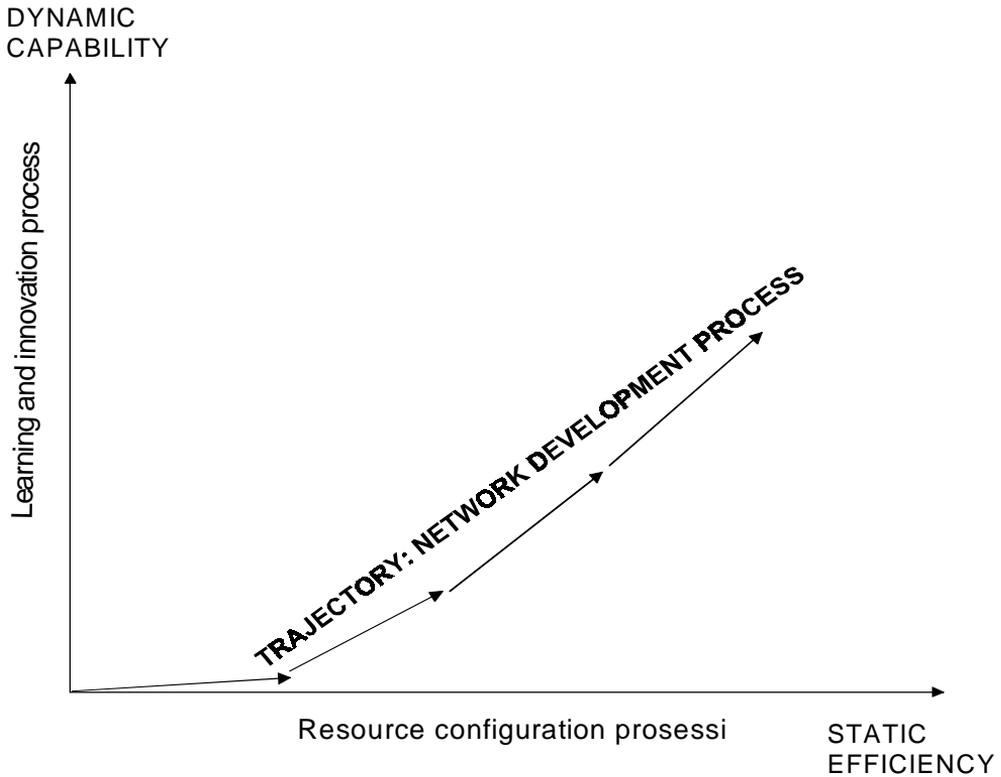
*Figure 1. Network development dimensions and process.*

Through the learning and innovation process, the network can create *dynamic capabilities* for itself and for the companies participating in the network (cf. Sanchez & Heene 1997; Quelin 1997; Nooteboom 1999). The companies operating within the network develop their expertise and capabilities to ensure their future competitiveness (i.e. the continuous growth of their static efficiency). This can be considered the learning and innovation process of organizations and their actors (Lowendahl & Haanes 1997). As a result of this, learning and "innovations" are created in the network and companies. These can be new products and services, new operations concepts, technological and process changes or new organizational and management practices (cf. Bidault et al. 1998).

Figure 1 presents the *trajectory* by which an enterprise network can develop. The objective is to increase static efficiency (i.e. the competition of operations of the network and its companies), the basis of which is to integrate resources in

order to achieve the desired results. The development of static efficiency as well as securing its continuation in the future requires the development of certain dynamic capabilities, learning and innovation. This is illustrated in Figure 1 as a trajectory of *network development process*.

## 1.3 Focus and aim of the study

This study analyzes strategic enterprise networks and their development processes. The perspective taken in the study includes network forms, network operations and management and network development processes. Network learning and innovation mechanisms will also be examined.

The study will cover three topics:

1. Enterprise network development mechanisms, *enterprise network models* and *enterprise network activity models*.

2. *Learning and innovation processes* of enterprise networks and their mechanisms.

3. Strategic enterprise network *development processes and models*.

The basic premise of the research is that networking is transforming the activity and management models of companies. We can say that these activity and management models are truly tested when the networking of companies develops further. New issues and challenges are emerging in the field of management and operations. The logic of merely maintaining the activity of one's own company may not be as substantial as when network cooperation develops to cooperation at the level of business plans. Under these circumstances, an enterprise group operating in a network is a strategic network (Lamming 1993; Jarillo 1993; Hines et al. 2000; Hyötyläinen & Simons 1998a; Heinonen 1999). When enterprise networks develop into strategic networks, new types of challenges emerge for business activity and its organization and management.

The utilization of opportunities created by networking can become the central competitive factor between participating companies. Enterprise networks can

form into a source of competitiveness in business activity as well as an expertise center - a network of excellence (cf. Peters & Waterman 1982; Samson & Challis 1999). Figure 2 illustrates the basic structures and processes of enterprise networks.

**Structure:**
*STRATEGIC ENTERPRISE NETWORK*

→ **NETWORKS OF EXCELLENCE**

**Experts:**
*PERSON NETWORKS*

**Process:**
*LEARNING AND INNOVATIONS*
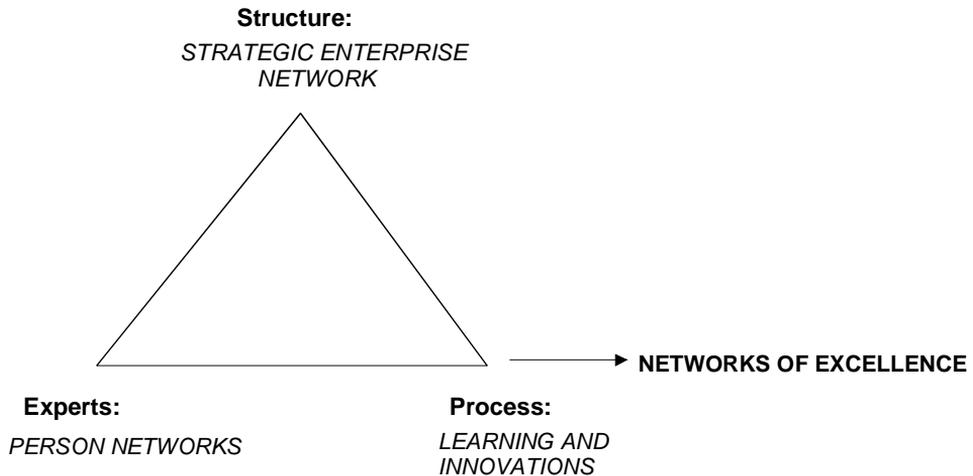
*Figure 2. Central structures and processes of enterprise networks.*

*The enterprise network* forms the foundation and creates new *structures and frameworks* for business operations. Strategic networks, in particular, change the activity and management models of companies. Networking brings forth new motivations and opportunities. Complex enterprise networks are not simply a way of strengthening activity and its continuous development. An enterprise network is a dynamic activity system in which different actors reallocate resources and operations (Dubois & Håkansson 1997). One central viewpoint involves the enterprise network's ability to react to changes in the environment and specifically to create new structures and new knowledge (Easton & Araujo 1997). Three research problems are connected with this:

1. *What changes does networking cause in companies' strategies? What roles do strategies play in the development processes of strategic networks?*

2. *What kinds of network structures and activity models do companies adopt in enterprise networks? Which network structures and modes of activity further the formation of learning and innovative human networks?*

3. *What impact could this have on management? What forms can network cooperation and network management assume? Which management models and methods support organizational learning and innovativeness in the network and in companies?*

In our complex world of rapid change, the ability of companies to continuously learn and operate innovatively becomes absolutely imperative (cf. Stacey 1996; Sherman & Schultz 1998). Learning and innovation occurring in an enterprise network is based on close cooperation relationships and interaction in which *human networks* are in a salient position, as illustrated in Figure 2 (cf. Hutt et al. 2000). We can discuss an innovation network where the actors' resources are complementary in their shared labor towards a common goal. The expertise and skills of individuals as well as the expertise of the different parties complement each other in relation to the problem that is being solved (see Miettinen et al. 1999; Bidault et al. 1998).

*Learning and innovation* can be seen as a process, as illustrated in Figure 2. Through the learning and innovation processes, enterprise networks can develop into "networks of excellence". The emergence of innovations has been seen as a long and intricate process, in which an initial open and indefinite assumption about the possibility and direction of cooperation develops through several consecutive problem solving processes. Each of them helps to solve problems important for the development of a product or an operation (see Miettinen et al. 1999; Biemans 1992; Bidault et al. 1998; Burns & Stalker 1994; Hyötyläinen 1998).

These types of "learning within the context of business activity" phenomena are not discussed widely in the research and literature of the field. Nonaka and Takeuchi (1995) have previously attempted to describe similar processes with their "middle-up-down" model (cf. Morton 1998). Little research exists on the role of "tacit" information in the creation of knowledge as well (see Polanyi 1983; Baumard 1999; Choo 1998; Sparrow 1998). On the part of enterprise networks, very few studies discuss learning and innovation (cf. Biemans 1992; Child & Faulkner 1998). The purpose of this study is to analyze learning and development models in the context of enterprise networks.

## 1.4  Research approach and method

This study is based on development projects of enterprise networks performed at VTT Automation during the course of several years (see Mikkola et al. 1996; Kuivanen & Hyötyläinen 1997; Mikkola et al. 1997; Tarvainen & Hyötyläinen 1997; Hyötyläinen et al. 1997a and b; Simons et al. 1998a; Hyötyläinen & Simons 1998a; Simons & Hyötyläinen 1998; Hyötyläinen & Kuivanen 1998; Kuitunen et al. 1999; Hyötyläinen et al. 1999). Development projects of individual companies activity and analyses of the results also form the basis of this study (see, e.g, Hyötyläinen et al. 1990 and 1991; Kiviniitty et al. 1994; Alasoini et al. 1994 and 1995a and b; Simons & Hyötyläinen 1995a and b; Hyötyläinen & Simons 1996 and 1998b; Simons et al. 1997; Hyötyläinen 1990, 1993, 1994, 1995 and 1998). Understanding network operations and particularly the analysis of their learning and innovation processes requires analysis of individual companies' models of operation as well.

The studies performed at VTT Automation have their basis in the *experimental development research* model (see Norros et al. 1988; Toikka et al. 1988; Alasoini et al. 1994; Hyötyläinen et al. 1997a; Hyötyläinen 1998; cf. Engeström 1987 and 1999). This research approach is characterized by four features: (1) the research is performed as intensive case study; (2) it rests upon and aims towards theoretical generalizations; (3) it is based on experimental development intervention; (4) its goal is methodic discipline (see Alasoini et al. 1994; Hyötyläinen 1998). These features are analyzed in the following manner:

(1) Experimental development research is performed as *intensive case study*, based on the tradition of action research (see, e.g., Argyris & Schön 1978; Gustavsen 1985; Westbrook 1995). The studies are based on long term development and research activity concerning the development processes of enterprise networks and network enterprises. Most of the studies performed have lasted from two to four years.

(2) Experimental development research aims at *theoretical generalizations* by utilizing case studies (cf. Eisenhardt 1989; Yin 1989; Westbrook 1995; Glaser & Strauss 1967). The research begins with the premise of theoretical hypotheses of new network and production models and their characteristics and development mechanisms.

In experimental development research, *hypotheses* act as research tools in the handling of study materials and case study results (see Miettinen 1993, 19–25; Eisenhardt 1989). Hypotheses and their development can not be regarded in experimental development research as a traditional combination of "hypothesis-testing". The meaning of hypotheses must be seen as a means to conduct research (cf. Yin 1989; Eisenhardt 1989).

(3) Experimental development research is related to the development process taking place in the enterprise network and companies. Experimental development research has three main phases which include basic analysis, experimentation, and follow-up and evaluation (see Alasoini et al. 1994; Hyötyläinen 1998; cf. Engeström 1987, 321–337).

A central feature characterizing the approach of experimental development research is that the ongoing transformation is not only monitored and analyzed in the study, but that the aim is *to actively participate in the developing process to create new solutions*. When working with the case studies, the researchers introduce research-based elements: *methods, tools, and organizational forms and training activities* (cf. Engeström 1987, 321–337). The experimental stage forms the main phase of the research in which new structures and methods are created, tested and developed in the participating networks and organizations.

(4) Experimental development research strives towards *discipline*. The progress of the experimental framework, the recording of results, and the theoretical generalizations call for specific methods to be employed in the collection and analysis of data on the development process. In order to "test" and develop further research hypotheses, it is necessary to organize the acquisition of data to last for an adequate period of time and to include a sufficient frequency (cf. Eisenhardt 1989; Pettigrew 1990). In case studies, *different kinds of methods and procedures* are used in data collection. Research results become more reliable if many sources are used in data collection and if these data are compared with each other during the analysis phase.

This study will focus on the analysis of models and methods developed in network studies at VTT Automation. The study aims to create a new type of enterprise network theory. In particular, this study will analyze the activity and development mechanisms of strategic enterprise networks. Learning and

innovation processes that take place in networks, and their mechanisms will constitute a special viewpoint. The study will also discuss and analyze the development process of strategic enterprise networks based on models and methods of experimental development research applied to the network environment.

Part of the study is based on analyses of previously unpublished research data. Material presented in the Introduction, the model on network development dimensions and the framing of the research in question go further than previous network studies conducted at VTT Automation. The creation of the pursued network theory and the analysis of the development mechanisms of strategic enterprise networks require also an analysis of the activity of network enterprise, an analysis of learning and innovation processes occurring in the network, and the creation of process models. The analysis on enterprise network development needs presented in Chapter 2 has been written specifically for the purposes of this particular study. Also sections 3.1 and mainly 3.2 of Chapter 3 are based on previously unpublished materials. The entirety of Chapter 4 is based on analyses of previously unpublished company-specific materials. Through Chapters 5–7 part of the text involves new approaches compared to the study results presented before. Chapter 8 contains analyses on learning and innovation processes of strategic enterprise networks. These analyses are based on research of models of activity and development mechanisms of the network enterprise and enterprise networks.

## 1.5  Structure of the study

The objective of this study is to develop a theory of enterprise networks and to analyze the development processes and activity models of strategic networks. The hypothesis is that understanding the development and operations of strategic networks requires the analysis and modeling of learning and innovation processes occurring in the network.

The structure and stages of this study are illustrated in Figure 3. The following presents the structure of the study.

Chapter 2 of the study discusses the development needs of enterprise networks. Highlighted will be the position of small and medium-sized enterprises in

enterprise networks. The development problems of Finnish enterprise networks will be examined through three enterprise groups and the challenges they encounter in networking. In particular, the aim of this study is the analysis of enterprise models and their development for the needs of two enterprise groups. The first enterprise group consists of so-called niche companies or companies developing in that direction and their networks. The second group consists of those small and medium-sized companies that, through networking, can grow into systems suppliers and strong actors. In addition, the networking situation and networking models of Finnish companies will be discussed.

Chapter 3 will include the theoretical bases concerning enterprise networks models. The chapter examines network development and network dimensions, which are discussed by means of two network models. Based on a discussion of the Japanese and the Western enterprise network models, the need for a third model will be presented. The need for this third model is connected to our present world of change and complexity. The chapter forms an important frame of reference for research. It presents a strategic enterprise network model, which is seen as the expression of the third model.

Chapter 4 includes analyses of a network enterprise and its development mechanisms. The starting point is the supposition that the activity of an enterprise network cannot be understood without an analysis of the activity of each individual company belonging to the network and its development. The network enterprise will be modeled at different levels, from an enterprise model to the actors' activity and thinking models. These models are used in discussing the development mechanisms of a network enterprise.

Chapter 5 includes analyses of the enterprise network, its activity and development mechanisms. The chapter will include the creation of a quasi-firm model, and using that, a governance model for an enterprise network as well as analyses of the development mechanisms of enterprise networks.

**STARTING POINTS OF THE STUDY**

**Object**: Development process of strategic enterprise networks
**Aim:** To understand development mechanisms of strategic enterprise networks
**Basis:** Learning and innovation are necessary elements for the development of strategic enterprise networks

CHAPTER 2:
Based on previous research and empirical data of Finnish enterprises

Analysis of the development needs of enterprise networks and SMEs

CHAPTER 3:
Based on litterature and my own development work

Analysis of theoretical models on the enterprise network development

CHAPTER 4:
Based on analyses of the development cases of companies

Analysis and modeling of business activity systems on different levels

CHAPTER 5:
Based on analyses of previous models and theoretical consideration

Analysis of the quasi-firm concept and development model of enterprise networks

CHAPTER 6:
Based on previous models and theoretical consideration

Description and analyses of the strategy and activity models of the strategic enterprise networks

CHAPTER 7:
Based on analyses of development models of previous network cases

Analyses of the development of multilateral network activity in strategic enterprise networks

CHAPTER 8:
Analyses and modeling of learning and innovation in strategic enterprise networks

CHAPTER 9: CONCLUSIONS

*Figure 3. Structure of the study.*

Chapter 6 forms the central part of the study. The chapter will include analyses on the strategies, organization and activity mode of multilateral network operations. The premise is that in multilateral network cooperation, a common network strategy and a network organization with its own forms and structures is created. The network is realized only through activity. The chapter discusses network activity modes and human networks and their activities.

Chapter 7 includes discussion on the development process of a network enterprise and the stages of the process. The discussion will be used to define those dimensions and mechanisms that are seen as central factors from the perspective of the change and development processes of companies and enterprise networks.

Chapter 8 includes analyses on learning processes and innovation that take place in strategic enterprise networks and examines their development mechanisms. Finally, Chapter 9 presents the conclusions of the study.

# 2. Development needs of enterprise networks

## 2.1 Enterprise networks and smes

Enterprise networks have been the focus of growing attention since the mid-1980s (Piore & Sabel 1984; Womack et al. 1990; Lamming 1993; Jarillo 1993; Hines 1994; Harrison 1994; Ebers 1997; Child & Faulkner 1998; Dussauge & Garrette 1999; Noteboom 1999; Hines et al. 2000). Enterprise networks have been seen as an opportunity to form a new kind of industrial structure. Networks formed from SMEs (small and medium-sized enterprises) have been an important element in the discussion of networks. SME networks have primarily been studied as regional forms in which local SMEs join forces on the basis of equality (Lomi & Grandi 1997; Braczyk et al. 1998). The long-standing view is that networking provides specialized SMEs with economies of scale and access to larger markets. However, there has been a good deal of skepticism about the extent and permanence of such networks. Successful cases, however, are limited in number. There is evidence that SME networks are more likely to connect with networks of larger businesses than to function with complete independence. In most countries, large companies and the forms of cooperation they maintain dominate the industrial structure despite many efforts and programs to enhance the position and the role of SMEs (Harrison 1994; Kay 1997; Whittaker 1996; Aldrich 1999).

Conversely, the growth of SMEs and the market growth should be seen as part of the structure of the economy and production, and consequently, their development. Networking is providing new opportunities for SMEs (Hyötyläinen et al. 1997a; Vesalainen 1999). Individual SMEs now have opportunities to grow into world-class actors in their niche fields. This requires, however, networking with other companies and actors (Heinonen 1999). One possibility for this is that SMEs form enterprise groups, which function as systems suppliers to larger principals (Hyötyläinen et al. 1999). The notion of a system supplier comprised of an enterprise group is related to the discussion on areal networking of SMEs as well as to views of the changing position of SMEs in the cooperation networks of larger enterprises (Perrow 1992; Jarillo 1993; Hines 1994).

## 2.2  Development problems of Finnish enterprise networks

In Finnish discussions, the networking of businesses has emerged during the last ten years as one of the principle factors for change in business and production (Ollus et al. 1990; Koskinen et al. 1995; Vesalainen 1996 and 1999; Kuivanen & Hyötyläinen 1997; Hyötyläinen et al. 1997a; Jahnukainen et al. 1997; Hyötyläinen & Simons 1998a; Ollus et al. 1998a and b; Hyötyläinen et al. 1999; Vesalainen & Strömmer 1999; Kuitunen et al. 1999; Heinonen 1999). Studies show that significant Finnish principals have outsourced their functions to a great extent and will continue to do so. These businesses have also shown that Finland lacks companies able to take responsibility for larger entities as a part of outsourcing functions (Confederation of Finnish Industry and Employers 1997).

The utilization of opportunities provided by networking is a considerable challenge for Finnish companies and for SMEs, in particular. The structure of Finnish industry has an impact as well. In key fields of industry, companies typically manufacture products in small amounts or as limited editions. Due to the small size of the domestic market, building profitable business operations has often required concentration on product and market segments in which the company has been able to utilize its unique expertise and has been able to gain access to the international market as well (Ollus et al. 1990; Vartia & Ylä-Anttila 1992; Alasoini et al. 1994; Hernesniemi et al. 1996; Artto et al. 1998; Pajarinen et al. 1998). However, in this respect, companies have varying starting points and a wide range of development opportunities. The structure of Finnish industry can be divided into roughly three types of enterprise groups which hold different positions in the networking economy (Vartia & Ylä-Anttila 1992 and 1996; Tilastokeskus 1997; Heinonen 1999).

Some of the companies are *large-scale enterprises*, which continue to grow even larger and more global. There are dozens of companies such as this. Large-scale enterprises operating globally are growing larger through acquisitions or by signing different types of cooperation agreements. The primary development challenge for these companies is the ability to centralize into core areas and strengthen their international position. Conversely, there are operations outsourcing, supply, and service networks (Confederation of Finnish Industry

and Employers 1997; Reilly & Ylä-Anttila 1999; cf. Gilroy 1993; Dussauge & Garrette 1999).

Some Finnish companies are considered to be so-called *niche companies* (Vesalainen 1999; Heinonen 1999). Companies that fit this description are possibly numbered in the hundreds. Often they are SMEs that, by nature, are innovative product and expertise-based companies. Typically they operate with narrow product concepts and focused markets. In most cases, companies have oriented strongly to export and even to operate globally in their own market segment. The major development challenges for these companies include the design and development of a product and service concept, the orientation to export, and the strengthening of global operations.

Most Finnish companies, however, are *small enterprises and SMEs* that operate as subcontractors or offer services to other companies (Vesalainen 1999). There are thousands of such companies. This group includes very diverse types of companies with diverse business concepts. Companies operate mostly at the domestic markets as subcontractors or service providers. The networking of the economy and larger companies places these companies in line for change. The central development challenges for these companies include adjusting to the pressure for change in the operational environment and modifying their own role in the developing enterprise networks and the network economy. One possibility is that small enterprises and SMEs could form enterprise groups operating in cooperation which would be responsible for system supply to principals and the development of their own products for the markets. Strong enterprise groups might grow into expertise centers, which would make it possible to aim towards international transactions (see Hyötyläinen et al. 1997a and 1999; Heinonen 1999).

The examination of enterprise networks in this study focuses on the perspectives of the needs of two enterprise groups. The first group consists of niche companies or companies developing into niche companies. By means of networking, the challenge is to create strong innovative expertise centers around these companies. These expertise centers will be competitive in the international markets and capable of developing their products and operations by utilizing the network. The second group consists of SMEs that have the potential to grow into strong expertise centers by forming enterprise groups. These groups can reach

significant positions in the principals' networks or get access to global markets with system deliveries or with their own products.

