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Understanding Change Processes in Business Networks

A Study of Convergence in Finnish Telecommunications 1985-2005

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Cover: Tove Ahlbäck

Åbo Akademi University Press
Biskopsgatan 13, FIN-20500 ÅBO, Finland
Tel. int. +358-2-215 3292
Fax int. +358-2-215 4490
E-mail: forlaget@abo.fi
http://www.abo.fi/stiftelsen/forlag/

Distribution: **Oy Tibo-Trading Ab**
P.O.Box 33, FIN-21601 PARGAS, Finland
Tel. int. +358-2-454 9200
Fax int. +358-2-454 9220
E-mail: tibo@tibo.net
http://www.tibo.net

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ÅBO 2008

ÅBO AKADEMIS FÖRLAG – ÅBO AKADEMI UNIVERSITY PRESS

CIP Cataloguing in Publication

Nyström, Anna-Greta
Understanding change processes in business networks : a study of convergence in Finnish telecommunications 1985-2005 / Anna-Greta Nyström. – Åbo : Åbo Akademi University Press, 2008.
Diss.: Åbo Akademi University.
ISBN 978-951-765-435-7

ISBN 978-951-765-435-7
ISBN 978-951-765-436-4 (digital)
Painosalama Oy
Åbo 2008

Acknowledgements

In 2002 I made a decision to find answers to questions that remained unanswered in my Master's thesis. Almost six years later I have found my answers, but also more questions. The past years in academia have been filled with joy, and agony. Still, it has been an important learning process, both personally and professionally. My very first thanks go to my supervisor, professor Jan-Åke Törnroos, who helped me get started and has throughout the years shared valuable comments and opinions, however allowing me to work independently. Discussions with my other supervisor, docent Per Andersson at Stockholm School of Economics, have helped me tremendously and I am grateful to Per for the many tricky questions that many times forced me to open my eyes. Valuable and constructive comments have been provided by my opponent, professor Jaana Tähtinen at Oulu University, and my other pre-examiner, professor Virpi Havila at Uppsala University – your comments raised the study to a whole new level! I would also like to thank the 39 interviewees that participated in the study, for giving me your time, and sharing your experiences and knowledge with me.

My colleagues at the Department of Business Studies at Åbo Akademi University deserve special thanks, for making the work atmosphere at Henriksgatan 7 so amazing. Monica Nyholm, whose door has always been open and with whom many (also) research related conclusions have been reached, has helped me develop both as a researcher and teacher. Reeta Valta at Åbo Akademi University, Niina Hanttu Halvorsen at Turku School of Economics and Dr. Fredrik Hacklin in Zürich – thank you for the wonderful and instructive periods of discussing research and writing papers together; your voices can in many ways be heard in this thesis.

In terms of financial support, I am grateful to the Finnish Graduate School of International Business (FIGSIB) for offering me a position as a full-time researcher. Liikesivistysrahasto, Waldemar von Frenckells stiftelse, Turun Kauppaopetussäätiö, Telealan Edistämissäätiö TAES, HPY:n tutkimussäätiö, and Dagmar och Ferdinand Jacobssons fond have also through financial support allowed me to focus on my research. Conference trips, presentations of research proposals and papers as well as participation in doctoral courses have also been supported by Fabian Klingendahls fond, Jubileumsfonden 1968 and Stiftelsen för Åbo Akademi.

Last, but not least, my friends who always have the power and energy to make me forget stress and worries; Yolina, Stella, Lotta, Anna, Micki, Linda and Pia – thank you for being there! My family deserves the biggest thank you for supporting, investing and believing in me. Tack mamma och pappa! And my Joachim, without your patience and support I would still be struggling. Together with you I look forward to tomorrow.