We can see that the development of these two enterprise groups forms a basis for new industrial structures and simultaneously creates preconditions to advance networking in the entire economy. This is how structures and activity modes emerging between companies can function as sources for new organization and product innovations, which can have national impact. These network structures and cooperation methods taking shape facilitate on their part the development of a national innovation system (see Lundvall 1992; Nelson 1993; Porter 1990; Nonaka & Takeuchi 1995).

Within these two enterprise groups, the creation and development of companies and their networks into strong expertise centers is a long and complex learning and innovation process, which requires several years of investment in development on the part of the companies, so that the companies' operations concepts and systems can be changed into practical models and methods (cf. Baden & Pitt 1996; Leonard 1995; Pettigrew & Whipp 1993; Kanter 1983). For the enterprise networks, this road is even longer (see Kuitunen et al. 1999; Hyötyläinen et al. 1997a and 1999). The progress may require the development of business concepts, internal organizational changes within the companies, development of companies activity systems and cooperation practices between companies, and the creation and implementation of new methodical and technological solutions.

The basic problem is that there are no substantially advanced methods and tools for the creation and development of enterprise networks. There are very few models and research data on those processes and phases through which networks are created and built (see Ebers 1997; Kanter & Eccles 1992; Borch & Arthur 1995). The situation is even more problematic on the part of expertise centers formed from enterprise networks, i.e. 'networks of excellence' type of innovation and expertise centers. The problem is that research performed on these types of organizational forms is scarce. There are no models or methods in this field (cf. Peters & Waterman 1982; Samson & Challis 1999). Even the basic concepts are problematic. Previous research and discussion has focused on larger units of activity. Discussion concerns clusters, cluster analysis and "micro clusters" which are terms used of enterprise networks as well (see Håkanson 1987; Porter

1990; Hernesniemi et al. 1996; Paija 1998). The situation is particularly questionable for SMEs. Building expertise centers requires significant changes in companies' activity models and cooperation habits. For SMEs, the renewal of activity modes and management of change processes is not easy. Furthermore, SMEs have been seen to have problems in adapting to rapid changes in their operational environments (Gerhard & Weimer 1992; Hyötyläinen et al. 1997a). Change calls for personnel, expertise, and experience in the implementation of change processes. SMEs frequently lack development personnel and the necessary skills and experience to implement change processes.

Also the operations of larger companies and their objectives for network building and utilization have a determining impact on the networking needs and opportunities of companies, and SMEs in particular. The development situation is not without ambiguity. At the strategic level there is an ongoing emphasis on the significance of networks and cooperation, but in practice, only the building of partner relationships has started. Companies' objectives have also diverged on part of the creation of different cooperation relationships (see Hyötyläinen et al. 1997a and 1999).

At the strategic level in Finnish industry, it is exceedingly clear that a competitive edge can be reached by specializing and focusing on the best areas of the companies' own expertise (Vartia & Ylä-Anttila 1996; Pajarinen et al. 1998). Elements and work stages requiring other kinds of special expertise are bought from subcontractors who have selected their business ideas from these areas. Larger companies have given to subcontractors an ever-growing part of manufacturing previously produced by the company itself. Particularly during the 1990s, a transition has taken place in Finnish industry where certain operations and components have been given to subcontractors to produce (Confederation of Finnish Industry and Employers 1997). For example, the portion of purchases in the selected 17-company sample had grown from 40% in 1990 to 50% in 1994 (Koskinen et al. 1995). This means that companies use outside providers, subcontractors and suppliers more and more and focus themselves on their special expertise areas.

At the same time the tendency seems to be to aim to establish cooperation relationships with fewer suppliers than before. The subcontractor network is reduced somewhat, but the suppliers are expected to be able to deliver larger units

and systems instead of single parts. This seems to be the case in Finnish industry during the past few years. The number of suppliers has decreased, and the relative portion of system suppliers has increased. The number of partner suppliers has simultaneously increased in proportion even though the number of partners of all suppliers was only 15% in 1994 in the selected sample of 17 companies. Likewise the number of system suppliers per the number of all suppliers in the same sample was only about 10% in 1994 (Koskinen et al. 1995). This means that Finnish industry has only during recent years become conscious about the necessity of new kinds of subcontracting relationships. However, determined operations to create partner cooperation and a focus on fewer suppliers is illustrated by Finnish companies. Nevertheless, partner relationships in Finnish industry are apparently still more publicly expressed objectives than actual practice.

Similar results were reached in a study made in 1998 on the subcontractor and cooperation situation of four principals (Hyötyläinen et al. 1999). Table 1 illustrates the principals' subcontractor situation and future objectives.

Based on the table, we can state that the principals emphasize system supplying as the future objective (see Hyötyläinen et al. 1999). It seems, however, that strategic network cooperation based on multilateral cooperation does not seem to be the goal thus far (cf. Kuivanen & Hyötyläinen 1997). The future development target of the principals seems primarily to be bilateral partner cooperation and the reduction of the number of suppliers. The portion of system suppliers of the number of all suppliers still seems low, at about 5–10%, which is close to the level found in other studies (Koskinen et al. 1995). Some of the companies are just now initiating development measures to use system suppliers. In addition, the principals declare that their objective is to use different levels of supplier relationships. These can be classified in three groups: (1) system suppliers, (2) contract-based regular suppliers (quality and JIT suppliers), and (3) capacity suppliers and random suppliers. System suppliers are expected to participate in shared development activities according to the partner relationship (see Hyötyläinen et al. 1999). Regular suppliers supply parts of a whole but do not participate in development. Capacity suppliers are used as the source of extra capacity supply.

*Table 1. Future requirements of core companies for their suppliers (Hyötyläinen et al. 1999).*

| Business/ requirements | Core company 1 | Core company 2 | Core company 3 | Core company 4 |
|---|---|---|---|---|
| Number of suppliers and status of supplier system | Thinning the supplier network.<br><br>Development of supplier system. | Changes in international operating mode of business; pressure on suppliers to go international. | 110 suppliers, 7 of which are system suppliers; contract suppliers total 40%. Goal is to increase the number of system and contract suppliers. | The number of suppliers has dropped in a few years from 600 to 160. Goal is to increase the number of system suppliers. |
| Operating mode | Development of partnerships: suppliers participate in developing operating processes and the product process. | System suppliers take part in development efforts. | Planning competence required of system suppliers. | Promoting partnerships: Suppliers take part in joint development; operations are an 'open book'. |
| Delivery times | Suppliers' delivery time one-fifth of current amount. | Suppliers' delivery time cut in half. | | Delivery time cut in half. |
| Reliability | 98–100%. Development of measurement. Flexibility in volume. | Over 95%. Able to adapt to large fluctuations in volume. | | 95%. Volume flexibility target + -30% / 14 days. |
| Operational and order routines | Development of information transfer; key suppliers get their information from real-time database. | Transport system more effective. | | Simple material control. Monitoring of cooperation. |
| Price | -3–0% per year throughout the cost chain | Factors affecting the price clearly stated. Division of development results to be agreed upon. | | -3% per year; 15% savings in costs for new products. |

The objective of this study is to analyze and discuss enterprise network models and the development process of networks and its methods. The models and methods discussed apply also to the networking needs of SMEs and the development of their joint operations (cf. Kuitunen et al. 1999; Hyötyläinen et al. 1999). The models and methods support the building and development of multilateral network cooperation (cf. Kuivanen & Hyötyläinen 1997). The objective of the application of the models and methods is to develop strategic enterprise networks. The development process requires *learning and innovation* from the participating companies. This kind of development can at the same time create pressures for the principals to change and strengthen network cooperation in accordance with the principals of multilateral development activity. Conversely, new structures and operation modes can function as *sources of learning and innovation* (cf. Nonaka & Takeuchi 1995; Kodama 1995). The result can provide new organizational, management and product innovations.

# 3. Theoretical grounds: models of enterprise networks

## 3.1 Enterprise networks and their characteristics

The network has been viewed as a new form of cooperation and organization for companies. Why do companies seek out cooperation with other companies, even their competitors? Both economic theory and economic research have searched for an answer. The *management system* of corporate contracts has been seen as a change in organizational thinking, as compared to the traditional focus on production function. The management system of corporate contracts has been examined in the framework of transaction theory, deviating from neoclassic economic theory (Williamson 1975 and 1985). According to this theory, a one-to-one contract between companies can be situated in the middle ground between the markets and a hierarchical company. The premise for the network is that the markets and hierarchic forms of organization have failed to regulate inter-company transactions. Trust between companies acts as a mediating factor, which explains the forms of networks. Within this framework, however, network relationships are examined from a rather broad perspective. The issues regarding networks are reduced to mainly those mechanisms that create the forms of networks. Activity internal to the network and companies' activity within the network are left without more detailed analysis. The issue is that either a network is a suitable form of transaction management or other more traditional ways are more applicable to the situation (Dubois & Håkansson 1997).

Two problems, *co-ordination* and *interdependence*, are connected with the management of companies' cooperation forms. Two approaches can be taken. One is based on a long-term evolutionary perspective, according to which objective transaction costs determine the survival of the most suitable management forms. The other approach derives from a short-term management selection perspective, according to which managers operate based on subjective costs. *Subjective costs* reflect different views and risk estimates. The subjective approach explains why companies even in similar circumstances may make different decisions about cooperation forms. The premise is that a network is developed through focused actions (cf. Nooteboom 1999, 16–20; Stein 1997; Aldrich 1999). The latter approach also creates opportunities for researchers and

consultants to impact the development process of organizations and networks (cf. March 1999, 100–113).

The formation of networks between companies requires mutual *trust*. Networks are about companies' strategic aims to maximize their competitive advantages. The traditional method is to observe companies' strategies of competition in relation to the structure of the field of business and the competitive situation. Companies are seen as having various generic strategies available, which include cost leadership, differentiation and centralization (see Porter 1980 and 1985). Another approach emphasizes competitive advantages that can be maximized through a company's unique capabilities and the creation of resources (see Sanchez & Heene 1997; Nooteboom 1999). These capabilities and resources are combined with the development of products, services and operations, and are difficult for competitors to adopt. *The cooperation strategy* can be seen as combining the pursuit for these two previous competitive advantages (Child & Faulkner 1998). Without trust there is always some trepidation and the risk that a partner or participants in the network may take advantage of the company's commitment and investment in the operations of the network. Such investment can be a matter of valuable know-how or other resources. Trust is an essential prerequisite for the development of enterprise networks. With increased trust, mutually profitable relationships can be formed in the enterprise network. This enables the development of network relationships and the creation of structures supporting organizational learning in the network (see Child & Faulkner 1998).

*The resource-capability approach* offers an important perspective from which to estimate the reasons for network formation and the internal activity of networks (cf. Quelin 1997; Nooteboom 1999; see Figure 1). In the new competitive environment, companies have had to focus on their core operations in order to be able to manage and develop enterprise-specific resources and capabilities, which will in turn become the companies' competitive features. These capabilities include technical, organizational, cognitive, motivational and communicative skills and expertise (Stein 1997). The flip side of this is that other kinds of expertise and resources needed must be obtained from other companies. By means of networks and networking companies can also change cooperation into *organizational and informational capability*. Organizations and procedures for information creation, exchange and alteration can emerge in a network (cf. Quelin 1997; Hyötyläinen & Simons 1998a; Nonaka & Takeuchi 1995). One

central learning and innovation issue for companies operating in a network becomes the efficient use of present resources and the development of new capabilities. On the one hand this issue deals with the utilization of the potential of existing resources and, on the other hand, the creation of new opportunities (cf. March 1999; Nooteboom 1999; Fujimoto 1998).

*Vertical relationships* between the principal and its suppliers comprise an important part of the companies' network relationships as a whole (Nooteboom 1999). Generally, vertical relationships can be said to be easier to manage than *horizontal relationships* between competitors. Relationships between competitors may be characterized by fear that competitors will abscond with the results. For vertical network relationships this danger is less severe. Fundamental questions about network relationships include *the objectives and forms of network relationships and their management*. The term "management" refers to the many interests in relationships between companies as well as to the challenge of achieving of a fruitful and credible balance between different interests and forces. The problem is how to manage a network organization, which is situated between "the markets and the hierarchy". The central perspective concerns the problem of how to create mutual benefits, build mutual procedures between partners and manage risk caused by dependence. Just as important a question is *how networks can be constructed* (see Nooteboom 1999; Ebers 1997).

At issue in the creation of network relationships between companies is how companies combine their internal operations with the customers' and cooperators' operations. Three different interactional and content-based factors can be distinguished. The first one pertains to the connections between functions and activity chains. In networks these connections are created by different activity processes and activity chains, which as a whole can be seen to form the *activity model* of the network. The activity model reflects each company's internal activity and functional structures. The second factor is associated with the connections and links between actors. The organizational structures of companies operating in the network are linked with this at a basic level. Connections between actors in a network can be seen to form *a network of actors* (cf. Hutt et al. 2000) The third factor concerns companies' resources. New links are created between these resources within networks. Thus we can consider

that a certain *resource combination* is represented by the network (see Dubois & Håkansson 1997).

An interesting perspective into network formation is offered by the fact that a company can itself be seen internally either as an organization based on distrust or one based on trust. We have seen that companies that network internally are *organizations based on trust*. This leads to the presupposition that companies displaying a high degree of trust internally find it easier to network with other companies because the strategies for the company's internal and external relationships are parallel. Correspondingly, companies that have *internal relationships based on distrust* may experience difficulties in building network relationships with other companies, because the principles of networking are not properly understood (Casson & Cox 1997).

Whether a company is an organization based on trust or distrust can have an impact also on the development of *strategic network relationship* conditions in enterprise networks and on the formation of internationally competitive expertise centers. In any case, the core issue in network development is the building of multi-level relationships between companies. Similarly, it is an issue of a complex multi-level *process*, when, for example, an enterprise group representing small and medium sized enterprises (SMEs) starts to develop into a nationally and internationally important actor.

Enterprise networks and their new forms can been seen as *organizational and management innovations*. Similarly, networks formed by enterprise groups can be examined as *sources and environments for learning and innovations* and even as national innovation systems (see Lipparini & Sobrero 1997; Vesalainen & Strömmer 1999; Porter 1990; Lundvall 1992; Nelson 1993). These kinds of enterprise groups, either as they are or through the operations of larger companies, can plug into larger national and international networks, in which the significance of learning and innovation is emphasized by changes taking place in the companies' environments, such as the emergence of global competition and the radical need for product differentiation, as well as the development of information and communications technology.

## 3.2  Japanese and western network models

Vertical relations between the principal and its subcontractors play an important role in business network relationships (Williamson 1985; Dubois & Håkansson 1997; Nooteboom 1999). The efficiency, innovativeness and growth opportunities of companies can be regarded as dependent on the reigning cooperation models in new environments. Roughly speaking, there are two different models of vertical networks (see Hyötyläinen et al. 1999; Hines et al. 2000), a Japanese model and a subcontractor model for Western businesses. The models seem to conflict sharply with each other. In particular, the Japanese model differs from the convential US subcontracting model. The European model seems to lie somewhere between the two, although closer to that of the US than of the Japanese (Clark & Fujimoto 1991, 129–166; Lamming 1993; Nooteboom 1999, 152–200). Based on a comparison of models and practical examples, the potential and usefulness of a third model has been previously discussed (Stuart et al. 1998).

### 3.2.1  Japanese model

The Japanese subcontracting model can be described as a hierarchical pyramid in which a chosen number of first-tier suppliers have a direct link to the principal. Specialized suppliers are found at the next level and unspecialized manufacturers at the lowest level (Figure 4).
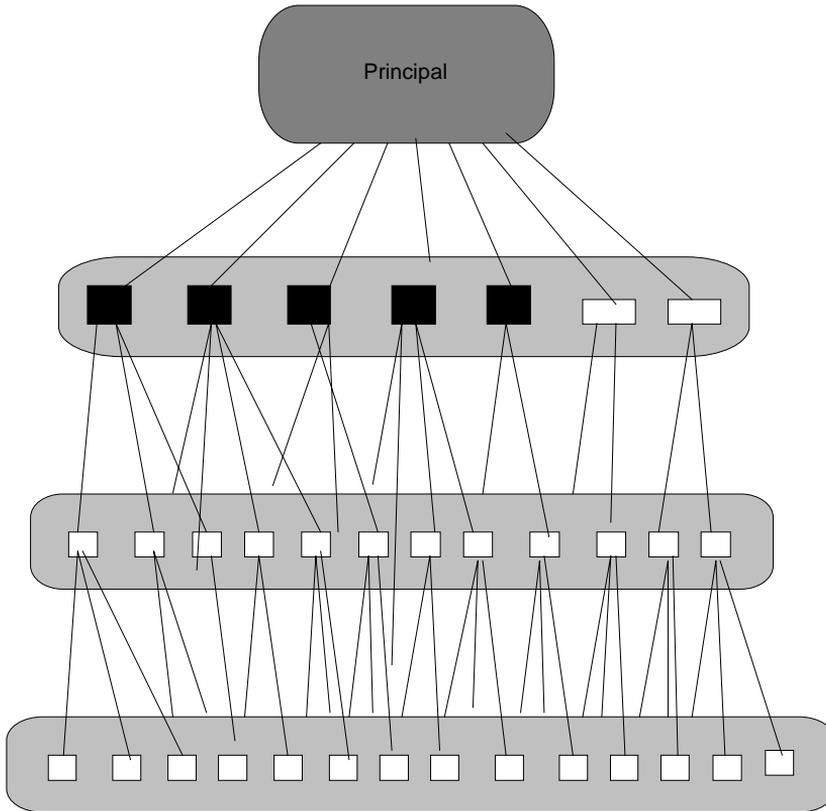
*Figure 4. The Japanese subcontracting model (Clark & Fujimoto 1991, 139).*

The principal has direct links to a select group of first-tier suppliers who meet its particular needs. These links cover extensive system deliveries, the coordination of functions, the choice of subcontractors, quality control and development activities. The first-tier suppliers integrate their systems deliveries using suppliers and manufacturers on a lower level. The principal places special demands on the first-tier suppliers concerning, for example, investment. In return, the first-tier suppliers are rewarded with long-term contracts, technology transfers and other support from the principal. Focusing attention on the first-tier suppliers has meant that priority has shifted from the price and quality of the products alone to technological competence, flexibility and innovative capacity. An obvious feature is that the principal has only one first-tier supplier for each activity. Similarly, the first-tier suppliers are often linked to only one principal or to a few at most.

The businesses that offer special products or special expertise are on the middle level, or second tier. The specialized technical suppliers of the second tier usually supply the first-tier suppliers, although they may have a direct link to other networks or principals. They are typically expected to have competence in some specialized technological area and the ability to offer services such as product planning, training, and maintenance and repair (Nooteboom 1999).

Businesses without any special areas of competence are situated on the lowest level, or third tier. These often act as capacity buffers for other businesses or supply standard goods, materials or services. Such businesses typically work in a number of networks and offer their services to a number of customers.

### 3.2.2  Western model

Typical of the US model is a large number of subcontractors with a direct link to a principal. The activity is based on short-term contracts (Figure 5).
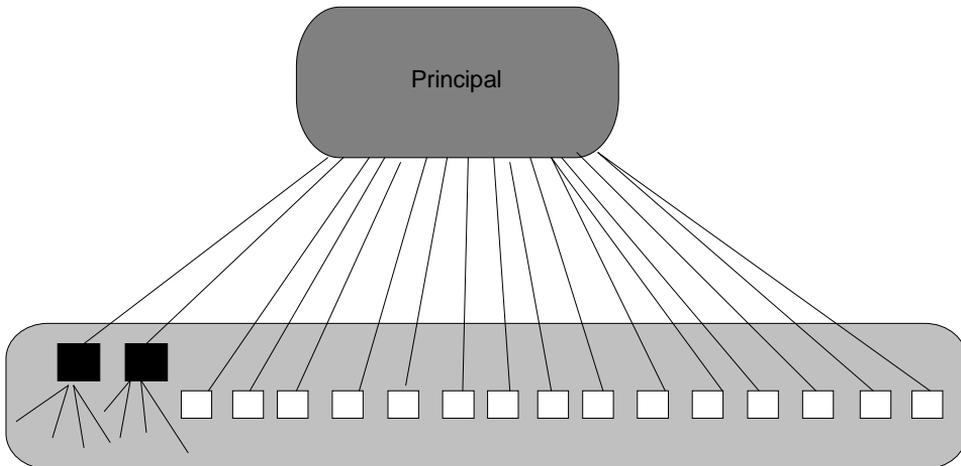


*Figure 5. The Western model (Clark & Fujimoto 1991, 139).*

In the Western model, an adversarial relationship exists between the principal and the subcontractors. Interaction is based on the principle of competitive bidding and subcontractors are forced to compete with each other within the framework of annual contracts. The principal may have many suppliers for the

same purpose at one time. The principal oversees product development and product planning. Subcontractors are provided with manufacturing specifications and are largely treated as a source of manufacturing capacity. In the Western model, there may also be system suppliers providing a broader range of goods and services. These system suppliers may have their own networks of businesses offering various subcontracting services.

## 3.3  Comparison of the models: a model of strategic enterprise networks

There has been some movement towards the Japanese model in Europe and the United States. Attention is no longer focused only on price and quality, but also on technological and innovative ability and on the development of products and operations (Langfield-Smith & Greenwood 1998; Nooteboom 1999). At the same time, the number of first-tier suppliers has decreased and supplier pyramids have emerged. There is, however, an obvious difference between the Japanese model and the Western model in the number of first-tier suppliers. The differences are apparent in the automotive industry, for example. In 1988, Japanese car manufacturers had 310 to 340 direct suppliers, whereas US car manufacturers had 1800 to 2500 direct suppliers. The European manufacturers were located in the middle with 500–1600 direct suppliers (Lamming 1993, 172). Despite this convergence, the basic differences between the Japanese and Western models remain. In the Western model, independence between the buyer and the suppliers is emphasized; buyers do not want any one supplier to be more than 30–50% dependent on them. Moreover, there is less commitment to the development efforts of the principal in the Western model than there is in the Japanese one (see Nooteboom 1999).

This prompts us to ask which approaches and models are better and what impact the environment has. Is it only a matter of national and cultural differences (cf. Clark 2000)? Nooteboom (1999, 160–200) has tried to compare the two models. His approach has included testing the qualitative material describing the models against a formal comparative model based on an application of game theory. This comparison includes both the Japanese and the Western models. He also discusses a third, different model and its potential. The effectiveness and usefulness of the models was compared with respect to four possible 'world views': a 'tightly knit clan world', a 'Fordist world', 'an efficient quality world'

and a world of 'rapid change and complexity'. The comparison produced the following results:

- The traditional Western model is efficient in a 'Fordist world'. The model is efficient when there is little need for information transfer or alternative learning and cooperative development. In today's operating environment, in which global markets, differentiation of products and fast changes are typical, the Western model is no longer efficient.

- With respect to the pure Japanese model, the result is that the model is not efficient in the 'efficient quality world', where it is generally thought that it would be most appropriate and provide the maximum efficiency. This is because the mutual hierarchical relationships and centrally directed development activity best serve the interests of the principal. The model does not guarantee the transfer of benefits to the suppliers (Gerlach & Lincoln 1992; Stuart et al. 1998). In the Japanese model, combined efficiency is nevertheless greater than in the Western model, particularly when the market requires a shift from economies of scale to product differentiation and when partners mutually benefit from competencies. The Japanese model, however, offers insufficient learning potential in a 'world of rapid change and complexity' (Nooteboom 1999; Stuart et al. 1998).

- In a 'world of rapid change and complexity', where differentiation of products is more important than economies of scale and learning in all of its forms is central, the 'third model' is more efficient than either the Japanese or the Western. This model emphasizes both multi-lateral transfer of know-how between many partners and full learning ability (cf. Kuivanen & Hyötyläinen 1997; Kuitunen et al. 1999; Stuart et al. 1998).

The third model is similar to the Western subcontracting system with respect to the diverse partnerships it involves. It is also similar to the Japanese subcontracting model with respect to its preference for specific investments and related guarantees, agreements based on 'open books', and the mutual exchange of competence and cooperation in development efforts (Nooteboom 1999; Fruin 1997, 92–121.) The third model will require a change in Western subcontracting practices, and how it will develop and take shape remains an open question (see Lamming 1993; Womack et al. 1990; Womack & Jones 1994).

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The new opportunities opened up by information technology are doing their part in creating novel structures and activity models, such as the creation of contract manufacturing and the so-called channel assembly models, among others (Ranta 1998 a and b). How widely the development of information technology and telecommunications affects the formation of the third model depends on the development of the organizations as well as of the network economy and its structures (see Sproull & Kiesler 1991; Castells 1996).

The third model opens up vistas for examining enterprise networks and their formation in a new way. The creation of internationally competitive enterprise networks, ones that are capable of learning and innovations in order to survive in this world of rapid change and complexity, can be seen as development targets and forms of implementing the third model (Stuart et al. 1998).

*Strategic enterprise networks* can be seen as manifestations of the third model (cf. Jarillo 1993; Kuivanen & Hyötyläinen 1997; Hyötyläinen et al. 1999). They are about the development of companies' cooperation at a new level and the organization of their activity according to common strategic goal. On the other hand, a new virtual company model has emerged in the United States (Davidow & Malone 1992; see Hedberg et al. 1997). A virtual company is an enterprise group, which is created for a certain task and broken up after performing its task. The idea is that companies seek corporate partners most suitable for a given task. By joining both the model of strategic enterprise networks and the model of a virtual company, we can develop structures that are flexible and still capable of learning. Figure 6 illustrates this mode of operation.
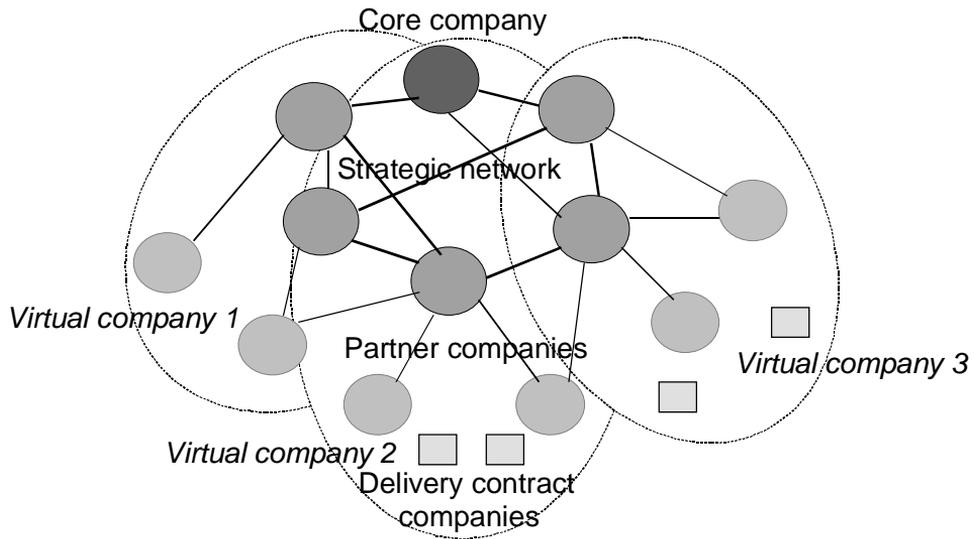
*Figure 6. Model of a strategic enterprise network.*

Enterprise networks include three types of companies (cf. Hyötyläinen et al. 1999). The core of the network consists of the strategic network, the companies which operate together according to the principles of the strategic network. A strategic network is characterized by multilateral cooperation between several companies (Kuivanen & Hyötyläinen 1997). A strategic network usually has one distinct core company, which has a central role in the creation and development of the strategic network as well as in the maintenance of it (cf. Hyötyläinen et al. 1999). At another level are the partner companies of strategic network companies. Companies' bilateral relationships are emphasized in partner cooperation. The relationships between strategic network companies as well as the relationships of partner companies are characterized by close and long-lasting cooperative relationships. At the third level are delivery contract companies, whose expertise and investment is needed for performing the tasks.

Enterprise networks form "virtual companies" within them. A virtual company is formed to perform concrete tasks (Ollus 1998). These tasks can be, for example, customer projects, delivery projects of certain products or product development projects. A virtual company is a subset of companies that are closely attached to the enterprise network. Companies essential for performing the task are selected from amongst the network companies. If necessary, companies outside the network are included. In Figure 6 these are called delivery contract companies.

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Reasons for needing these companies include a lack of required special expertise in the network or a need to use a certain type of service that is local, for example.

Virtual companies operate for a fixed period of time. When the task has been carried out, the virtual company is dissolved. However, the activity mode of a strategic enterprise network differs from the traditional model of a virtual company. A strategic network is a permanent network with its own shared objectives and organizational practices. A strategic network can be a learning environment in which companies included in the network learn from each other and across the boundaries of virtual companies as well. The experiences and lessons remain within the companies of the network. Companies in strategic networks can make use of experiences and lessons gained through its cooperation partners as well as create new ideas, models and methods for future operations (cf. Nooteboom 1999).

Strategic networks can operate as environments for learning and sources of innovation. An organization, as well as procedures for creating, exchanging and utilizing information, can take shape in a network (cf. Nonaka & Takeuchi 1995; Nooteboom 1999). Strategic enterprise networks can develop into so-called quasi-firms, which have their own strategies, organizations and activity modes (Hyötyläinen & Simons 1998a). Strategic enterprise networks can develop into strong actors and expertise centers. They can also reach an important position in the international markets.

# 4. Models of network enterprise and its development mechanisms

As a concept, *a network enterprise* is ambiguous. The concept is generally used to refer to a company or organization that has deep network-like relationships with other companies or organizations. Similarly, the concept is also connected with the internal network-like activity mode of a company or organization (see Ebers 1997; Hedberg et al. 1997; Ashkenas et al. 1995). Various differing models of the essence and activity modes of network enterprises exist (see Hyötyläinen & Simons 1998a).

First of all, the so-called *virtual company* concept comes from the United States (Davidow & Malone 1992). The idea behind this concept is that companies seek the most suitable partners for a given task. This concept has also been criticized because it is seen to represent the traditional neoclassic approach (Biggart & Hamilton 1992; Granovetter 1992). Secondly, the networking of companies has been described with a *holonic structure* (McHugh et al. 1995). Central to the "holonic" concept is that a holon refers simultaneously to a whole and a part of a whole (Valckenaers & Brussel 1994). A holonic company can be seen to resemble a *fractal company* (Warnecke 1993). A fractal is an independently operating part of a corporate unit. Fractals are self-organizing units, which function like whole units and produce services - for other fractals as well. Fractals define and formulate their objectives in a dynamic process and decide upon their internal and external connections. Fractals are networked together through effective information and communications systems. Thirdly, there is the *lean production concept*, which is based on Japanese management systems and production experiences. The lean production concept is gaining special stature in the fields of activity development and management of companies (Womack et al. 1990; Womack & Jones 1994 and 1996; Alasoini et al. 1994; Kajaste & Liukko 1994; Hyötyläinen 1998).

The strategic development process and activity and management models of the enterprise network can be seen to be dependent on the adopted network enterprise model, on the one hand, and on the level of network cooperation between companies and organizations on the other hand (cf. Nooteboom 1999). Figure 7 illustrates network enterprises with cooperation relationships.
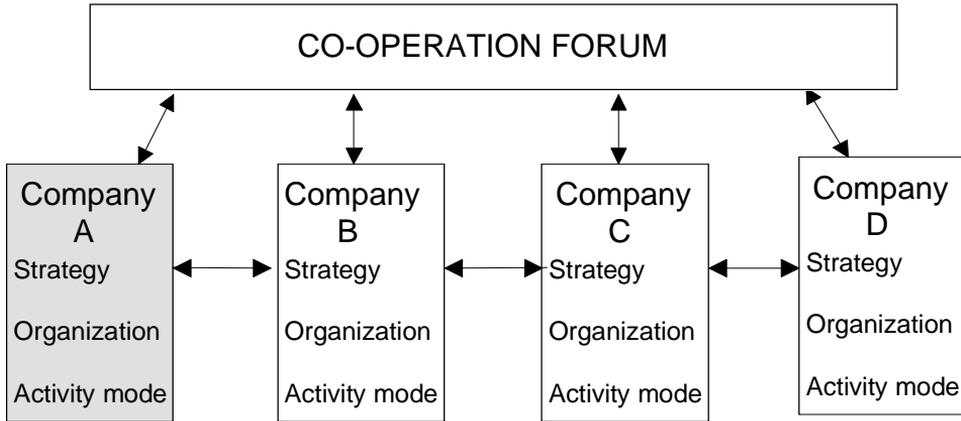
*Figure 7. A model of a network enterprise and corporate cooperation.*

Each network enterprise has its own corporate strategy, organization and activity mode. The enterprises may also have bilateral relationships. Furthermore, the enterprises may have multilateral relationships via a cooperation forum (cf. Kuivanen & Hyötyläinen; Hyötyläinen et al. 1999). Company A may have a central role in the network because, for example, it has direct relationships with customers.

The starting point of this study is that network enterprise business is viewed as an activity system and as the activity of its actors. Business activity is practiced by individuals organized for cooperation, whose ideas, skills and relationships provide business activity with a starting point and grounds for development (cf. Räsänen 1994, 36–42; Kanter 1983).

This chapter will discuss the levels of business activity of a network enterprise and activity models connected with them as well as the actors' modes of thinking and activity. Based on this, the study will discuss the development mechanisms and learning and development cycles of network enterprises. The discussion will lay the foundation for the analysis and modeling of enterprise network activity and development mechanisms.

## 4.1 Levels and models of business activity systems

Business activity can be examined as a *system of activity*, which consists of several levels of activity (cf. Hyötyläinen & Simons 1998a; Engeström 1987, 1998 and 1999; Blackler 1993). The activity system has three distinguishable levels: the level of business activity, the level of activity processes and activity chains and the level of operative activity and events. The levels are in close interaction with one another. The levels are presented in Figure 8.

*VISION AND OBJECTIVE MODELS*

BUSINESS ACTIVITY

*PROCESS AND CONTROL MODELS*

ACTIVITY PROCESSES AND ACTIVITY CHAINS

*ACTIVITY MODELS*

OPERATIVE ACTIVITY AND EVENTS
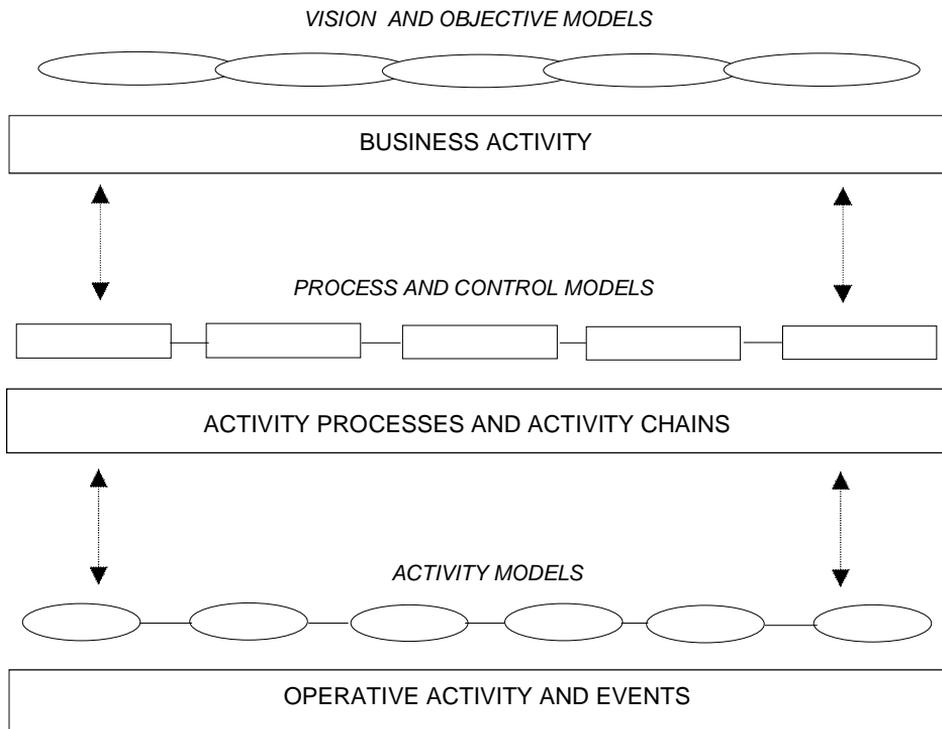
*Figure 8. Levels of companies' activity system and activity models (Hyötyläinen 1999).*

*The level of business activity* refers to the company's strategic level and field of management (cf. Cyert & March 1992; Minzberg 1994). For business activity, it is characteristic to unite two principles, namely profitable activity and useful activity.

At the level of business activity the company is pressured from many directions, starting from customers and competitors to owners and the goals of the organization's personnel and its different functions. The corporate management has to mesh these different interests and perspectives together. Traditionally strategic management of business activity has been undertaken in the following way: the management decides what the right strategy in the competitive situation is, and then implements it by changing the organization and the operations of the company. This is a common doctrine of strategic management. It emphasizes development processes that proceed top–down in the organization. It is based on a notion of the omnipotence and primary nature of strategic planning in the direction of the company's activity (see Ansoff 1968; Mintzberg 1994; Räsänen 1994).

A different kind of perspective on strategic management is introduced by the incremental approach that proceeds in stages (see Quinn 1980; Mintzberg et al. 1998). The formation of the strategy is perceived as a stage-by-stage process, in which different parts of the organization and its management and different actors, with their continuing actions and with opportunities opening up in the activity, have an important position in the management of the company and in the reorientation of activity. According to this view, strategy emerges from the organization. The shaping of a definition for business activity starts from considering what the existing skills of the organization are and in which direction the company wants to develop this expertise. This emphasizes the development processes moving top-down and bottom-up in the organization. The formation and the generalized use of the new activity mode is not seen as a result of systematic planning, but rather it emerges gradually from the pressures of challenges and conflicts, as a result of learning, organizational activity and the interaction of the actors and groups. The formation of the new activity mode is a complex learning and development process, because historically different development states are always represented by strategic layers of assumptions and activity modes (see Stacey 1992; Mintzberg 1994; Hyötyläinen & Simons 1998a).

The level of business activity is related to the *vision and objective models*, as illustrated in Figure 8. Vision and objective models represent views, perspectives and models that relate to business activity. Models of a learning organization, of decentralization of decision-making and of the significance of

activity processes for activity have come to the field of business management. This is significant for strategic management (Mintzberg 1994; Porter 1996). More and more, the inclusion of strategic management as part of the development work of activity processes is emphasized as is the importance of vision and the development of clear objectives for the company's future. Vision does not precisely correspond with objectives. It is used to form a general view of the interrelated effects of various factors (Virkkunen 1990; Kare-Silver 1997). At best, the formation of a vision is based on cooperative work of different functions and actors. This occurs when strategic management acts in the organization as a learning process and brings out the significance and effects of various actions from the viewpoint of created visions and objectives depending on them (see Nonaka 1991; Nonaka & Takeuchi 1995; Nohria & Eccles 1996; Dixon 1999). This also has impact on new opportunities opening up in business activity. Many efficient innovations start small. Innovation opportunities are found often from the "field", near events themselves. Innovations can be initiated from anomalies and unexpected incompatibilities. In this way, emerging new innovations and business ideas can also be contrary to the reigning vision and objective models of the organization (see Burns & Stalker 1994; Sahal 1981; Drucker 1985; Burgelman & Sayles 1988; Hippel 1988; Hyötyläinen & Simons 1998a).

The second level of business activity is comprised of *activity processes and activity chains*, as illustrated in Figure 8. Business activity consists of chains, in which several functions are linked together. These can be seen as the value chains of business activity. Traditionally companies' organizational structures are based on a functional (i.e. function-specific) activity model (Rummler & Brache 1990; Alasoini et al. 1994; Simons & Hyötyläinen 1995a and b). Companies consist of several levels of hierarchy and the organization is divided into different functions, such as sales, product design, purchasing, production design, manufacturing and marketing. When activity is divided into specialized functions, activity is managed via departments. The organization of the company is managed from the top by dividing resources and directing activity. Departments report to the top and make suggestions for improving the activity. For this reason, companies wrestle with many problems connected with the model (Hyötyläinen & Simons 1998b). In principle, the most significant problems are associated with the various links between different functions in the activity process. This type of problem is related to communication breakdowns

and the difficulty of information transferrance. Furthermore, efficient management of activity processes is complicated by differing functional objectives that conflict from the perspective of the whole company and by the mutually differing views, perspectives and activity modes of functions and their actors that are connected with these objectives. In this case we talk about the "white spaces" of an organization, as well as activity breaks and conflicts (Rummler & Brache 1990).

Essential differences between companies are found in how they manage different activity processes as well as in how they build and utilize the bonds between sub-processes (see Porter 1996). Business activity requires skills to perform the basic activity processes efficiently, reliably and repeatedly. This usually causes problems. In principle, the activity processes and the value chains of business activity can be restructured. Such restructuring deals with the streamlining of the delivery process and other activity processes (re-engineering activity) (Hammer & Champy 1993). Another central means for this restructuring is a one-time drastic change in processes implemented by applying information technology; this approach has been criticized as an unrealistic objective (see Davenport 1993 and 1997; Imai 1986; Coulson-Thomas 1994; Kuutti 1994; Hyötyläinen 1998). In any case, the development of activity processes requires restructuring of the organization and the activity, and the creation of team-like and network-like structures. Mere strengthening of functions is not adequate. The need for joint work in activity processes that exceed the limits of functions and in the actor networks implementing those processes is more strongly emphasized than before (see Ashkenas et al. 1995; Womack & Jones 1996; Imai 1997; Fujimoto 1998).

*Process and control models* are connected with activity processes, as presented in Figure 8. Process and control models represent views, perspectives and models in relation to the activity processes. These models form the basis for cooperation between functions and for the functionality and development of activity processes. These models can become formal models and concepts that are shared in the organization and with the actors functioning in the activity processes. This enables different actors and different functions to adopt these models as the basis of their own activity and as the tools for the development of their activity mode (cf. Nonaka & Takeuchi 1995; Dixon 1999).

The practical activity of an organization is implemented as *operational activity and events*, presented in Figure 8. Business tasks and objectives are implemented by means of operational activity. The reliable repetition of basic operations and their co-ordination is an essential part of business activity and its management. The actors' activity modes latch onto the performing of operational tasks. The ability to handle basic tasks repeatedly and still maintain high quality standards creates prerequisites for developing the activity mode. In principle, all events in operational activity can be changed into a "seed" for the formation of a new, more developed activity mode. This requires that operational activity is examined from the perspective of the organizational problem solving process (see Garvin 1993; Adler & Cole 1993; Cole 1994; Toikka et al. 1990; Alasoini et al. 1994; Sitkin 1996; Winter 1996; Hyötyläinen 1998).

Operational activity is also connected with *activity models*, as illustrated in Figure 8. Activity models represent the actors' and functions' views, perspectives and models in relation to operational activity and its events. Actors have a direct relationship and experience with everyday operational activity and its development, which shapes their activity models. Making activity models into salient and explicit procedures is an obligatory prerequisite for getting the organization to cooperatively manage both the way basic activity is conducted and its successful development. Operating in this way, the contribution of experts at different levels of the organization can be incorporated into the planning of basic outlines for business activity. On the other hand, the development of operational activity and the changing of its basic terms opens up new opportunities and experiences for actors and functions, which may affect their objectives and their way of thinking, and, following that, their way of acting (see March & Simon 1958; Clark & Starkey 1988, 105–122; Zuboff 1988).

## 4.2  Multivoiced activity system

A company's activity system consists of different functions, and groups and individuals operating within those functions. For this reason, different views and assumptions about activity and its needs for development co-exist in the activity system. These views include models of thinking and activity that reach different levels of the activity system.

The activity of groups and individuals can be described using the concept of activity. "Activity" refers to the interaction of groups and individuals with each other and with the environment. Activity can be observed as a single unit that is comprised of three levels (Leontjev 1977). Figure 9 presents these levels.
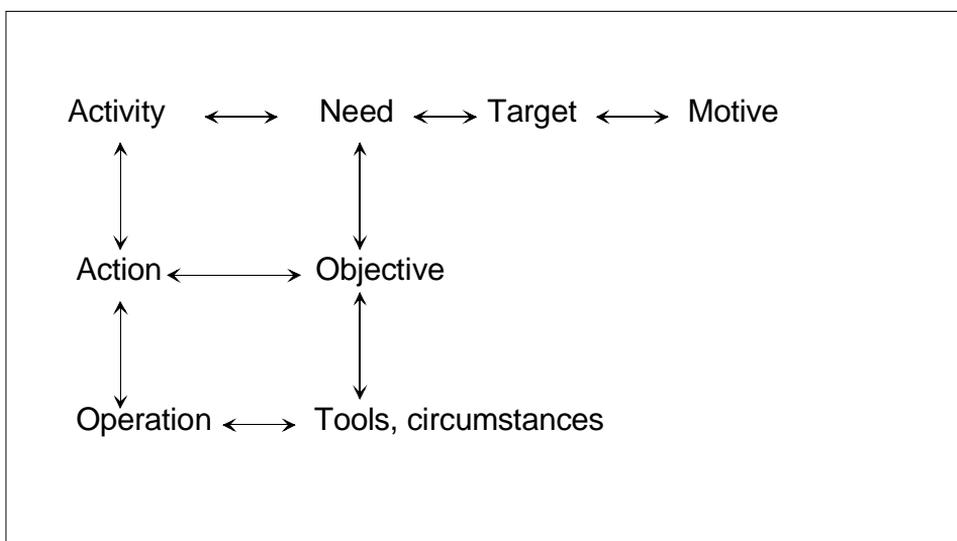


*Figure 9. Three-tiered structure of human activity (Engeström 1998, 43).*

Activity is based on the need to shape the target of activity and to implement successful activity, which is where the motivation for activity lies. The motive provides the impetus for the existence of the activity. Activities can be separated from each other based on their targets. An activity has a doer, who is either an individual or a group. The doer can be aware of the motives of the activity but he can also be unaware of the actual goal of the overall activity. Activity is formed of actions and series of actions. Activity is realized through actions. Activity is visible as practical and conscious actions, which have a direct objective and a clear target. Actions and the implementation of the task orient to the objectives, which are connected to the terms and prerequisites of the action. However, actions separated from the context of activity cannot be understood as such. Actions for their part consist of operations that are always realized through concrete means and in concrete circumstances. Actions are realized as simple chains of operations, which are well-defined, subconscious routines through which the actor responds to the conditions set by the situation that is prevailing

when he is attempting to reach the goals (see Vygotski 1978; Engeström 1987; Kallela 1996).