The journey has been amazing. Still, the journey continues. In the words of Joni Mitchell,

I've looked at clouds from both sides now
From up and down, and still somehow
It's cloud illusions I recall
I really don't know clouds at all

Turku, May 30th 2008

Anna-Greta

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List of abbreviations

ADSL	Asymmetric Digital Subscriber Line
AMPS	Advanced Mobile Phone System
AR	Annual Report
ARP	Autoradiopuhelin (Car radio phone)
ATM	Asynchronous Transfer Mode
ATT	American Telephone and Telegraph
BT	British Telecom
B2B	Business to Business
B2C	Business to Consumer
CDMA	Code Division Multiple Access
CEPT	European Conference of Postal and Telecommunications
C2C	Consumer to Consumer
DCS	Digital Cellular System
DMB	Digital Multimedia Broadcast
DVB-H	Digital Video Broadcasting - Handheld
DVB-T	Digital Video Broadcasting - Terrestrial
EC	European Commission
ESA	Event Structure Analysis
ETSI	European Telecommunications Standards Institute
EU	European Union
FCA	Finnish Competition Authority
FDI	Foreign Direct Investment
FICORA	Finnish Communications Regulatory Authority
FMC	Fixed-mobile convergence
GPRS	General Packet Radio Service
GPS	Global Positioning System
GPT	General Purpose Technology
GSM	Groupe Spécial Mobile
HDTV	High Definition Television
HPY	Helsingin Puhelinyhdistys (Helsinki Telephone Association)
HTK	Hämeen Tietokeskus Oy
ILC	Industry Life Cycle
INA	Industrial Network Approach
IP	Internet Protocol
IPDC	Internet Protocol Datacasting
IPTV	Internet Protocol Television (broadband TV)
IPv6	Internet Protocol version 6
ISDB-T	Integrated Services Digital Broadcasting Terrestrial
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunications Union
IVO	Imatran Voima
MB	Megabyte
MBMS	Multimedia Broadcast/Multicast Service
MHz	Megahertz

MINTC	Ministry of Transport and Communication
MP3	MPEG (Moving Picture Experts Group) 1 audio layer 3
MVNE	Mobile Virtual Network Enabler
MVNO	Mobile Virtual Network Operator
M&A	Merger & acquisition
NGN	Next Generation Network
NMT	Nordiska Mobiltelefongruppen
NRA	National Regulatrion Authority
OMA	Open Mobile Alliance
PBX	Private Branch eXchange
PC	Personal computer
PCM	Pulse Code Modulator
PLC	Product Life Cycle
PSTN	Public Switched Telephone Network
PTT	Post, Telegraph and Telephone (incumbent operator)
RBV	Resource-Based View
RTT	Radio- ja televisiotekniikan tutkimus
R&D	Research & development
SDH	Synchronous Digital Hierarch
SME	Small- and Medium-sized Enterprise
SMP	Significant Market Power
SMS	Short Message Service
SPC	Stored Program Control
TAC	Telecommunications Administration Centre
TACS	Total Access Telecommunications System
TV	Television
UMTS	Universal Mobile Telecommunications System
VoIP	Voice over Internet Protocol (Internet telephony)
WAP	Wireless Application Protocol
WLAN	Wireless Local Area Network
xDSL	Digital Subscriber Line
2G	Second Generation Mobile Telephony (GSM)
3G	Third Generation Mobile Telephony (UMTS)
3GPP	Third Generation Partnership Project

PROLOGUE
AN INTRODUCTION TO MOBILE COMMUNICATIONS

A number of mobile telephony standards have been developed through the years, starting with the Nordic cooperation NMT-450 (Nordisk mobiltelefon), of which specifications began in 1970. NMT was deployed 1980-1981 in the Nordic countries. NMT-450 differed from earlier and local solutions, since it was an analogue standard, fully automatic and with roaming functions within the Nordic countries. Roaming means locating the mobile handset of the person called (Edquist, 2003). In 1986 NMT-900 was added as an upgraded standard due to the increasing number of subscribers. Other competing standards were also developed during this time (AMPS, TACS etc.). NMT constituted the base for the world-wide standard GSM (Groupe Spéciale Mobile). GSM, a pan-European standard, developed into a commercial service in 1992. Later, GPRS (General Packet Switching System) was developed to bridge the gap between GSM and UMTS (Universal Mobile Telecommunications System), the next generation standard that allows for video- and data transmissions at higher and faster bandwidths. For end-users of mobile handsets, the technological specifications are perhaps not in focus, as long as the mobile services they use function in a desired and satisfactory way. However, when it comes to understanding the structure of the mobile communications market or sector, technological development in terms of standards are very important and has both a direct and indirect impact on, for example, which kind of actors exist in the market. The next section presents a number of possible actors in mobile communications and their purpose in making the mobile ecosystem function smoothly.