Activity is not static activity but rather is shaped by development. It has internal conflicts that continuously shape the activity. Solving these conflicts is the source of the development of activity. Activity, action and operation are tightly connected and they are interchangeable with the development of the level of work management and activity. Operations, for example, may at first be actions, but, through acquired experience and learning, the orientation basis of the action drops out and the action is streamlined to a fluid "normal" and "automatic" operation. Similarly, activity can become the action of another activity, if some action is able to reach the kind of independence that provides a reason to talk about a new activity (see Leontjev 1977; Engeström 1987).

Activity in an organization is communal. An organization generally contains levels of hierarchy and a division of work between different functions. Activity takes place in the organization within the activity system. Due to the nature of the activity system, the system includes participants representing many different backgrounds, interests and perspectives. In one sense, organization is *a multivoiced activity system*, in which employees and also different functions can be seen to have different kinds of views, which reflect the objectives and circumstances of each actor and function (see Leontjev 1977; Engeström 1998, 48–51). The natural multivoicedness of the activity system is not limited to views and models of thinking. Work performances can also be seen to incorporate qualitatively different methods and habits of working and operating.

By connecting different perspectives with the modes of activity and thinking of actors and functions, we can form descriptions of *work orientations* prevalent in the organization. These help us to understand the permanent modes of thinking, shaped by the history of the organization and its activity, which are the bases of the actors' activity (cf. Engeström 1998, 48–51; Kuitunen 1991). Work orientation can be seen to represent the historical "stratification" implicit in the organization's activity, which is an important form of multivoicedness. Multivoicedness in an organization can be seen to to mean the risk of fragmentarization on one hand and the possibility for dialogue that creates new combinations on the other hand (cf. Dixon 1999).

Figure 10 contains four fields representing four different kinds of work orientation types (cf. Engeström 1998, 27–33). The bases of the *flexibility dimension* are found in the theoretical discussion of the flexibility of the economy and organizations and in practical development work for creating flexible organizations (Piore & Sabel 1984; Hirschhorn 1986; Zuboff 1988; Womack et al. 1990; Ollus ym. 1990; Hyötyläinen & Simons 1998a). An increase in *cooperativeness* results from the growth of organizations in terms of size and the accompanying increased need for co-operation (Rummler & Brache 1990; Simons & Hyötyläinen 1995a and b).

Low co-operative degree is characteristic of *craft work orientation*. The premise for this orientation is the attitude and way of thinking of a "master". The activity is focused on a craft-like work, which is mainly based on skills acquired through experience. The operation is characteristically context-bound and the expertise is mainly unexpressed personal "tacit" knowledge (cf. Polanyi 1983). Activity is based on experience and not as much on "theory" and thinking through models. Historically the roots of the craft work orientation are in handcraft workshops, which were based on simple technology and communication. A craft-like organization is based on a rather limited division of labor and the workers work with their individual pieces mostly from start to finish. Rules are typically "guild rules". The craft-like orientation is not rare even nowadays. It exists in present organizations as a craft-rationalized work type. The basis is a craft-like orientation mixed with rationalized elements based on the organization's strong division of labor (see Alasoini et al. 1994; Brödner 1989).

```
                          Increase in
                          co-operativeness

                              ↑
  Routine work orientation,        Development orientation,
  activity mode oriented           activity mode oriented
  towards procedures               towards innovation
  (hierarchical and                (team and network
  bureaucratic                     organization)
  organization)
                                                    Increase in
                                                    flexibility
  ─────────────────────────────────────────────→
  Craft work orientation,          Work management
  activity mode oriented           orientation,
  craft-like and context-          activity mode oriented
  bound activity mode              towards results
  (craft organization)             (market-oriented
                                   organization)
```

*Figure 10. Work orientation types of organizations described by the dimensions of flexibility and co-operativeness (cf. Engeström 1998, 28).*

When the size of organizations grows and the need for co-operativeness increases, a hierarchical and bureaucratic organization will be formed, based on division of labor. Division of labor is taken as far as possible both vertically and horizontally. The organization model is typically a hierarchical and functional structure, in which different functions have been parsed into their own divisions dominated by manager authority. The processes of planning and performing work are separated (see Rummler & Brache 1990; Simons & Hyötyläinen 1995a and b; Hyötyläinen 1998). An individual worker will see only a small, carefully limited part of the operational whole and end product. *Routine work orientation* is related to this type of organization. It is an activity mode oriented towards procedures. The rules of activity are mainly norms concerning procedures, use of time, quantity of production and costs. This type of organization model is common. Companies even nowadays wrestle with several levels of hierarchy

and department-specific activity modes (see Simons & Hyötyläinen 1995a and b; Womack & Jones 1996; Imai 1997).

When demands for operational flexibility grow, the hierarchical and bureaucratic organization does not correspond well to the needs of the activity. This has brought about models of market-oriented organization and market organization (Williamson 1975 and 1985). These models are based on the view that hierarchical control models relying on centralized decision-making have proven to be inadequate. Therefore, these models could be replaced by activity models that emphasize independence and individual responsibility of functions. Activity is followed and managed by means of profit-oriented budgeting and on the basis of indicators and measures estimating the level of activity. The doctrines and practices of result-oriented management are important to this organization model (Virkkunen 1990). The work orientation, called *work management orientation*, can be said to belong to this organization model. It is a mode of working and operating that focuses on results.

The increase in complexity forces organizations to seek out more flexible solutions to create new types of organizations, characterized by decentralized, network-like structures, consisting of independent units and attempting to minimize hiearchy (cf. Sherman & Schultz 1998). Associated with this is the creation of diverse, mutually inclusive job descriptions and group work that exceeds the limits of traditional jobs and functions (Adler & Cole 1993; Hyötyläinen & Simons 1998b). This kind of an organizational model is connected with work orientation that by its nature is a *development orientation*. The characteristics of *team and network organizations* include cooperation and assistance over organizational boundaries as well as innovativeness and initiative accomplished through them. Team and network-based organizations orienting to innovations have also been called learning organizations (Argyris & Schön 1978; Senge 1990; Leonard-Barton 1992; Garvin 1993; Alasoini et al. 1994). Actors operating within this organizational model start cooperatively to analyze, predict and plan the development of their activity system. This requires that the organization is using a shared knowledge base, high-level conceptual tools and "theoretical " models (see Engeström 1994; Cole 1994; Hyötyläinen 1998).

Transferring to a team and network organization is not a straightforward process. It can be seen to take place in a "grey zone". This is the zone where demarcation

and struggles between different organizational options occur. This struggle also creates combinations of different alternatives. Changeover is hindered by the fact that elements from previous developmental stages exist as layers in organizations' organizational practises and in the thinking and activity models of the actors. The formation of new forms of activity proceeds as a social process, in which the different actors and functions of the organization, both together with and separately from concrete actions, influence the change processes (see Burgoyne 1994; March & Simon 1958; Cyert & March 1992; Räsänen 1986; Sitkin 1996; Hyötyläinen 1998).

## 4.3 Model structure of thinking and activity and the development of organization

With help from business activity levels and activity system multivoicedness, a model structure of organization and functions can be built for the thinking and activity models (cf. Engeström 1994; Dubois & Håkansson 1997). The model structure assists in trying to describe the relationship of actors' and functions' thinking and activity models to the organizations' overall activity. The model structure to be presented can assist in concretely analyzing the company's prevailing thinking and activity models, their conflicts and development possibilities and the organization's development activity.

The model structure for the thinking and activity models of the organization's actors and functions can be presented in three tiers. These tiers include (based on Hyötyläinen 1999):

- Actors'/functions' objective models
- Actors'/functions' process models
- Actors'/functions' activity models

Furthermore, the actors'/functions' views and perspectives into the organization's meeting and team practices can be estimated.

With the model structure we can represent above all actors'/functions' views and thinking models. This may be based on analyses of actors' interview data. Finding out the actual modes of work or activity would require close monitoring of actors' work (see Toikka et al. 1990; Hyötyläinen 1998). We can assume,

however, that views and thinking models reflect the actors' actual behavior in those circumstances in which concrete activity occurs.

Actors' and functions' *objective models* express the actors' relationship with the target of their activity and their relationship with business activity (cf. Engeström 1987; Hyötyläinen & Simons 1998a). Actors'/functions' objective models are presented in Table 2.

The target of activity refers to the views of the actor/function about the target of activity. Vision of activity refers to the views of the actor/function about the future vision of and grounds for their activity. Objective of activity describes what kinds of objectives the actor/function sees as controlling its activity. Correspondingly, the key factors of activity are the determining factors of activity experienced by the actor/function. Using the cooperation concept, the actor's/function's cooperation model can be evaluated.

*Table 2. Actors'/functions' objective models (Hyötyläinen 1999).*

| Viewpoint of actor/ function | Target of activity | Vision of activity | Objective of activity | Key factors of activity | Co-operation concept |
|---|---|---|---|---|---|
| Actor/ function A | | | | | |
| Actor/ function B | | | | | |
| etc. | | | | | |

The perspectives of actors/functions on the activity processes of activity systems can be estimated by using *process model*s of actors/functions (cf. Rummler & Brache 1990; Engeström 1998). These models are presented in Table 3.

*Table 3. Process models of actors/functions (Hyötyläinen 1999).*

| Viewpoint of actor/ function | Activity process model | Activity control model | Objective model | Information system usage model | Co-opera-tion model |
|---|---|---|---|---|---|
| Actor/ function A | | | | | |
| Actor/ function B | | | | | |
| etc. | | | | | |

The process models of the actors/functions describe the relationship of actors/functions to business activity process and control models. The activity process model describes the views of the actors/functions of those processes that the actor/function sees as connected to his activity. The activity control model describes the viewpoint of the actor/function to the controlling processes. The objective model is used to examine the assumptions of actors/functions of their own objectives. The information system usage model describes the relationship of the actor/function to the organization's information systems and their usability. The co-operation model presents the position of the actor/function in the organization's cooperation field.

The work and activity modes of actors/functions can be examined with *activity models* (cf. Engeström 1987; Lowendahl & Haanes 1997). These models are illustrated in Table 4.

*Table 4. Activity models of actors/functions (Hyötyläinen 1999).*

| Viewpoint of actor/ function | Activity mode model | Rule model | Orientation basis | Method of tool use | Division of labor model |
|---|---|---|---|---|---|
| Actor/ function A | | | | | |
| Actor/ function B | | | | | |
| etc. | | | | | |

The activity mode model reflects the thinking and activity models of the actor/function. The rule model describes those rules that the actor/function feels are governing his activity and determining his work method. The orientation basis is an estimate of the actor's/function's work orientation and its components (cf. Engeström 1987 and 1998). The method of tool use can be used to estimate the actor's/function's method of using tools and their own conception of the significance of tool use for activity. The division of labor model reflects the relationship of the actor/function to the division of labor and cooperation prevailing in his activity and organization.

Organizations have different meeting practices and work group activities and possibly also different cell and team activities, which can have definite

significance for the activity of the organization, its learning processes and its development activity (see Cole 1989; Adler & Cole 1993; Alasoini et al. 1995a; Hyötyläinen & Simons 1998b). The actors'/functions' views and their relationship to these practices are illustrated in Table 5.

*Table 5. Actors'/functions' perspectives into the organization's meeting and team practices (Hyötyläinen 1999).*

| Viewpoint of actor/ function | Meeting practice 1 | Meeting practice 2 | Meeting practice 3 | Meeting practice in general | Cell and team practice |
|---|---|---|---|---|---|
| Actor/ function A | | | | | |
| Actor/ function B | | | | | |
| etc. | | | | | |

In the meeting practice columns the actor/function can present his conceptions and thoughts about the meeting practices and his opportunities to participate in these meetings. The actor/function can estimate generally how the organization's meetings succeed and how cooperation work is conducted in them. In the cell and team practice columns the actor/function can present his view of the organization's team practices and his own participation in these practices.

Actors and functions are often not used in presenting matters clearly based on model thinking. They discuss issues wordily and often non-uniformly (see Hyötyläinen 1998 and 1999). It is understandable that operating this way it is quite slow for different actors and functions to learn to thoroughly understand each others activity logic and start building a new model of activity together. The problem is that there is plenty of knowledge in the organization but it is mostly possessed by individuals (see Polanyi 1983; Nonaka & Takeuchi 1995).

Business activity development requires sufficient cooperation and discussion of activity and its development within the organization (cf. Nonaka & Takeuchi 1995; Dixon 1999; Hyötyläinen 1998). This will not succeed if different actors and functions do not possess a sufficiently shared image of the activity of the organization in their thinking and activity models. This is where middle management has a key role in the organization (see Nonaka & Takeuchi 1995).

Generally, upper management operates using vision and objective models that reflect the goals of business activity development. The management's visions and objectives are partially unanalyzed and lack concrete models for progress towards the goals. On the other hand, at the level of basic operations the actors' and functions' models are connected with their immediate work tasks and basic processes. Their thinking and activity models are most detailed at the level of processes. Middle management can operate between these two levels. Middle management is able to understand upper management's ways of thinking and their objectives, which are frequently expressed through allegories, analogies and goals (see Nonaka 1991; Prange 1999). Middle management also has a clear enough image of the organization's everyday operations and its development problems. Thus middle management can act as a link translating upper management's visions and goals into operational "language" for functions and their actors. Middle management can also communicate to upper management about the functions' and actors' realistic possibilities and limitations.

The changing and developing of business activity is based on *organizational learning* (Nonaka & Takeuchi 1995, Stacy 1996, Checkland & Holwell 1998). Individuals learn in organizations, but at the same time, the entire organization gains shared expertise. Through dialogue, knowledge gets transferred, and meaning is assignd by each individual. In this way a shared view of issues emerges through conversation. This dialogue helps determine the creation of new innovations and enables the effective implementation of new ideas, methods and techniques  (see Stacy 1996, Hyötyläinen 1998, Dixon 1999).

Organizing development activity in an organization requires that functions, and particularly their key individuals, start examining activity at the "meta level", thinking reflexively about activity and its bases, and consequently developing a model of the activity (cf. Schön 1983; Engeström 1994). This goal cannot be reached without work and applicable methods and tools. An equally important requirement in the systematizing of information is the cooperation between actors and functions (see Davenport & Prusak 1998). Information is distributed throughout the organization. It is tied into the routines and methods of each function (see March & Simon 1958; Nonaka & Takeuchi 1995; Hyötyläinen 1998). Therefore, a fruitful dialogue can start taking shape in the organization. This opens up the possibility for systematic work throughout the organization on re-orienting actors' and functions' mode of thinking and activity towards

development. This development is supported by the organization's team and network structures. By operating this way, it is possible to attain learning mechanisms and network-like activity modes, which will assist "knowledge-creating" activity (see Nonaka 1991; Nonaka & Takeuchi 1995; Grant 1996; Spender 1996).

The discussion and dialogue connected development activity is part of the organization's *information system* (see Checkland & Holwell 1998; Macdonald 1998). This refers to all communication, such as information transfer and management, which the organization uses to support its activity. As a whole, the information system is flexible by nature and changes depending on the situation. This is possible because a set of various methods is available. The simplest and most natural part of the system is a spontaneous, everyday conversation between individuals. Other information system methods and procedures are, for example, meetings planned and prepared beforehand, and different kinds of documents and formal tools. Part of the company's information system is based on the use of information technology tools.

Companies' development activities are also connected with learning and development cycles at different levels, which creates tension and conflict in the activity of the organization. Using the model of business activity and its three levels we can examine the nature of business activity change and development activity, and the learning and development cycles of network enterprises. The levels of business activity learning and change can be outlined as three development and change cycles: *the strategic planning cycle*, *the systematic development cycle* and *the continuous change cycle*. The levels differ from each other both in terms of the time span of the changes and their systematicity (cf. Child & Faulkner 1998, 283–297). Figure 11 illustrates the three development cycles of a company.

*In strategic planning* particularly the company's management follows what happens inside the company and in its environment. Based on this they make plans for how the company should operate in the future. The plans crystallize into visions and company strategies. Changes in business activity can only be planned in part beforehand, because business activity is often formed in the context of the markets and competition. Thus we can talk about planned strategies as well as "spontaneously" forming (emergent) strategies (Mintzberg

et al. 1998). In the changing environment, companies have to continuously seek new ways to develop their competitive edge.
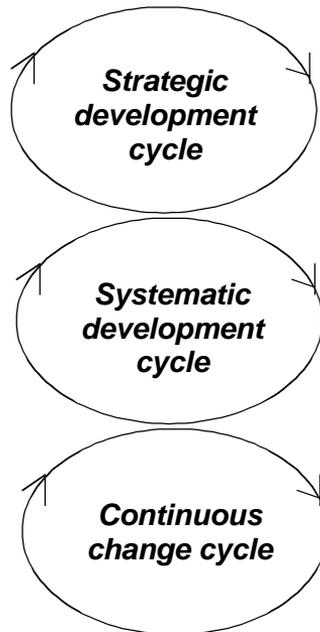


*Figure 11. Three development cycles of companies (adapted from Magnus Simons, VTT Automation).*

*Systematic development activity* attempts to reach the set goals and follow them to their realization. Development measures may be focused on the company's products and production system structures, such as information systems, organization and modes of operation, organization management methods, business processes etc. The shaping of these structures and processes that form the company's infrastructure often occurs more or less systematically during projects. These investments and structures are planned for the long term. The problem is that a company's strategic focus often changes faster than these structures and processes. This creates tension, because the infrastructure does not change as quickly as needed.

On the other hand, companies' infrastructures experience pressure "from below". The third level of change is the *continuous change cycle*, which describes flexible and context-based adaptation to the operative demands of the activity

environment. Since both the customers' needs and the availability of the company's own resources constantly vary, the organization always faces new situations. Thus the company has to rely on its employees' expertise and skills to cooperate and adjust to new situations (see Imai 1986 and 1997; Jones 1989; Lillrank 1990). In their development activities, companies might have to face the limitations set by their infrastructure, complicating their adaptation to development needs as determined by activity.

# 5. Models of enterprise network, its management and development mechanisms

## 5.1 Approaches to networks and their management

The perspective and networking interest of company managers arise from the need to capitalize on network concepts in order to create efficient working methods and organizations. However, there is often a wide gap between network research and discussion and the practical needs of companies (Kanter & Eccles 1992). Research activity has not been able to adequately support companies' increasing networking efforts. Research activity has mainly remained at a descriptive level of modeling, separated from practice, or it has developed isolated techniques (see Borch & Arthur 1995; Ebers 1997; Koskinen et al. 1995; Mikkola et al. 1996).

Despite all this, changes in companies' cooperative relationships and networking have gained significant attention in Finnish research. The SITRA TES (Technology, Economy, Society) program, implemented between 1986–89, conceptualizes the essential features of the new production paradigm based on the development of Finnish companies and industries. The model was crystallized into the concept of *flexible production and network economy* (Ollus et al. 1990). Subsequently, research done on companies' and enterprise network's development has proceeded in Finland on many levels, from the modeling of individual companies' and their subcontracting relationships to perspectives on reshaping industry (see, e.g., Lovio 1989; Hyötyläinen et al. 1991; Raatikainen 1992; LTT 1993; Raatikainen & Ahopelto 1994; Eloranta et al. 1994; Kuisma 1994; Luhtala et al. 1994; Härkki et al. 1995; Koskinen et al. 1995; Jahnukainen et al. 1996; Vesalainen 1996 and 1999; Kuivanen & Hyötyläinen 1997; Jahnukainen et al. 1997; Forström et al. 1997; Ollus et al. 1998a and b; Hyötyläinen & Simons 1998a and b; Simons et al. 1998a and b; Järvenpää & Immonen 1998; Paija 1998; Hyötyläinen et al. 1999; Kuitunen et al. 1999; Vesalainen & Strömmer 1999; Heinonen 1999).

The perspective taken in research has treated networking as a phenomenon. The interest has focused on the economic, structural and operational issues of networking. Information technology systems have also been the focus of

discussion. Modeling and development research, centered on enterprise networks, has mainly struggled with the issue of expanding subcontracting cooperation into partner cooperation. The partner model has been seen as offering considerable advantages compared to the previous subcontracting forms. At the same time, cooperation extends to new areas. Cooperation also concerns larger units thus extending to system level activities.

Multilateral network cooperation has received less attention in research. Strategic network cooperation offers a new perspective through which to examine networking. During the last few years research and development work has been conducted together with several Finnish companies and enterprise networks to create and build multilateral network cooperation. This corporate cooperation has applied to network strategy, organization forms and activity modes (see Simons & Hyötyläinen 1995a and b; Mikkola et al. 1996; Kuivanen & Hyötyläinen 1997; Hyötyläinen et al. 1997a and b; Tarvainen & Hyötyläinen 1997; Simons et al. 1998a ja b; Hyötyläinen & Kuivanen 1998; Kuitunen et al. 1999; Hyötyläinen et al. 1999).

The following will develop this concept even further. Strategic enterprise networks are examined from the perspective of a quasi-firm (see Hyötyläinen & Simons 1998a). This is a new type of interpretation of network cooperation. Enterprise network activity and governance model are examined from this vantage point. In practice, cooperation and networking progresses through multi-phased processes. The development mechanisms of networking are examined using the development model of the enterprise network.

## 5.2 Guasi-firm as a governance system of strategic networks

Lamming (1993) discusses the mutual cooperation of the principal and the subsystem suppliers as a strategic and technical joint activity. According to Lamming, the management of a cooperation chain requires both parties to view the relationship as a "quasi-firm", which has its own organization structures and objectives, communication mechanisms and culture. This means that both companies have to move resources outside their own company's limits so that they can develop the "quasi-firm". Thus the quasi-firm, the "third partner", has its own resource base upon which it operates. The main objectives include rationalizing the supply chain and producing added value with costs as low as

possible. This viewpoint also reinforces the recognition of cooperation as a learning strategy (Lamming 1993, 238–259; cf. Vesalainen & Strömmer 1999).

This "quasi-firm" way of thinking can be extended to strategic enterprise networks in which cooperation between companies is multilateral (cf. Dubois & Håkansson 1997; Kuivanen & Hyötyläinen 1997). A strategic enterprise group can be seen to have its special cooperation formula, the quasi-firm, which has its own strategy, organization and activity mode. Figure 12 illustrates the strategic enterprise network and the quasi-firm associated with it.
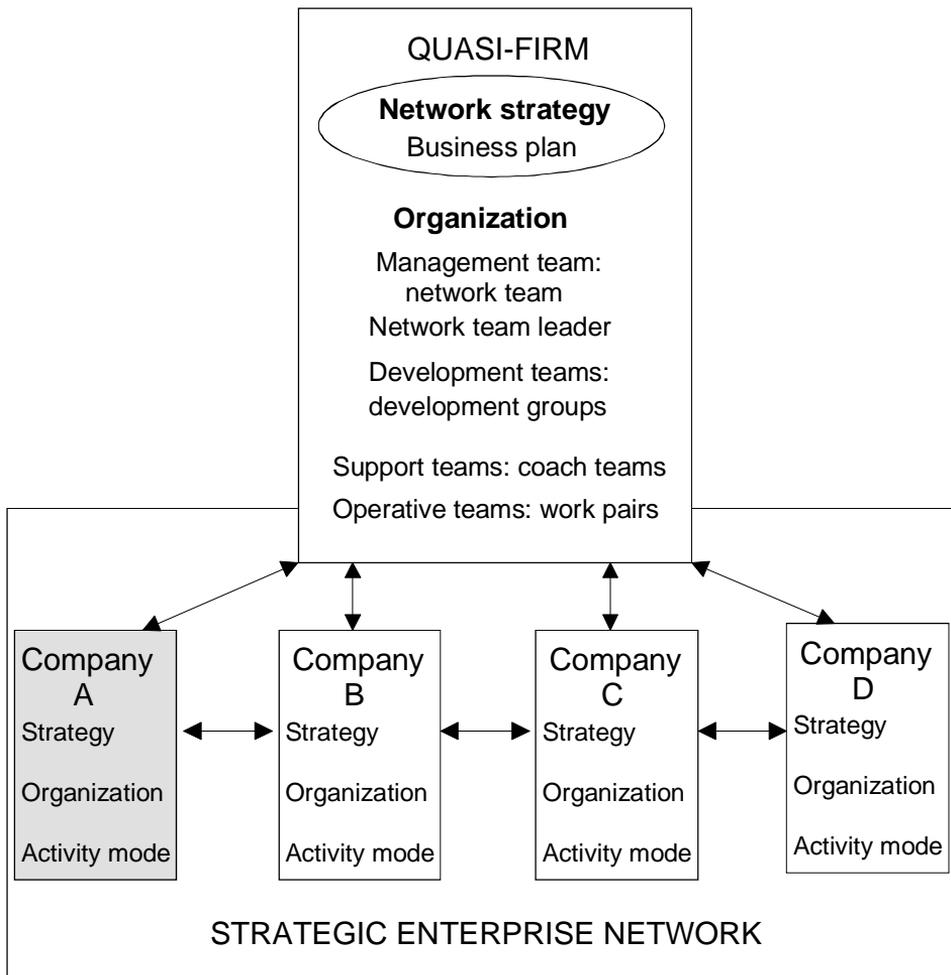


*Figure 12. Quasi-firm of a strategic enterprise network (Hyötyläinen & Simons 1998a, 83).*

A strategic enterprise network contains a group of companies operating tightly by the principles of multilateral cooperation. Each company has its own strategy, organization and activity mode. Company A can have a more central position in the network than other companies because, for example, customer relationships and end products pass through company A. The resulting new position views the solidification of cooperation from the perspective of the quasi-firm.

The quasi-firm of a strategic enterprise network has its own *strategy* and organization. The strategy can be referred to as a network strategy (Kuivanen & Hyötyläinen 1997). The *business plan* includes products that the strategic enterprise network supplies to its customers. The plan can be used to develop business activity and create new markets as well. Through business planning, the whole of the strategic network, including its products and services, can be projected (see Hyötyläinen & Simons 1998a; Hyötyläinen et al. 1999).

The *organization* of the quasi-firm consists of four tiers. The top layer is comprised of the management team, which creates the guidelines for cooperation and development activity. In network cooperation, the management team has been either a network team or the mutual network event of the company (see Kuivanen & Hyötyläinen 1997; Kuitunen et al. 1999). A separate network team leader can work under the management team who can manage the team either on full-time or part-time basis. The costs for hiring this person will be divided between the network participants based on each individual situation. There can be development teams, working closely with the management team. Development teams are responsible for the planning and implementation of different kinds of development tasks. Case studies have used a variety of development groups as development teams (Kuivanen & Hyötyläinen 1997; Kuitunen et al. 1999; Hyötyläinen et al.1999).

At a more functional level, the quasi-firm has *operative teams and coach teams* supporting them. Operative teams are responsible for practical activity. Work pairs have been used as operative teams. Activity is supported by the coach teams, which represent employees who were previously supervisors. Their role is changing now to support network activity (see Simons et al. 1998a, Hyötyläinen et al. 1999).

The significance of the quasi-firm model is in progressive analysis of the activity of a strategic enterprise network. The model offers an interesting perspective to the development of enterprise theory (cf. Biggart & Hamilton 1992; Prange 1999). To what extent present enterprise theories are applicable for explaning quasi-firms is yet unclear. Do we need a new type of theory for understanding the activities of a quasi-firm based in a network? Could this constitute a theory for networking as well?

Beyond simply theoretical questions, the model of the quasi-firm is significant in the practical development of enterprise networks. The new perspective enables companies and managers to break away from the narrow frames of the company in the development of network activity. At the same time, network activity can be seen in companies as activity outside of the company with shared participation of other companies within the strategic network frame. The quasi-firm and its activity become their own development target, with which the desired benefits can be reached easier and new innovations and business ideas can be developed.

The essence and features of an enterprise network will be discussed in Chapter 6 through an examination of enterprise network strategy, organization and activity mode.

## 5.3 Management model of enterprise networks

From the basis of the quasi-firm model, it is possible to examine the management of enterprise networks as activity. By using the model, three distinct levels are present in enterprise network activity and management: the strategic management of the network, the organization of network cooperation and the activity mode within the network. This is clearly illustrated with the model entitled the enterprise network "management triangle". The model is presented in Figure 13.

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                    ┌─────────────────────┐
                    │  NETWORK STRATEGY   │
                    └─────────────────────┘
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┌──────────────────────┐  ┌──────────────────┐  ┌──────────────────┐
│ NETWORK CO-OPERATION │  │ ACTIVITY MODE    │  │ OBJECTIVES       │
│ ORGANIZATION         │  │ IN NETWORK       │  │                  │
│                      │  │                  │  │ -> RESULTS       │
│                      │  │                  │  │    ACQUIRED      │
└──────────────────────┘  └──────────────────┘  └──────────────────┘
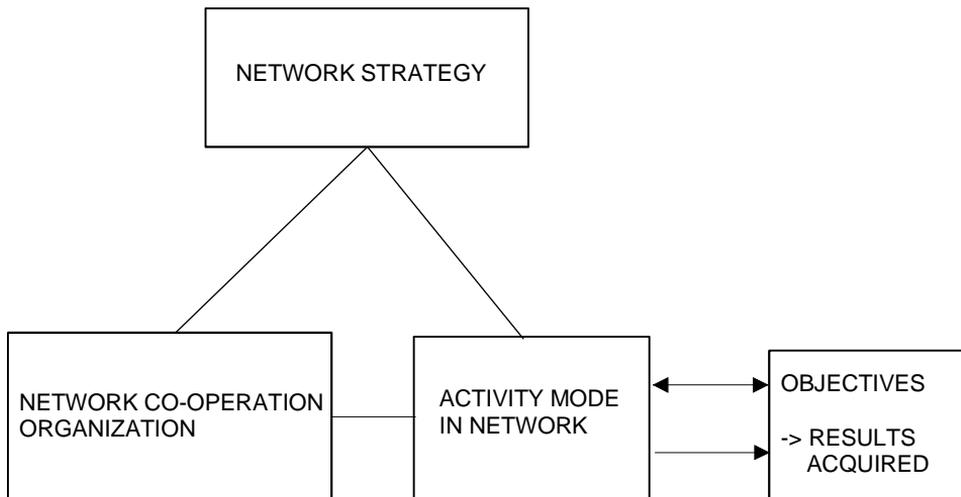
*Figure 13. Management triangle of an enterprise network (Hyötyläinen & Simons 1988a, 85).*

The figure illustrates a dynamic perspective in enterprise network management and governing. As seen in the figure, networking occurs at all levels of activity. The task of the corporate management is to organize the activity in a way that all of the expert resources of the network of the different functions will participate in networking and development. The objective in networking is to utilize the participants' expertise and to eliminate overlap of these specialties. Different combinations of expertise are needed in the network so that it can efficiently serve its customers.

The top section of the figure refers to the *network strategy building* and the associated management process. This creates an elaborately complex field of activity. The result can be crystallized in the network strategy.

*Cooperation in the network requires structures* that form a framework in which different actors can handle network issues and development questions in cooperation. For example, network teams and development groups become these types of organizational forms of network cooperation (see Kuivanen & Hyötyläinen 1997).

The operating of a network requires *modes of activity* that enable effective practices within operative cooperation. One efficient method can be different

work pairs, which manage everyday practical cooperation (Simons et al. 1998a). Renewing the network's modes of activity cannot be successful unless each company's own modes of activity are altered simultaneously. This concerns the renewing of companies' organizations and also the activity of different teams and cells. The starting point for the network's mode of activity is that all levels of the organization must have freedom of innovation and development of new activity models and methods. The skill of management lies in the utilization of this kind of local innovative activity as the ingenuity of the whole network and continuous development of its products and activity. Only then can "knowledge-creating" structures and processes be attained (cf. Nonaka & Takeuchi 1995).

Network enterprises and enterprise networks have *set objectives*, shaped and defined in strategy processes and practical cooperation, generally connected with the customer processes and the rationalization of activity. These objectives include increasing customer-orientedness, access to new markets, high-quality products, fast and reliable deliveries, stengthening of operations, product development cooperation, and fast development of new products  (see Kuisma 1992; Lamming 1993; Hines 1994; Rackham et al. 1996).

*To what extent the objectives will be met* depends upon many factors connected with network cooperation and activity systems as well as the degree of cooperation (see Dubois & Håkansson 1997).

## 5.4  Development model of enterprise networks

There are active periods of searching as well as periods of stability in the development of modes of activity in companies and organizations. Business activity is developed in cycles in which new forms of activity emerge and stabilize and get redefined and renewed (see Normann 1976; Mintzberg 1994; Fujimoto 1998). Companies grow at times by changes in product and activity modes and by redirecting their activity. Each company has a tendency to go through cycles of development where different forms of growth replace others and form subprocesses. The basis of progress can be a well-grounded view of a particular conflict requiring a solution and a potential new mode of operation.

Similarly, technological development occurring in companies has been analyzed. Technological paradigms are seen as the prevailing method which determines

significant problems, procedures, operative and strategic objectives, and the technological choices to be applied (Kuitunen 1991). Changing the company-specific paradigm directs the company's focus into new forms of tasks and solutions.

New business ideas emerge from the problems and conflicts of prevailing activity when it is possible to interpret the conflicts from a wider perspective. When a new mode of activity is emerging, learning takes place based on the observation of opportunities in activity and on a new perception of factors that have formed in practice. When a new mode of activity has emerged, learning comes from the application of the new model, from practicing its use and also from developing it even further.

The different development phases of modes of activity require different kinds of organization and methods of management. The main problem with management is contingent upon the observation of the company's move from one phase to another, the recognition of change in the terms of decision-making, and implementation of the profound change in the new management method required by the new phase, the organization and the activity culture (see Normann 1976; Tushman et al. 1986; Hurst et al. 1996).

A company's development model can be expanded to apply to the enterprise network and its management. Figure 14 illustrates the development method of the enterprise network and its management.
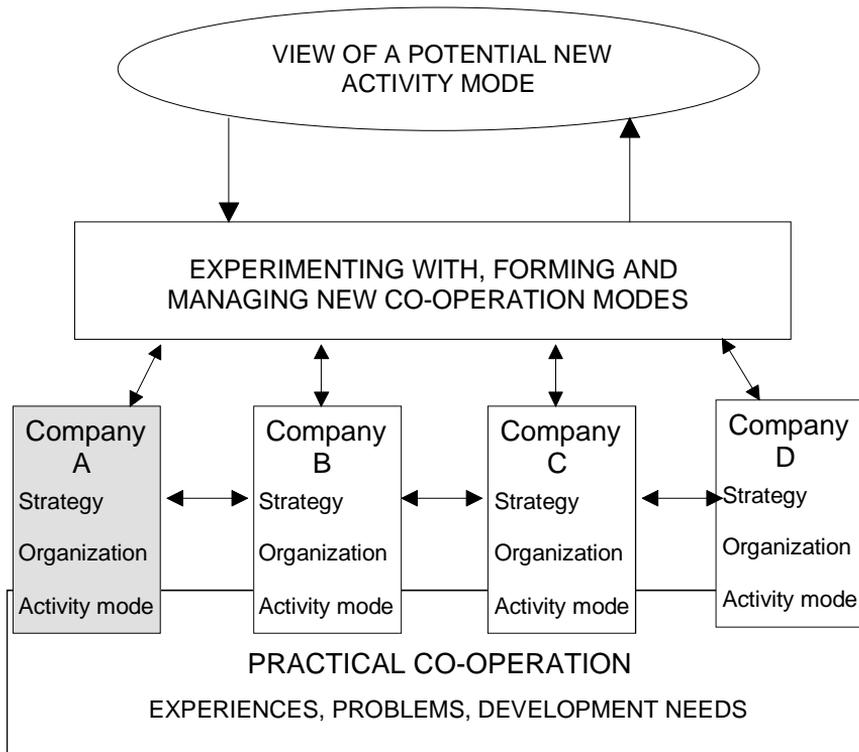
*Figure 14. Development model of an enterprise network (Hyötyläinen & Simons 1988a, 88).*

The figure applies to companies that have practical cooperation with other companies. Company A has the dominant role in the network. Company A can be, for example, a principal for whom the other companies work as subcontractors and subsystem suppliers. Forming the network is initiated by the principal's needs even if there had not been previous cooperation with some of the companies. In such case, the task will be to seek out cooperation companies and initiate a relationship of cooperation.

The figure illustrates that companies start experimenting with and establishing new forms of cooperation. How does this process start? Two main factors form the basis:

- Experiences emerging from practical cooperation, problems and development needs observed
- Views of the potential new mode of activity

Both factors are required in the creation of new forms of cooperation. Forming and experimenting with new forms of cooperation functions as the trajectory to new forms. A view of a future model is not an illusion, but rather a "working hypothesis" about a potentially more advanced mode of activity to lead to a learning process. Making progress is grounded in taking steps towards the new model of cooperation and experimenting to test out the new perspectives. The faster the working hypothesis becomes focused and takes shape as a results of the experimentation, the faster the companies progress in the implementation of the new mode of activity.

An enterprise network can be seen as an activity system. Similarly, each company participating in cooperation constitutes its own activity system. The different activity systems of the network constitute multilateral systems linked to one other which function as a part of the entire network system. There is a basic source of internal conflict in the fact that each activity is simultaneously part of a wider network of activity systems as well as its own activity system with its own special terms and conditions (cf. Engeström 1987 and 1998; Blackler 1993). Environmental pressure for change on the network means that individual activity must adapt to the requirements set by the whole.

Other pressures to initiate change also focus on the enterprise network and its activity systems (cf. Engeström 1987; Virkkunen 1990). First of all, the *functioning and economy* of the network can contain problems that can surface, for example, as problems in the profitability of the participating companies or as difficulties in the growth opportunities of business activity. Second, when circumstances change, operational incompatibilities may arise *between subsegments of the system*. For example, the companies' objective setting and strategies do not concord with the network's development needs. The companies' modes of operation can also conflict with the changed division of labor. Third, conflicts between the network's *present practice and a more developed method* may emerge. A mode of activity based on a more developed activity model and better tools creates new operational standards for activity which force the development of activity within the network. These more developed models can be the previously mentioned virtual company, the holonic network or the lean product concept. Conversely, many practical network examples help to shape conditions and models for enterprise networks. Such examples include the network practices of Japanese companies, Benetton's operations and IKEA's

mode of activity (Hines 1994; Piore & Sabel 1984; Lorenzoni 1996; Pitt 1996). Further, a central development factor for a network is the network's *relationship and connection with the customers*. Customers' needs and modes of activity are substantially evolving, creating a new competitive situation for networks and setting significant demands for the tightening of the network's cooperation at different levels of the activity systems, from modes of activity to strategies.

The development of enterprise networks is based on the culmination and resolution of conflicts. At the same time the solution is the next phase for developing the conflicts. This way it is possible to create structures in the network that can become learning and "knowledge-creating" structures and processes (cf. Nonaka & Takeuchi 1995). How can network development lead to "knowledge-creating" processes, and how can they explain the emergence of the network's new modes of activity?

The formation of an activity strategy for a new, more advanced mode and model of activity is complicated by the fact that each company participating in the activity observes activity from its own perspective. Instead of one shared network-wide perspective, there are several potentially competing views of what the central development problems for activity are and recommendations on how these problems could or should be solved. Furthermore, each company can have differing perspectives about the company's position in the network and about the modes of cooperation.

The basic premise for overcoming different views is that mutual state of will is created by means of planning, mutual meetings and compromises (cf. Dixon 1999). Through these actions, shared concepts of development targets and solutions can gradually be formed. A central part is constituted by the formation of the corporate management's strategic outlines, which can be made in the form of strategies, visions and decisions concerning organizational forms (cf. Hurst et al. 1996). This is how models and methods can be constructed for the new mode of activity. It is central to transform the developed models and methods into operative activity modes, tools and conceptual models in companies and networks (cf. Nonaka & Takeuchi 1995, 83–90; Grant 1996; Spender 1996).

# 6. Strategy, organization and activity mode of strategic enterprise networks

Individual companies are the targets of analyses of strategic thinking and strategy planning processes. A strategy is formulated by an individual company for the needs of the company. The company's business strategy sees other companies as present and future competitors or entities supplying production inputs (see Porter 1980). This kind of thinking leans on microeconomics, in which the central idea is "firm theory". The approach is not well suited to the conceptualization and management of the strategies of enterprise networks. How should the strategic management of strategic networks be conducted? How do companies in the value chain formulate shared business plans? What is network strategy all about? According to the model of the quasi-firm, the enterprise network has its own network strategy and a business plan that rests on it. The model assists in conceptualizing the significance of a strategy that cuts across the enterprise network.

Views about companies' strategic processes and the significance of defining a strategy have varied across time (Mintzberg et al. 1998). A belief in the omnipotence and primary nature of strategic planning in directing company activity was prevalent even as recently as the 1960's and 70's. Gradually other kinds of views began to arise. Forming a strategy was viewed as a gradually progressing process, an incremental process, in which different parts of the management and the organization with their continuous actions and with possibilities opening up in the activity have a significant impact on the management of the company and on the redirection of activity. No longer was the systematically progressing, purely analytic approach viewed as exclusive (Quinn 1980).

## 6.1  Development of strategy of enterprise networks

The development of enterprise network strategies and management can be examined through two strategy models. The incremental approach can be taken as basic. Management by vision complements the enterprise network strategy process. These models can be used as the bases for creating a model of strategic management of enterprise networks.

The incremental approach offers a realistic starting point for the development of an enterprise network strategy. Companies' network cooperation has gradually developed from the traditional subcontractor culture towards partner cooperation (see Kuivanen & Hyötyläinen 1997). At the same time, the companies participating in cooperation have had to change their strategies to better reflect the demands of the changed circumstances and to consider new opportunities brought about by the tightening of cooperation.

Strategic issues have gradually arisen as a natural part of cooperation. Cooperation has covered a continuously growing set of factors closely related to strategic issues. Even at the initial stages quality issues and delivery methods as well as cooperation in their development have been discussed in meetings between the companies. Gradually, issues about information transfer, product design and product development have arisen and been included, which has further increased the need for more strategic cooperation.

This development can be characterized as the interaction of companies' strategies and the historical development of the new network's cooperation (cf. Mintzberg 1994). Companies participating in cooperation have many parallel strategies; they proceed as if using several divergent operational paths at the same time. It is a question of which forms of activity become general and of when the companies can strategically move into using uniform operational lines. The new mode of activity can become the basis for a mutual strategy among organizations when it transforms into a mutual resource and becomes generally used in the network.

When evaluating the possibilities of the incremental approach from the perspective of managing the enterprise network, we need to pay attention to two issues. First, the companies may have to proceed in small steps without any policy outline. Second, new emerging possibilities might have to be utilized. The most conclusive aspect is what general view and plan forms the basis of solutions. At best, progress and management is based on analyses of elaborate links of influence and the examination of the essential connections of activity and its systemic modeling. The main issue, however, is what kind of overall view strategic management should be based on.

This process is not necessarily entirely consciously managed. The task of the companies' management is to notice and seize new modes of operation that are developing in the network and to direct their development when necessary.

Management by vision offers an excellent method for this. In the changing business environment, the significance of visions and scenarios is highlighted (Mintzberg 1994). The vision process serves the network's activity and the decision-making that is taking place, decisions that are used in the continuous construction of future policy. Decision-making is not the "slavish" implementation of a plan but rather is a "context-bound" and "creative" activity. Decision-making will have to react to new emerging opportunities and correspondingly to implement actions to fight off emerging threats. In such a situation, strategy processes that are based on creating visions and their results can function as efficient means for estimating the significance of different actions from the perspective of long-term objectives.

## 6.2 Network strategy

When network activity develops into a strategic enterprise network, the network's cooperative mode of activity changes into multi-lateral cooperation (Kuivanen & Hyötyläinen 1997; Hyötyläinen & Simons 1998a). The enterprise group commits to the development of mutual activity and to systematic modes of operation. Business processes are designed in cooperation, which strengthens value chains and clarifies the division of labor in the network.

The basis for a strategic network is a shared vision of network activity, products and product development. In this way, a new activity culture is created in the network. Central to the development of the network is the utilization of development potentials. Multilateral cooperation brings about new perspectives, which further the innovative abilities of the network.

The network's operation principles and development visions can be combined into a common network strategy. The network strategy crystallizes the network's common development direction and its model. The strategy forms the basis for network development activity and for the development of new forms of cooperation. A new cooperation form can be the progress towards a quasi-firm,

which becomes an independent development target in the redevelopment of the network.

There is little experience in creating network strategies. Enterprise networks have not been examined much from the perspective of multilateral cooperation (Hines 1994). The creation of a network strategy has been a central development target in the enterprise network projects of VTT Automation (see Kuivanen & Hyötyläinen 1997; Hyötyläinen & Simons 1998a; Kuitunen et al. 1999; Hyötyläinen et al. 1999).

Harjavalta Oy's network strategy, designed in the Puustelli network, is an example of a network strategy (see Kuivanen & Hyötyläinen 1997). This strategy is presented in Table 6.

The first phase in the development of the Puustelli network was the formation of a network strategy. This strategy was created as a result of a network analysis (see Chapter 7). Network analysis is a basic analysis of a network's activity (Kuivanen & Hyötyläinen 1997; Hyötyläinen & Simons 1998a).

In Harjavalta Oy's network analysis, the principal's view of the network and its development needs was formulated first. The results of this analysis were examined with regard to all of the ten supplier companies involved in the project. These companies added their own views based on their company-specific analyses. A summary of these analyses was discussed together in a network team, with representatives from each company, and a final network strategy was developed by this team (see Table 6).

*Table 6. The network strategy of the Puustelli network.*

1. A full service package and a complete delivery are offered to Puustelli's customers. The service package includes design, measuring, bid price calculation, remodeling service, installation service and financing. The delivery must include all service needed by the customer, and it also must be fast, flawless, timely and occur in a single visit.

2. Long-term continuing cooperation relationships are created between the companies in the Puustelli network with a focus on continuous improvement of cooperation.

3. Each company in the network focuses on key technologies and the continuous cooperative development of expertise and products.

4. The operations of the company's own production and its subsystem supplier network are based on customer-specific operations control.

5. The network aims at cell and team work. Direct links are created between different companies' cells and teams.

6. The network team group forms the basic cooperative body and has the task of managing cooperation at all levels of the organization and between the companies in the network. The companies in the network have an obligation to participate in the group's activities.

7. Flexibility in network activity is increased. The companies in the network will develop their activities by reacting to changes in the quantity of products to be produced, in product selection, products themselves and delivery speeds.

8. In their activities companies will aim at cooperative use of resources, including production capacity, personnel, and the service, development, and production machinery as well as transportation resources.

9. The companies in the network commit to developing their products and operations to be environment friendly.

From the basis of the network strategy, companies in the network agreed on the mutual development targets of network activity, and separate development groups were founded for each of these targets (see Kuivanen & Hyötyläinen 1997; Kuitunen et al. 1999).

## 6.3  Organization of network cooperation

The determining factor in the formation of vertical networks (production networks) is the role of the *core company* as the principal of the network (see Baden-Fuller et al. 1990; Harrison 1994; Hedberg et al. 1997; Hyötyläinen et al. 1999). The core company acts as the creator and administrator of the network and creates the rules and systems according to which the network operates. Because the success of the network is centrally dependent on the competitiveness of the product supplied to the customer, the supplier of the end product is in a central position in the product supply network.

The relationships between the principal and the subcontractors are undergoing significant changes. Development is moving towards closer cooperation than existed previously. This lays a foundation for multilateral network cooperation, which is what strategic enterprise networks represent. The following chapter characterizes the organization of strategic enterprise networks. According to the quasi-firm model, the network has its own organization, which is comprised of several levels.

### 6.3.1  Organization of multilateral cooperation

The goal of multilateral cooperation in enterprise networks is to improve cooperation between the network's companies and thus the performance of the entire network. Multilateral cooperation means that joint development work is performed by more than two companies. The goal is to gain greater expertise through wider cooperation, which in turn improves the solutions discovered as a result of cooperation. In addition, a larger group of companies may commit to these solutions, which furthers the implementation of those solutions and spreads them further through the enterprise network (see Kuivanen & Hyötyläinen 1997).

Multilateral cooperation and development activity requires its own organization. In the quasi-firm model organizations include a management team, development teams, support teams and operative teams. These are theoretical concepts for organizational bodies (see Kuivanen & Hyötyläinen 1997; Hyötyläinen & Simons 1998a). The organizational structures and cooperation bodies of multilateral enterprise networks are illustrated in Figure 15.

The figure shows the network principal organization, system suppliers and their subsystem suppliers. There is also a sales organization, which handles connections and relationships with customers. The figure also presents new multilateral organization forms of network cooperation.

*The network team* is the management team of the network (see Kuivanen & Hyötyläinen 1997). The companies of the network examine issues pertaining to the whole network within the framework of the network team. The network team is the collective body of the network companies, which handles changes in the network's operational environment as well as the development needs of the companies' cooperation and, based on that, directs network-level development actions.
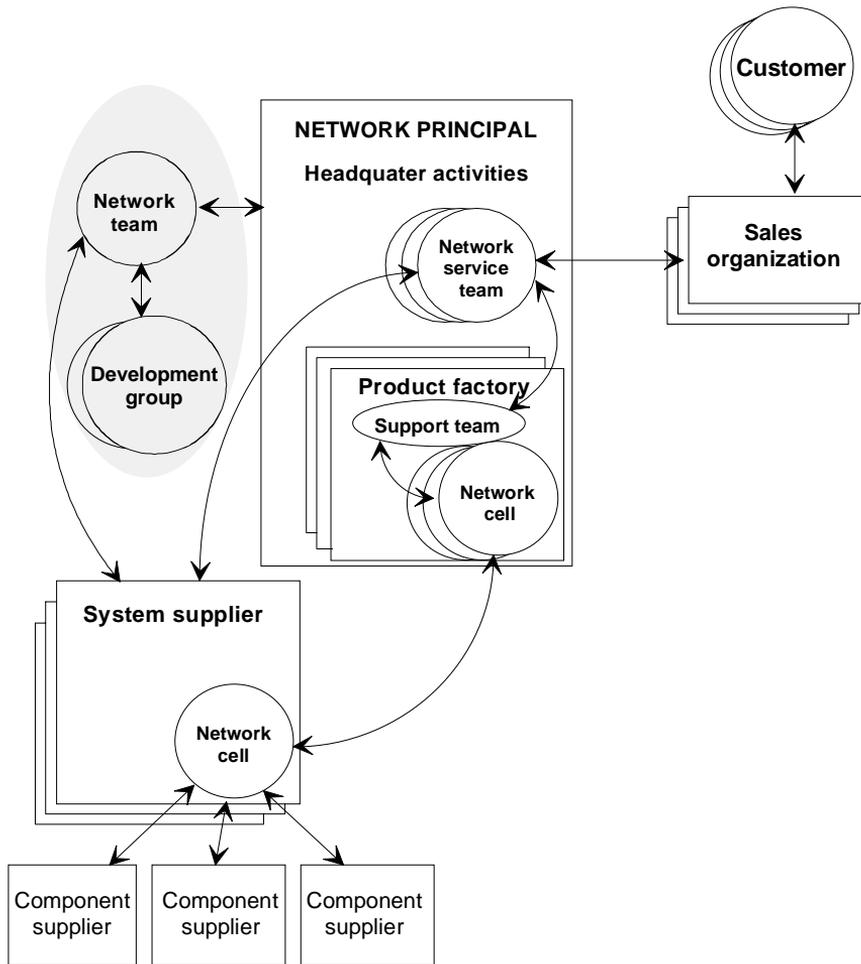
*Figure 15. Co-operation organization in multilateral enterprise networks (Hyötyläinen et al. 1997a, 205).*

*Development groups* are basically development teams, which can be permanent or temporarily assigned to accomplish a particular task. Development groups are work groups formed by the network team, which assigns tasks for the group to solve work on. Only a part of the network's companies might be represented in the development groups. The groups' results are processed by the network team.

The figure also illustrates other organization and activity types of multilateral network cooperation. Arrows between cells and teams refer to operative team cooperation. Normal, everyday issues are handled directly by the operative cells

and the network team without intermediaries. This cooperation is also connected with the development of activity. The maintainance and development of operative activity is supported by support teams, which generally consist of coaches for operative activity.

The organization and development of multilateral cooperation requires changes also in the network companies' own activity. Operational activity modes in the network as well as companies' new organization forms are discussed separately in the next chapter.

### 6.3.2 Activy of the network team and development groups

Figure 16 illustrates how the network team and the development groups can operate.
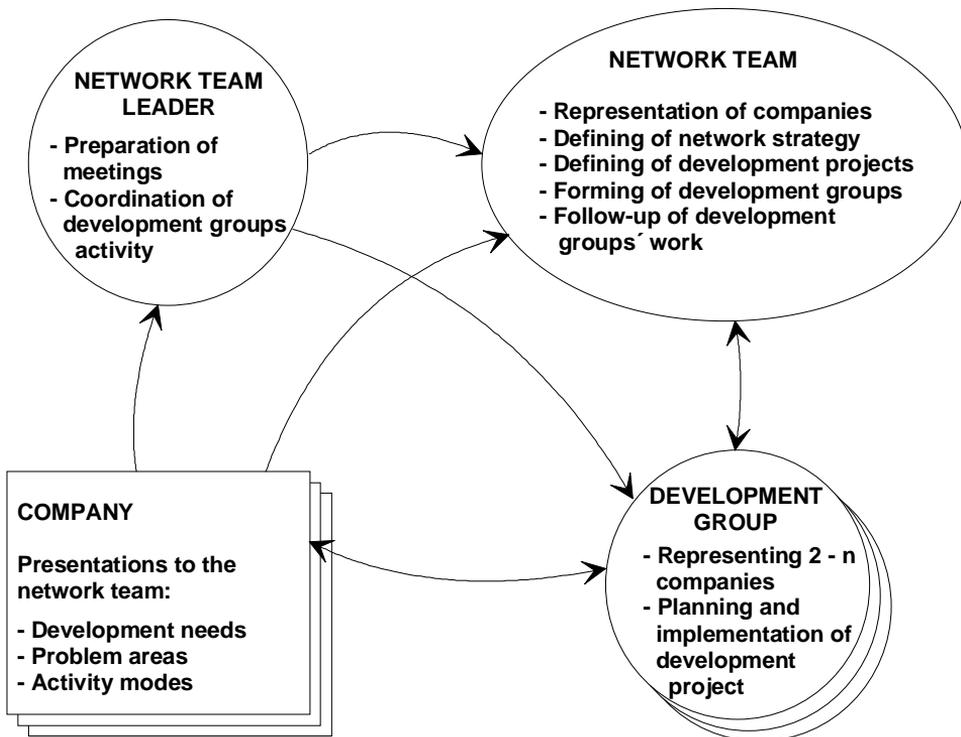


*Figure 16. Activity model of the network team and the development groups (Kuivanen & Hyötyläinen 1997, 57).*

For a network team to operate, the team needs its own *leader*. The leader can take responsibility for the preparation of meetings and the coordination of the development group activity. Without a separate leader it is probably difficult to keep the shared organization of the multilateral network going as a continuous activity (see Kuivanen & Hyötyläinen 1997; Kuitunen et al. 1999).

The network team is a body, which has representatives from all companies of the network. This means that managing directors and/or production directors participate in the network team's work. The central task of the network team is to determine the network strategy. Other important tasks include the specification of the key development targets of the network, forming development groups and monitoring their activities.

Development groups work under the network team. Development teams can have participants from only a few or more companies depending on the scope of the development target. Groups can contain individuals from all levels of the companies if required by the issues at hand. The development groups analyze development problems and plan solutions for the common needs of the network. The solutions can be handled in the meetings of the network team, which will decide on the implementation of the solutions.

Solutions are implemented through cooperation within the network. Many solutions require changes and actions that apply to the whole network or at least to some of the companies. Naturally, some solutions are connected only with the companies' internal operations.

## 6.4  Activity mode in the network

According to the quasi-firm model we can separate different organization and cooperation forms in the operative activity mode of the enterprise network. These dimensions include the operative teams and the assisting support teams.

The following chapter discusses direct cooperation methods between companies. Work group operation is a work form applicable for operative activity. Management of network relationships also requires equivalent changes in each company's own activity. A central part of this is performed by basic level network cells and different teams.

### 6.4.1  Operative teams: work pairs

*Work pair thinking* is based on the needs of the members of companies' manufacturing and logistic chains. The premise of this method is that when cell and team work becomes common, manufacturing employees are given more and more latitude to decide on the monitoring and development of their own work. This also enables workers to act as contact persons either within the company or across company borders. In this way, the employee takes a role that has traditionally been taken by either the supervisor or the buyer. This mode of activity is beneficial most of all for handling special situations and for the development of activity. Direct links between organizations decrease waiting time and enable work-related issues to be handled with the best possible expertise. A work pair is a contact between two cells or teams, which will be given tasks that otherwise would have required the participation of several people. Figure 17 compares the traditional mode of operation between different organizations and a model of activity based on work pairs (Simons et al. 1998a).
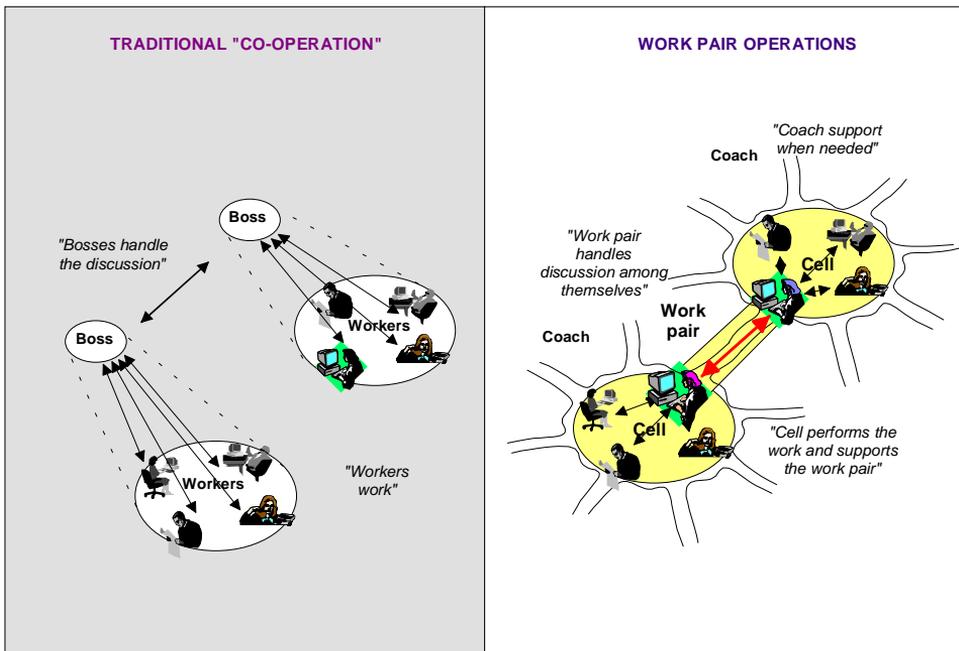


*Figure 17. Traditional co-operation and work pairs (see Simons et al. 1998a, 199).*

The members of the work pair have their *own organization* in the background. In a small company this can consist of the entire company, but for a larger company the members' own organization can be, for example, a cell or a team, in which the person in question works. Their own organization can also be a group of people from different departments of the company. The most important thing is that this members' own organization exists and that its members are aware of the operations of the work pair.

Work pair members occasionally need concrete support for their tasks. The role of the *coach* includes training the work pair members in work pair skills, solving difficult problems with the work pair and ensuring that the activity of the work pair still continues even when the composition of the work pair changes.

Cooperation between two organizations consists of *operative work tasks*, *tasks connected with planning of activity* and *activity development tasks.* The objective of work pair operations is that the work pair can perform a sensible part of this cooperation based on the nature of the cooperation and the experience of the work pair. Organizations also engage in cooperation outside the work pairs, but this work is coordinated with the work of the work pair.

### 6.4.2  Network of work pairs

Figure 18 illustrates an enterprise network in which direct inter-company cooperation at different levels is performed by work pairs (Simons et al. 1998a; Hyötyläinen et al. 1999).
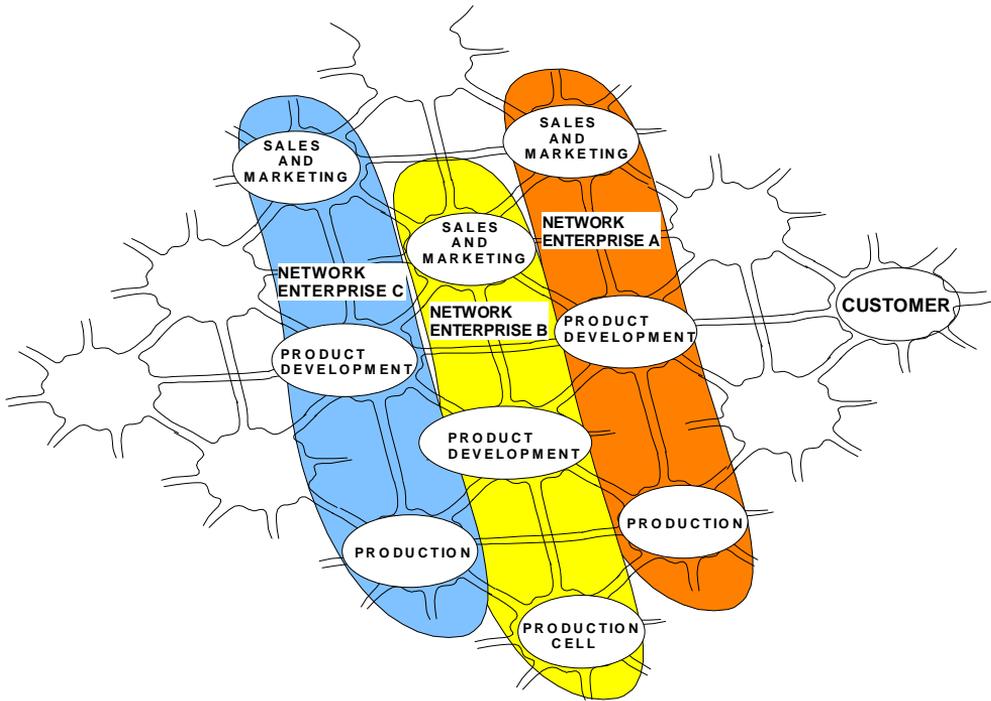
*Figure 18. Model of network co-operation based on the principles of work pairs (see Simons et al. 1998a, 196).*

The idea of the work pair model is to form direct contacts between certain individuals in the companies of the network. This forms the basis for direct communication, which is needed in development operations. The work pair model thus refers to an extended connection between companies in cooperation. An organization based on the work pair model enables more resources for its activity and its development, which further increases the extent of service and the rationalization of activity in the entire network. Also innovation potential in the network increases with the work pair model.

### 6.4.3 Conclusion on the way of acting in the network

The success of work pair operations is crucially connected with the organizational practices of companies participating in the network. These must support work pair activity and its development. On the other hand, cooperation in the network is not at all limited to direct operative work pairs. Cooperation is needed at many levels. The work pair idea offers a useful model for arranging connections also in the cooperation of other functions.

The team and network organization that supports cooperation and communication inside companies is also very suitable for supporting enterprise network cooperation between different companies (cf. Casson & Cox 1997). VTT Automation, in cooperation with several companies, has developed new types of cell and factory models. The models have included the *network cell* and the *network factory* models (see Alasoini et al. 1994 and 1995a and b; Hyötyläinen 1995; Hyötyläinen & Simons 1995, 1996, 1997 and 1998b; Simons et al. 1997).

The network factory model is very suitable for supporting enterprise network cooperation between different companies. The basic idea of the network factory is to emphasize network relationships within the company as well as outside the factory.

A network factory is a cell and team network emphasizing cooperation and communication. It operates in an environment in which fast information processing and reliable management are central features of operative activity and in which activity is undergoing constant change. The efficiency of a network factory is based on the fact that operative activity control and information management takes place in the cells and teams of the delivery process. The close network-type cooperation of cells and teams creates an excellent basis for organizational learning and continuous development activity.

Network factories attempt to build cooperation between functions by using activity process thinking and team structures. The strength of a traditional functional organization is its focus on certain work tasks and the development of those tasks. For network factories, this is also one sector of development of activity. Therefore network factories combine process-specific thinking with

functional thinking. This can teach us about lean production, for example, in which the organizational structure resembles a dynamic matrix where functional line organization and a certain kind of objective organization are linked to form a "hybrid organization" (see Womack et al. 1990; Helling 1991; Nonaka & Takeuchi 1995).

A dynamic network factory, which consists of cells and teams and their connections, forms a good basis and a strong foundation for work pair activity between companies in an enterprise network. Work pair activity requires that work pairs know the state and development prospects of their own organization. In addition, they must get support for their work to perform the network's operative tasks and development work. The internal network-type activity of each company operating in the network furthers for its own part the activity of the enterprise network and the rapid implementation of the development procedures agreed upon by the network.

# 7. Development of multilateral network activity

How can network cooperation be initiated between companies? What procedures have been used in the creation and advancement of network cooperation? These are some of the questions that will be examined in this chapter. We know relatively little about the formation processes of networks (Ebers 1997). Research has produced information regarding the motives, conditions and structures of networking. Instead, there is less information on the processes, steps and phases by which networks are created. This chapter discusses the initial construction of multilateral cooperation in networks. The discussion is based on my research of experiences in enterprise network cooperation that accumulated over several years. At first, the chapter examines the challenges presented by multilateral cooperation followed by the evaluation of different approaches about the building of enterprise networks. Then the central principles of network development are examined. Based on this discussion, a development cycle is introduced as a method of building multilateral network activity. The chapter will also examine development group work and systematic development activity as tools for the development work of enterprise network actitity. Finally, the development methods of multilateral enterprise activity will be summerized in the last section of the chapter.

## 7.1 From partners to networks

During recent years there has been growing discussion about partners and partnerships. This usually refers to long-term cooperation between a principal and a subcontractor, which also includes development goals for mutual activity. In such cases we talk about bilateral cooperation relationships. It is becoming necessary to have several companies form networks that have shared development programs vision on the development of a product or activity. In such networks, innovation skills and shared visions and values of activity are emphasized in the development of the enterprise network. The network in question will thus be a strategic enterprise network and the cooperation will be multilateral network cooperation (see Kuivanen & Hyötyläinen 1997).

Development from a bilateral mode of operation to multilateral cooperation is a larger step than one might imagine. According to research, experiences on

multilateral enterprise networks have been few in Western countries (Lamming 1993; Hines 1994). Development work has mainly occurred in Western companies owned by the Japanese.

The shift to multilateral network cooperation has been hindered by the lack of applicable models and examples. This creates a challenge for research and development (see Borch & Arthur 1995; Kuivanen & Hyötyläinen 1997; Hyötyläinen et al. 1997a and b).

## 7.2 Approaches to the development of networks

Traditionally research has focused on gathering information on changes that take place in companies by using different types of "external" methods. Scientists have interviewed personnel participating in the change process, made questionnaires and reviewed documents. This has proven to be inadequate for understanding these complex change processes. Different types of activity research methods have been suggested in which the researchers can participate closely and impact the change processes (Argyris & Schön 1978; Gustavsen 1985; Westbrook 1995).

The significance of research in the creation of new methods is particularly important when companies experience changes with which they have no previous experience. This causes a re-evaluation of research and development methods. This is also what has occurred in the development research performed by VTT Automation. Researchers have further developed some of the so-called experimental development research methods (see Alasoini et al. 1994; Hyötyläinen et al. 1997a; Kuivanen & Hyötyläinen 1997; Kuitunen et al. 1999; Hyötyläinen et al. 1999). The cooperation projects have aimed at initiating multilateral cooperation in the enterprise networks. Researchers have participated actively in the analysis of the present situations, the planning of changes, and the testing and stabilizing of new modes of activity.

The starting point maintains that the building methods of network cooperation are dependent on the desired level of cooperation. Here three different models for building cooperation can be distinguished: the competitive bidding model, the partner model and the network model (see Hyötyläinen et al. 1999). These "ideal models" of enterprise network's planning and implementation methods are

presented in Table 7 (see Alasoini et al. 1994; Hyötyläinen 1998; Simons & Hyötyläinen 1988).

The competitive bidding model resembles the traditional "techno-centric" approach in which the planning and implementation of solutions occurs as dictated by the principal in "top-down" direction. The role of the subcontractor is to conform to the principal's wishes and solutions without participating in the planning of the cooperation forms (cf. Hyötyläinen 1998, 26–29).

*Table 7. The "ideal models" of enterprise network's planning and implementation methods (Simons & Hyötyläinen 1998, 135).*

|  | COMPETITIVE BIDDING MODEL | PARTNER MODEL | NETWORK MODEL |
|---|---|---|---|
| **Starting point** | Competition- and economy-oriented approach | Product- and activity-oriented approach | Vision- and activity-oriented approach |
| **Objectives** | Cost objectives | Operational objectives | Innovation and development objectives |
| **Target of planning and development** | Purchases and logistic processes | Information processing and communication processes | Business processes |
| **Organization of planning** | Principal alone | Principal, cooperation with partner | Group of companies in cooperation |
| **Evolution of planning process** | Analyses on principal's own activity and formulating development objectives | Analyses on principal's activity and cooperation practises and agreement on cooperation forms between companies | Analyses on network's present situation, development objectives and different companies' views; formulating a common development plan |
| **Planning results** | Ordering practises | Cooperation and quality practises | Network strategy and cooperation practises |

*Table 7. Continues.*

| **Method of implementation** | Straightforward implementation of plan Setting objectives to/for subcontractors | Systematic implementation method Cooperation in activity development | Systematic and phased way or progressing Network-like cooperation, shared work groups |
| --- | --- | --- | --- |
| | Principal's production management and purchases are responsible for implementation | Company management, production management and companies' purchasers participate in implementation | Company management, production management, representatives from different functions, teams and production cells participate in implementation |

The partner model resembles the "user-centered" approach, which is based on the socio-technical tradition (van Eijnatten 1993; Vartiainen 1994). In the partner model, the parties plan and implement new cooperation solutions working closely together. The subcontracting partner creates close and long-lasting relationships with the principal that are based on reciprocal trust (cf. Hyötyläinen 1998, 30–33).

The network model represents the "lean production" approach in which companies cooperatively create the network's business processes and the division of labor that is based on those business practices. The task applies multilateral cooperation and systematic procedures (cf. Hyötyläinen 1988, 38–43).

The three "ideal models" of Table 7 have been compared in terms of several different dimensions, from the premises and objectives of the model to its methods of planning and implementation. The following discussion will explore the differences between the models.

The premise for the competitive bidding model is a competition- and economy-oriented approach. The principal emphasizes eliminating costs and seeks for a

cost advantage by soliciting competitive bids from subcontractors. Gaining a cost advantage is the central objective of this model. The partner model has a product- and activity-oriented approach, which means that operational objectives such as quality and product design issues are emphasized in bilateral cooperation. The premise of the network model is the vision- and activity-oriented approach, which emphasizes the innovativeness and development objectives of the network.

The targets of planning and development work in the competitive bidding model are direct purchasing and logistic processes. In the partner mode, however, bilateral information processing and communication processes become central. Information exchange gains in a significant position when cooperation deepens. The development targets for the network model include business processes, extending the examination to shared issues of the division of labor.

Planning is organized in the competitive bidding model so that the principal alone is responsible for planning solutions. In the partner model planning occurs mainly cooperatively, although the principal naturally has the determining position. In the network model, cooperation occurs as multilateral activity, and all companies of the network participate.

Planning evolves in the competitive bidding model so that the principal first analyzes its own activity and then uses this analysis to set objectives for its subcontractors. As a result, ordering practices are created. In the partner model, the principal analyzes its own activity and cooperation practices. Cooperation and quality practices are agreed upon with the partners. In the network model, the present situation and development objectives are analyzed first. In development work, the views of different parties are considered and a common development plan is designed based upon these views. The result is cooperative procedures and a network strategy.

Regarding the method of implementation, differences exist between the models. Implementation in the competitive bidding model proceeds in a straightforward manner as principal's instructions to the subcontractors. The principal's purchase department and production management in particular take part in this implementation. In the partner model, implementation is systematically carried out in cooperation. Companies' management, purchasers and production

management participate in the implementation. In the network model, implementation is carried out systematically in various phases. The implementation is based on network-like cooperation and mutual work groups. Personnel from all levels of the companies, from corporate management to representatives from different functions to teams and production cells participate in the implementation.

## 7.3  Development phases of strategic enterprise networks

Building and developing strategic enterprise networks is a complex and multi-phased social, organizational, stategic and technical process. The advantages of the network will be only reached with progressive development work. Building and developing the network requires a dynamic approach (cf. Nooteboom 1999). Learning and innovation focused on developing cooperation forms and procedures to be used are also required from the companies in the network. Strategic enterprise networks, by their very nature, are based on mutual cooperation between companies (Kuivanen & Hyötyläinen 1997). Available for initiating and developing multilateral network cooperation is the *model and method of experimental development research* (Toikka et al. 1988; Alasoini et al. 1994; Hyötyläinen et al. 1997a; Kuivanen & Hyötyläinen 1997; Hyötyläinen & Kuivanen 1998; Kuitunen et al. 1999; Hyötyläinen ym. 1999) based on the tradition of activity research (Argyris & Schön 1978; Westbrook 1995).

These models and methods have been experimented with and applied in practice in the enterprise networks and their development processes. The challenge is to attract all companies of the network into the mutual development activity. This can be best managed by means of the *development cycle method*. The basic phases of the development cycle of network development include network basic analysis, planning, experimentation and stabilization. This is a model that follows certain principles, with applications that vary on a case-by-case basis. The phases can be realized partly in overlap, and their significance and duration also depend on the starting point, special features and development needs of the enterprise network.

According to the development cycle method, a *cooperative project* must be set for the building and development of the enterprise network and will be participated by all companies in the network. *Researchers* have also participated

in the development work in close cooperation with the companies. The researchers work on issues about the development projects of the network and its companies, defining the projects, and the planning and stabilizing of new activity modes. This requires that researchers participate actively in the development processes. The task of the researchers is particularly to produce methods, models and tools for the needs of the network and the companies as well as to train the personnel in the use of these tools and methods. The researchers also have a role in the creation of the phasing and organization of the development process.

Figure 19 illustrates the evolving *phases of the building and development activity* of the strategic enterprise network. The figure illustrates the four main phases of the development cycle: (1) the formation and crystallizing of core company's business strategy, (2) basic network analysis, (3) planning and experimentation, and (4) stabilization. In addition, the basic analysis includes a possibility for separate and fast problem-solving procedures. Planning and experimentation includes the development of information technology solutions. These phases will be discussed in more detail below.

### (1) Formation and crystallizing of the core company's business strategy

The starting points for building and developing strategic enterprise networks are the *economic objectives and development needs* of companies. In this respect, the central component is the *core company of the network* which has a significant role for the operations of the network. The core company can be seen as a strong "lead company" around which the network is formed and developed (see Hyötyläinen et al. 1999). A natural starting point for the development of the strategic network is the *formation and sharpening of the business strategy* of the core company. The central objectives of the core company can include, for example, increase in business activity, solidifying customer relationships, access to new markets, new product development and strengthening of operations. The business strategy of the core company creates the foundation for network basic analysis and development activities. New strategic opportunities can open up for the core company as the enterprise network activity develops.
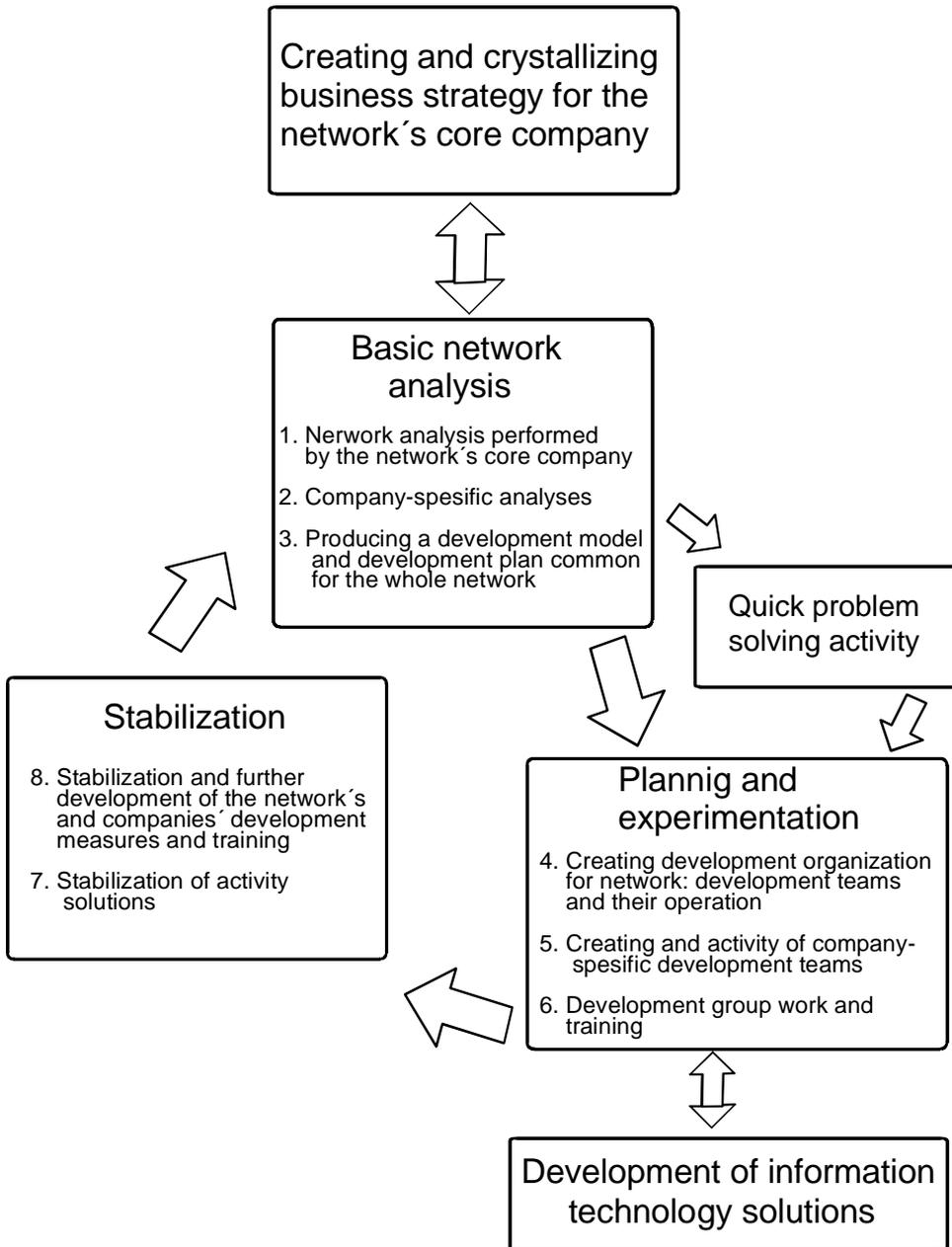
*Figure 19. The building and development phases of strategic enterprise networks (see Kuivanen & Hyötyläinen 1997; Hyötyläinen et al. 1997a; Kuitunen et al. 1999; Hyötyläinen 1999).*

**(2) Basic network analysis**

The objective of the basic network analysis is to create a common development model for the network and to produce a development plan, based on which development activities can be initiated in the network. For this, the building and development of the enterprise network requires that the *cooperative and network-like mode of operation* is utilized. At the level of the network this means that representatives from the network companies participate in decision-making that applies to network development. Extensive participation is a prerequisite for both adequate expertise and commitment. Only in the discussion and cooperation between different parties of the network can different perspectives and dimensions of activity be discussed. Correspondingly, in company-level development projects, the planning and implementation of solutions is performed by related personnel as well as by representatives from other functions.

A network should be initiated by the core company (Kuitunen et al. 1999; Hyötyläinen et al. 1999). This requires a preliminary mapping of the core company's objectives and development goals. Initiating multilateral cooperation in the network can be implemented by the companies' *network team or during network events, to be organized separately*. Both of these form the network's *cooperation forum*, which is participated by all salient companies of the network. This is when the companies agree on procedures to be followed in development and make plans for schedules. After this, the basic analysis can progress though the following three phases:

1. *Network analysis of core company*. For the drafting of the network analysis, a *project team* should be set in the core company. The project group should be representative of the company's different functions. As a result of the network analysis, the network's present structures and activities are described from the perspective of the core company. Objectives are set for the development of the network and its activity. These objectives will be based on the core company's operating environment's pressures for change and on the development needs of the network's present activity. A summary of the network analysis is provided to the other companies of the network. The summary acts as a mediator of the core company's perspective and as a tool in detailed activity analyses.

2.  *Analyses of company-specific activity.* The companies of the network each can analyze their own development needs. This should be done in a company-specific *project group*. In addition, the company should comment on and complement the core company's network analysis from the company's own premise. Based on this, network development objectives can be set for the company.

3.  *Creating a shared development model and a development plan for the network.* In this phase the results of the company-specific analysis phase will be brought to mutual discussion. Aften this mutual handling, a shared development model and development plan can be drafted for the network. The development model essentially contains the network strategy and the network's development objectives. The development plan prioritizes development targets and presents practical measures for starting development work. From this basis, we can proceed to the planning of development targets and the testing of solutions.

The development model and the development plan for the network is prepared at cooperative meetings of the network's companies. One possibility is, that either at the company level or at the network level separate development targets emerge at the basic analysis phase, which can be solved quickly and easily. This can be done with the help of separate *fast problem solving procedures* (see Alasoini et al. 1995a; Toikka et al. 1995).

**(3) Planning and experimentation**

The purpose of planning and experimentation is to create and build solutions for selected development targets. Some of these solutions are targeted at the operations of the network while others can be company-specific solutions. The premise is, however, that the network cannot be developed into a strategic network without company-specific changes in activity and development activities. Managing network relationships requires changes in each company's own activity. Companies' internal network-like structures and modes of activity further the development of strategic networks (see Hyötyläinen & Simons 1996, 1997 and 1998a; Ashkenas 1995). When planning solutions, companies should try to use organization forms and methods that can become procedures that can be continuously used by the network and the companies. Applying and

redeveloping methods can become part of the continuous development activity of the networks and companies, which supports learning and innovation (cf. Imai 1997; Alasoini et al. 1994; Leonard-Barton 1992; Leonard 1995). Three different tasks can be distinguished in the planning and experimentation phase:

4. *Creating development organization for the network*. The task is to create organization structures and division of labor to support the cooperation of the network companies. This refers to setting different kinds of *development groups* and their work. The development groups plan and test development actions in order to develop the activity of the network and companies.

The development groups' suggestions for solutions are handled in the meetings of network teams that consist of network companies' or during separate network events. The network team decides on the implementation of and resource allocation for the solutions.

5. *Creation and activity of company-specific development groups.* The development of the network's activity also requires changes in the operations of the companies of the network. For this reason, it is necessary to set in each company a *company-specific project group*, which will be responsible for the development work in the company and can at the same time operate as a cooperative body towards the network. *Development groups* should perform the detailed planning of development activities in the companies.

6. *Work and training of development groups*. To support the operations of development groups it is necessary to develop the network's common modes of activity, methods and tools (see Simons & Hyötyläinen 1998). The development groups can also require separate training about a new working method in the network.

The implementation of different information technological solutions can be an essential part of the development solutions of the network and the companies. For this, in the planning and experimental phase, it is necessary to chart options for different information technological tools and to *develop information technology solutions* as well as to apply the solutions to the needs of the network's and companies' cooperation (cf. Sproull & Kiesler 1991; Kuutti 1994; Ranta 1998b; Checkland & Holwell 1998).

**(4) Stabilization**

The purpose of the stabilization phase is to make the results of experiments and solutions developed in the experiments into common practices. In this phase, the solutions are stabilized and distributed in the networks and companies. Two tasks are connected with stabilization:

7. *Stabilization of activity solutions.* At the stabilization phase, it is central to stabilize new models and solutions of operation in the network and the companies. For this, it is necessary to organize follow-up and evaluation of implementation. This way information of the implementation and adaptation processes of change can be received. The results also include suggestions for the redevelopment of the mode of operation and the network organization.

8. *Stabilization of the development and training activities of the network and companies.* The central perspective is to establish in the network and its companies organizational structures and methods of continuous development (cf. Imai 1986; Garvin 1993; Winter 1996).

**Conclusions**

The central objective for the building and development process of the network is to create modes of operation that support learning and "knowledge-creating" structures in the network and its companies (cf. Garvin 1993; Nonaka & Takeuchi 1995; Hyötyläinen 1998). This is supported by the adopted network-like cooperation in the development project. Network-like cooperation is the premise of and basis for the creation of new innovative solutions. Only in discussions and cooperation between different parties of the network can different perspectives and dimensions of network activity be discussed, together with issues such as development objectives and development targets for network activity. Only in such discussion can new solutions be created and their implementation be ensured. This requires finding a "common language" as well as common models and methods, which function as the essential common tools when examining activity from the perspectives of different actors or the different needs of the functions (cf. Dixon 1999; Sparrow 1998; Engeström 1994).

*Systematic development activity* consonant to the development cycle procedure requires the need and the will to set common innovation and development objectives in the network for common business processes. The central means for this include the network strategy and the modeling of the network's business and activity processes. In the network, the activity processes extend across company limits and describe operational connections between different companies (see Dubois & Håkansson 1997; Simons & Hyötyläinen 1995a and b; Hyötyläinen et al. 1999). Thus the created models and methods can function as the basis to which knowledge existing in different organizations can adhere and be jointly processed.

# 8. Analysis of learning and innovation in strategic enterprise networks

The purpose of this research is to analyze development processes and activity models in strategic enterprise networks. These are viewed from the perspective of the learning and innovation processes of enterprise networks. Learning and innovation are related to the building and development process of enterprise networks in two ways. First, the development of an enterprise network towards a strategic network requires learning and innovation by the enterprise network and the network's enterprises. Second, a strategic network can generate a learning environment, in which the enteprise network and network's enterprises create new organizational, activity and product innovations.

## 8.1 Development process of strategic enterprise networks

The building and development of srategic enterprise networks cannot succeed without innovations in organizational, activity and management issues. During the development process, companies cooperatively create new structures and activity models according to the principles of multilateral development activity (see Kuivanen & Hyötyläinen 1997). The process of development from an enterprise network to a strategic enterprise network is illustrated in Figure 20.

Building and development
methods for the network

Learning and
innovation process

Strategic
enterprise
network

Network
co-operation
organization

Targets
for activity
developmet
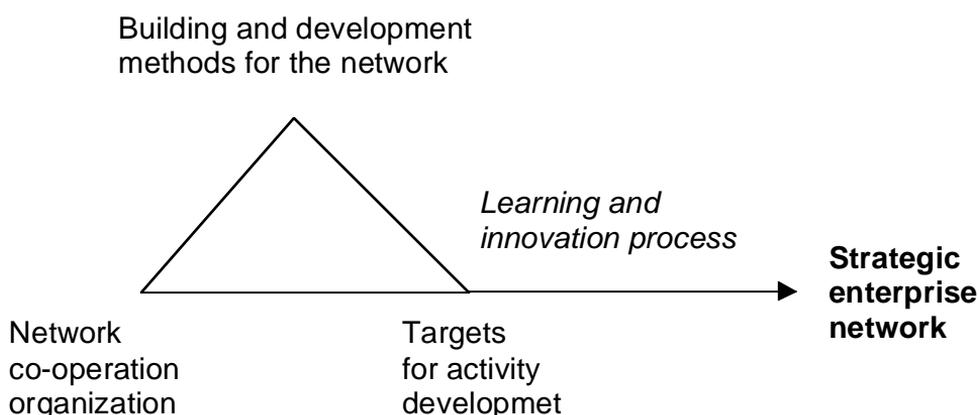
*Figure 20. The model on the development of an enterprise network into a strategic network.*

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The development process of an enterprise network requires *methods* for the building and developing of the network. Chapter 7 includes analyses of the development process and methods of strategic networks based on multilateral activity. Development activity requires a *network cooperation organization*, which sets the objectives and takes responsibility for the building process of the network. Chapters 5 and 6 include analyses on organization, activity and management of enterprise networks. The development of a network is a concrete activity, in which different actors operate together in cooperation. The central development organizations of the network include the network team and the network events and development groups established by the network team. The development of a network equals the development of cooperation and the development of the activity of separate network enterprises. Building and developing a network is implemented through *concrete development targets* and development steps. The creation process of a strategic network is a demanding challenge for companies. The development requires *innovations in organization, activity mode and strategy* both in the network and in the network´s enterprises. The development of the activity mode can also require new information and knowledge systems that support the cooperation taking place in the network at the different levels (cf. Sproull & Kiesler 1991; Checkland & Holwell 1998; Tuomi 1999).

However, the development process of the enterprise network is not a straightforward progression towards strategic cooperation. In enterprise network development, interaction between complex activity systems takes place (see Chapters 4.3 and 5.4, cf. Engeström 1998). The change and development processes are by nature social activity, in which different companies and actors base their attempts and actions on the goals and context of their own organizations. Formulating a policy for the development of network cooperation is complicated by the fact that each company participating in the activity observes the activity from its own perspective. Instead of one view regarding the entire network there are several perspectives and potentially competing views about what the central development problems for activity are and how they could and should be solved. Actors' different thinking and activity models also impact the changes. Different functions of companies can have different kinds of goals as well as different thinking and activity models, which can impact the implementation of network cooperation and its activity modes.

The development of an enterprise network is based on conflict culmination and resolution. This is affected by experiences born out of practical business operations as well as observed problems and development needs. Companies and networks experience many pressures for change, such as companies' new activity models and the changing demands of customers (see Chapter 5.4). The problems with present practices receive a new meaning when they can be reinterpreted through a potential new cooperation model (cf. Vicari & Troilo 1998). The model can be a vision and an objective model taking shape and becoming concrete during the building and development process of the network.

Building and developing strategic enterprise networks is a process of change in which different actors cooperatively solve problems that occur in operations and prepare for future challenges. This can be seen to occur in a "grey zone" (see Chapters 4.3 and 5.4). Demarcation and conflicts between alternative cooperation methods occur in this zone. Combinations of different alternatives are created in this process. Evolution is hindered by the fact that there are layers of elements from previous development phases in the organizational practices as well as in the actors' thinking and activity models.

The learning processes and innovations required by the building and development processes of networks require that different actors in the network be in close interaction. Establishing *direct personal connections* is a mandatory requirement for building functional networks and an essential part of the network-like activity mode (cf. Nohria & Eccles 1996; Hutt et al. 2000). The formation of new cooperation forms and modes evolves as a social process in which different actors and functions of the organization influence the change processes both together with and separately from concrete measures (cf. Burgoyne 1994; Cyert & March 1992; Räsänen 1986; Sitkin 1996).

The basic premise for overcoming different views and different thinking and activity models of the network's different companies and actors is that a *mutual state of will and trust* is created in the network by means of discussion, planning, mutual meetings and compromises (cf. Dixon 1999). This way, common concepts of development targets and solutions can gradually be formed. This is how models and methods for the new activity mode can be generated. The models and methods developed are made into operative activity modes and tools as well as conceptual models in companies and networks. Creating new

processes, connections and activity modes facilitates the thinking and activity processes of individuals participating in the implementation of the change, supporting the desired new activity mode in the change and development processes. This is how it is possible to create structures and models of activity in the network that support organizational learning and "knowledge creation" (cf. Nonaka & Takeuchi 1995, 83–90; Leonard 1995).

## 8.2  Functions of strategic enterprise networks

The strategic enterprise network can operate as a learning environment in which network enterprises and enterprise networks create new organizational, activity and product innovations. The network can develop into fertile soil for learning and innovation activity.

Network companies constitute the base of enterprise network activity. A network company can be modeled as illustrated in Figure 21.

**Network enterprise**

Strategy

Organization                    Activity mode
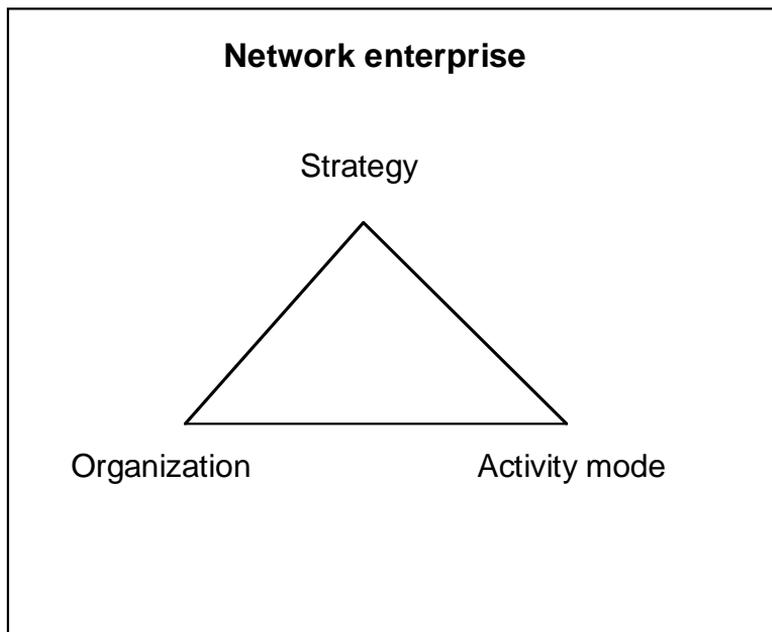
*Figure 21. Network enterprise model.*

A *network enterprise* can be conceptualized as an activity system, which has the central elements of strategy, organization and activity mode. Business operations and activity take place though the activity of the activity system. Business operations are handled by individuals who are organized for cooperation. Their their own skills, mutual relationships and thinking and activity models create the premises and bases for activity (see Chapter 4).

There are periods of radical change and exploration as well as periods of stable activity in the development of companies' and organizations' activity. Business activity develops in cycles of evolution, stabilization and eventually redefining and replacement of new activity modes. Every company has a tendency to go through cycles of development in which different growth forms replace each other (see Normann 1976; Mintzberg 1994; Fujimoto 1998). Companies' radical change processes are about strategic redirecting. They may be based on a well-founded view that a conflict needs solution and a potential new model of operation. At the critical stage, the triangle of the company's strategy, organization and activity mode can waver. The prerequisite for the balanced development of a company is that strategy, organization and activity mode are all developed in parallel (cf. Mintzberg et al. 1998).

With the development of a company's strategy and activity, changes can occur in the organization's demands for cooperation and flexibility. This can lead to changes in organizational structure and activity. The new type of activity requires different organizational forms. Changes in organization may require and enable changes in the actors' and different functions' thinking and activity models. This can then have impact on how the actors' work orientation changes, which for its part can support the stabilization of new models of operation (see Chapter 4).

*Strategic enterprise network* activity can be illustrated in the same way as individual enterprise network's model of activity. The model of operation for a strategic enterprise network is illustrated in Figure 22.
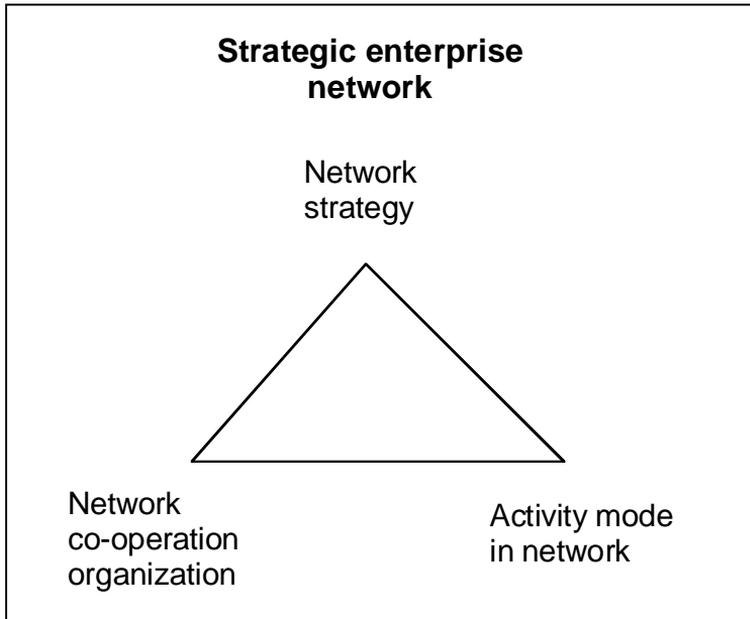
*Figure 22. Model of strategic enterprise network.*

The building of a strategic enterprise networks requires changes at all levels of companies' cooperation. At the level of the strategic network, companies' cooperation must have a network strategy, a network cooperation organization and its own activity modes. Thus, the enterprise network requires its own enterprise structures and models of activity. Chapter 5.2 presented the quasi-firm model as this kind of a model of activity. Network activity can be seen as its own activity. In this case, a network can become a separate development target with which it is easier to create an environment for learning and innovation taking place in the network.

Same principles apply to enterprise networks as to network enterprises. The activity and development of the network requires a balance between a network strategy, a network cooperation organization and the activity mode implemented in the network. Reaching this balance in the network, however, is more difficult than in an individual network company. The development of enterprise networks into strategic networks surfaces as a "paradigmatic" change in the cooperation models of companies (see Castells 1996; Hyötyläinen & Simons 1998a). Networking can bring out new objectives, motives and opportunities, which can be realized only through experimentation. This activity can be partially

described with the "trial and error" mode of progress (see Chapters 4.3 and 5.4; cf. Sitkin 1996; Hyötyläinen 1998).

## 8.3  Activity model of strategic enterprise networks

The activity model of a strategic enterprise network is efficient "in the world of rapid change and complexity" (see Chapter 3.3). Characteristic to strategic networks are the close and confidential relationships of network enterprises. The strategic network can become a learning environment in which companies in the network can learn from each other and from mutual experiences. The companies of the strategic network can process the experiences and lectures gained through their cooperation organizations and create new models and methods for future operations.

The creation of a learning and innovation environment in a strategic network requires the certain conditions be fulfilled (see Hyötyläinen et al. 1999). Figure 23 presents the strategic enterprise network's activity model, which supports learning and innovation taking place in the network, leading to development steps in the enterprise network and network enterprise activity.

Models and methods for
network and its activity

*Learning and
innovation process*

**Development steps
of enterprise network and
network enterprises**

Network
co-operation
organization

Measurement and
evaluation of
activity
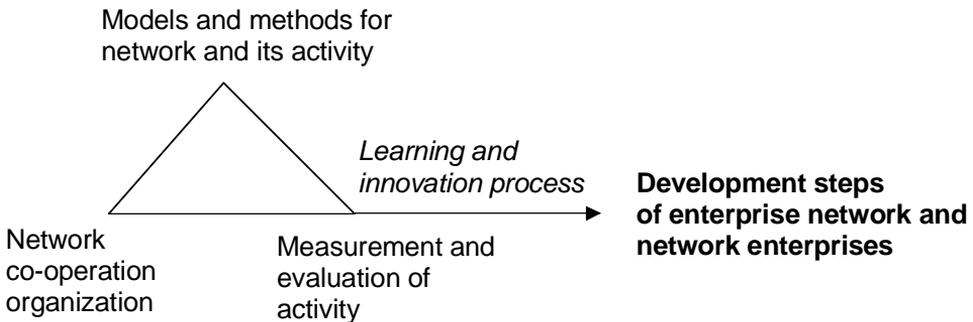
*Figure 23. Activity model for strategic enterprise networks.*

The basic premise of the above is the *network cooperation organization*, which ensures multilateral cooperation in the network (see Kuivanen & Hyötyläinen 1997). Chapter 6 analyzed network cooperation organizations. The network team, its meetings and network events and development groups were suggested

as cooperative bodies. The network must also have its own leader. The networks of work pairs perform operative, planning and development activities in the network. The proper functioning of the network cooperation organization requires changes also in each network company's activity. Network activity and team-like activity in companies furthers the closeness of cooperation and extends cooperation to all levels of the organization.

Discussion and dialogue in the network about network activity, development needs and solutions are an essential requirement for learning and innovation to emerge in the network. Through learning and innovation, new activity models and methods can be created in the network. Network cooperation organizations establish a common focus in which actors from different organizations can interactively build a shared conception of the activity and its development needs (cf. Dixon 1999; Nonaka & Takeuchi 1995).

In a world of rapid change and great complexity, international competition and new operational opportunities have set the pace of change so fast that companies have to explore new unknown territories just to keep their competitive edge. It is a question of organizational learning and innovation, which the company can use to increase its dynamic capability (cf. Stacey 1992; Sherman & Schultz 1998; see Figure 1). This also applies to strategic enterprise networks. In this case, a situation easily arises in which an individual company or individual supplier does not know where it is heading or should be heading in the activity of the network. If the direction is unknown, nobody can manage changes in activity alone.

Strategic enterprise networks do not develop merely as a result of strategic and systematic planning, but the network also emerges from a chaos of spontaneous challenges and conflicts as a result of real-time learning (cf. Stacey 1992 and 1996; Mintzberg 1994). The key issue is to identify the real questions, problems and possibilities. The challenge is to find an appropriate and creative inclination or objective for the network (cf. Tushman & O´Reilly 1997). Here the network's cooperation organization creates the framework for cooperation. Different groups of people and individuals, their intuition and skill at recognizing metaphors and analogies in complex environments must be relied upon in the network and in development. Learning occurs efficiently in the development groups in the network. The groups' learning processes are directed by, for

example, the views of different parties, conflicts, and inter-group power relationships and hierarchies (cf. Cole 1989; Stacey 1992; Simons & Hyötyläinen 1998). As a result of this kind of activity, certain questions or problems arise as strategic issues in the network and network enterprises (cf. Lumijärvi 1990; Nonaka 1991).

People's "tacit" (silent) knowledge has been seen as a central factor in the creation of organizational knowledge (see Polanyi 1983; Nonaka 1991). Organizational knowledge also includes the know-how connected with activity, and cognitive models, which contain thinking models, beliefs and opinions about desired visions of the future (see Chapters 4.2 and 4.3). The only way for organizational learning and creation of new knowledge to occur is to bring the different views into contact, which is when we can achieve shared views of the present, its development needs and visions of the future (see Nonaka & Takeuchi 1995; Nohria & Eccles 1996). Gradually these will be formalized into explicit models and shared concepts. Formal models and methods can be extended in the network to different actors who can adopt and internalize them as their own tools and bases for new "tacit" structures.

The development of network activity requires "explicit" *models and methods of the network and its activity*. These kinds of models are needed at different levels of the network's activity (see Chapter 4.1). Business activity in the network can be described with *vision and objective models*, which represent views, perspectives and activity models of the network in relation to the network's common field of business operation. Chapters 5 and 6 highlight the network strategy as the central model connecting the network. The vision and operating principles of the network can be crystallized as a network strategy.

Many connections are formed between companies in a network. These connections can be material or information flows, activity development, product development cooperation etc. These kinds of activity chains form activity processes that cross company boundaries (cf. Rummler & Brache 1990; Simons & Hyötyläinen 1995; Dubois & Håkansson 1997). These activity processes can be described with *process and control models*, which represent views, perspectives and activity models in relation to activity processes. These models can develop into formal models and concepts, which are common inside the network and for actors operating in companies. The models can form the basis

for cooperation between different actors in the network. At the same time, this enables different companies and actors in the network to adopt these models as tools for their own activity for the purposes of establishing the basis of the network's and companies' activity mode and development (cf. Nonaka & Takeuchi 1995; Child & Faulkner 1998).

For the purposes of the enterprise network's operative activity, the process describing activity processes and control models are not adequately detailed. The practical activity of the network is implemented as operative procedures, consisting of different kinds of events between different actors. Only through operative activity do the objectives set for the network get realized. The actors' activity modes are connected with the performing of the operative tasks. Operative activity includes *activity models*, which represent the actors' views, perspectives and models in relation to operative activity and its events. The actors have a direct relationship and experience on everyday operative activity and its development, which shapes their thinking and activity models and "tacit" knowledge. Bringing activity models to be visible and definite methods is an essential prerequisite for the fact that networks and their companies can cooperatively handle the way basic operations are made and the direction to which they can be successfully developed in the near future (cf. Nonaka & Takeuchi 1995; Engeström 1994; Choo 1998). Functioning in this way, input from the experts at different levels of network enterprises can be included in the development of the enterprise network activity, which then gives actors new experiences and opens up new possibilities for the development of their thinking and activity models (cf. March & Simon 1958; Clark & Starkey 1988, 105–122).

*The measuring and evaluation* of the network's and its companies' activity is an essential part of the learning and innovative network activity (cf. Kaplan & Norton 1996; Vicari & Troilo 1998). The basis of the measuring and evaluation can be tied to the objectives of the enterprise network. Measuring and evaluation can be performed at different levels of the network. The results of the measurement and evaluation of the activity can be compared with activity models describing network activity. At the highest level, the degree of the implementation of vision and objective models can be evaluated. The functionality of the process and control models can be followed and their correlation with the state of and development challenges of activity can be evaluated. The operative activity of the network and its companies can be

followed with different indicators and parameters. The results of the follow-up can be compared with activity models describing operational activity.

By developing the network and its activity models and methods and by measuring and estimating the activity, the cooperation organization established in the network can develop the network's activity and create new activity models. The network can thus become a "laboratory" of cooperation, in which new activity models and procedures are created and tested according to the principles of organizational learning models (cf. Leonard-Barton 1992; Garvin 1993; Leonard 1995; Winter 1996; Child & Faulkner 1998).

# 9. Conclusions

The analyses and models of enterprise networks and their learning and innovation processes presented in this study are based on the analyses of the results of case studies performed at VTT Automation. The original studies were based on the experimental development research approach.

The main point in the approach is that researchers actively participate in the change processes taking place in the networks and organizations, and initiate, direct and maintain these processes together with the personnel of the organizations. This approach has connections to three different research approaches in the field of organization sciences. The first one is *the action research approach* (see Argyris & Schön 1978; Westbrook 1995; Naschold 1994). There are two common themes among different traditions of action research. On the one hand, emphasis is laid on case study, while on the other hand the active participation of researchers in the organizational processes is emphasized as means to acquire knowledge of organizational phenomena. The second approach is the approach of *the developmental work research*, which has been largely developed at the University of Helsinki since the beginning of the 1980´s (see Engeström 1987, 1998 and 1999). Developmental work research is grounded in the basics of activity theory (see Vysotsky 1978). The development work research is an approach based on participating principles. The research does not produce ready solutions for the workplace but provides tools for analyzing activity and planning new models inside the work community. The third approach behind experimental development research is *the grounded theory approach* (see Glaser & Strauss 1967; Strauss & Corbin 1990 and 1998). In this approach, theory is derived from data, systematically gathered and analyzed through the research process. Researchers in this field suggest that theory derived from data is more likely to resemble "reality" than theory derived by combining a series of "normative" concepts.

This study is based on the analysis and interpretation of the results of several case studies and adopts *the system view*. The analyses of the case studies are viewed from a systematic perspective. The aims of the study are both theoretical and practical. The purpose of the study is to summarize the reseach done in the area of enterprise networks at VTT Automation. Learning and innovation

processes in networks are analyzed and modeled in many-folded ways, according to the new approaches in literature from the field of network studies (see Biemans 1992; Lamming 1993; Lipparini & Sobrero 1997; Child & Faulkner 1998; Vesalainen & Strömmer 1999; cf. Nonaka & Takeuchi 1995).

The analyses and models of this study confirm that the development activity of the network and organizations is by its nature a social activity through which different actors construct a new activity system. Development activity consists of concrete actions carried out by different actors and their coalitions (cf. Blackler 1993). Due to the social nature of the organizational change, realization methods and their success depend on the traditions of the organization and the level of its planning practices, the organizational culture of the company, and the professional skill, motivation, work organization and cooperation patterns of the organization and its different groups (cf. Cyert & March 1992; Clark & Starkey 1988; Burgoyne 1994; Hyötyläinen 1998).

Enterprise networks and organizations as activity systems are complex systems, which consist of multi-level relationships. The building and development of these kinds of systems is a long and multi-phased social process. The participation of research in these processes requires that the researchers understand the nature of the activity systems under investigation, their development opportunities and the possibilities to influence the development processes. According to March (1999, 101–113), organizations cannot be planned and developed however one wishes. Instead, the natural development processes of the organization can be influenced significantly by relatively small, well-timed scheduled interventions (cf. Engeström 1987; Hyötyläinen 1998).

Intervention into organizational change processes requires adequate methods from the research. The experimental development research aims to be such a method. The analyses and models of this study aim to increase our understanding of the development mechanisms of enterprise networks and particularly of the activity of strategic networks. The models formed in this research can serve as grounding for the further research on enterprise networks. At the same time, the analyses and models offer new tools for empirical case studies on analyzing and developing enterprise networks in practice.

The development phases of strategic enterprise networks are presented and analyzed. Also the role of researchers in that process is assessed. A central feature of the experimental development research is that the ongoing organizational change process is not only monitored and analyzed in the study but the aim is to actively participate in the change process for creating new solutions. The development cycle has a central role in the experimental development research. The main phases of the development cycle include basic analysis, experimentation with the support of the planning efforts in the organizations, and the support, follow-up and evaluation of the consolidation of the solutions in the network and its companies.

Due to the development mechanisms of the development activity occuring in the network and in organizations, the solutions formed through the development activity can be assumed to be more or less unpredictable and continuously evolving (cf. Aldrich 1999; Schienstock 1997; Räsänen 1986; Hyötyläinen 1998). In a sense, one can talk about development opportunities as a "grey zone" instead of as indisputable planning and implementation practices and solutions (Sitkin 1996). The "grey zone" can be seen as a controversial area where the planning and implementation practices adopted and the techno-organizational solutions concerning the network organizational change process are formed through social activity and learning and innovation processes.

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Title

# Development mechanisms of strategic enterprise networks
# Learning and innovation in networks

Abstract

This study examines the developmental mechanisms of strategic enterprise networks, with a special emphasis on learning and innovation within networks. The aim of the study is to establish theoretical and practical bases for understanding and developing strategic enterprise networks. The study, carried out at VTT Automation using experimental development research methods, is based primarily on the analysis of case studies on the development of companies and enterprise networks. This research views the activities of companies and enterprise networks as activity systems. The developmental method demands that researchers use two "lenses".

The activity system, when used as the unit of analysis, projects two complementary views: the system view and the subject's view. On the one hand, the researchers construct the activity system as if looking at it from above, i.e. from the system viewpoint. Furthermore, researchers examine the case from the outside when analyzing the findings of the case study and writing the study report. On the other hand, the researchers work together with the subjects of the case study to identify the participants or multiple different groups of the local activity, through whose "eyes" and interpretations the activity systems are constructed and developed. Thus, the researchers are themselves actively involved in the activity of the social systems under investigation. The study of activity systems becomes a collective, multivoiced construction of the past, present, and future models for developmental activity. Furthermore, the researchers participate in the development activity itself, as well as in the planning and realization processes of new models in the activity systems under examination.

This study adopts the system view. The object of this study is the developmental processes within strategic enterprise networks and dilemmas of learning and innovation connected to networks. An analysis of the developmental problems of Finnish enterprise networks forms the starting point of the study. Special emphasis is placed on the needs of small and medium-sized enterprises (SMEs). The analysis of models of enterprise networks forms the theoretical basis for the study. The outcome of this study is the elaboration of a model of strategic enterprise networks.

To understand the developmental mechanisms of strategic enterprise networks, it is necessary to analyze the activities and model of an individual network enterprise in terms of a model of a business activity system. By analyzing the model structure of thinking and activity within the multivoiced activity system of a company, it becomes possible to discover the development mechanisms of the organization.

The quasi-firm model is taken to model the governance system of the strategic enterprise network. A management model for the enterprise network is created based on an analysis of this quasi-firm model. The development model of the enterprise network projects an activity system whose development is a disruptive process where different views and interests of the companies and their actors collide. The real problems that are regarded as needing future solutions and new opportunities provide the impetus to form and experiment with new cooperation patterns in networks.

According to the quasi-firm model, strategy, organization and activity mode form the central elements of strategic enterprise networks and their activities. These elements are analyzed and modeled. The salient feature of the activities of strategic networks is multilateral activity among all companies belonging to the network. Work pair activities at different levels between companies are sites for operational cooperation in the network. The development of the way of acting in the network requires changes within the companies as well. The team and network organization of companies creates excellent preconditions for intensifying cooperation in the network.

The planning approaches to the development of different kinds of networks are analyzed. Then the construction and development phases of strategic enterprise networks are described and analyzed. The model of this study is based on experimental development research methodology.

Learning and innovation in strategic enterprise networks are then analyzed and modeled. This part of the study is based on the analysis and modeling presented in previous chapters of the study. Learning and innovation are analyzed in two connections with strategic networks. On the one hand, the building and development of networks requires learning and innovation within the network and its companies. On the other hand, activity within the strategic networks creates an environment for learning and innovating. In such environments learning and innovation processes are modeled and analyzed.