I. Traditional players in mobile communications

Kalakota and Robinson (2002) categorise the players on the mobile marketplace according to business areas. Many actors on the market belong to several different business areas (Nokia, for example). Firstly, (1) one business area within mobile communications concerns *network infrastructure*, which has the aim of replacing hardware-based switching and proprietary service platforms with open network protocols, next-generation mobile switching centres, and high-capacity base stations. Examples of network infrastructure actors are Ericsson, Motorola and Nokia. (2) *Access* is provided by companies, which sell dedicated network connections. Examples of access providers are mobile operators Sonera and Elisa in Finland. (3) *Content* is an increasingly important business area. When a person goes online, everything she or he sees is content, provided by companies. These firms include portals, which organize, aggregate and provide access to content created by other companies. Examples of global content providers are Yahoo! and Sonera Zed, which are also considered to be portals. (4) *Commerce* is furthermore a mobile business area and encompasses companies selling merchandise or information, or acting as intermediaries, facilitating the matching of buyers and sellers. Commerce companies operate in three areas, namely consumer to consumer (C2C), business to consumer (B2C) and business to business (B2B). Examples include Amazon.com and eBay. (5) *Software* companies facilitate inter- or intra-enterprise communications and commerce. The software area includes e.g. operating systems, security and applications software. Microsoft is an example of a software company. (6) *Hardware* such as portable personal computers (PC) or mobile devices facilitates mobile applications. Hardware companies, such as HP or Sun Microsystems, sell (servers, telecommunications services and equipment etc.)

directly to users or network operators. The final business area (7) consists of *applications* and is dominated by companies providing a wide variety of services necessary in the online ecosystem. These actors were based on business area, but practitioners within mobile communications often refer to the following distinctions among actors:

Network operators, service operators and MVNOs

Telecommunications operators originally developed their products and services themselves (including hardware and software) and outside suppliers have been relied on for hardware components. Before the liberalisation and deregulation of the market, players were seen as whole entities and all the production took place in the same company (cf. Ojala, 2004). However, here one of the trends on the market can be identified, as operators increasingly outsource functions and operations in order to gain flexibility and economies of scale. Such trends depend on market forces while other identifiable trends in mobile communications stem from the regulatory environment and actions taken herein. The legislative context has enabled a set of whole new actors in the market. For instance, a *network operator* is defined according to the fact that it owns a backbone network of its own. Owning and maintaining the network used to be the core competence of every network operator on the market. However, the Telecommunications Act, which came into force in the European Union (EU) area during summer 2004, requires all operators with significant market power (SMP) to allow competitive players to lease network capacity. Thus, a network operator with SMP status is required to open up its network to competitors. It is therefore possible for companies to offer mobile telephony and services without owning a mobile network. These players are referred to as *service operators*, and do not own a network, but lease capacity and other network services from a network operator (which does not necessarily have to be the same company or owned by the same company). Service operators are often referred to as mobile operators and are, to a large extent, subsidiaries of traditional fixed-line telephone operators. Mobile operators are the ones that are most dependent on the mobile market place, as they have invested heavily in building the network infrastructure. A service provider, which owns only a small amount of important network elements, and buys network capacity from a network operator, is called a *virtual operator*. It is therefore possible for actors to build their own network components, but if the required investment in hardware components is too high, the company may rely on other actors' networks and act as a *mobile virtual network operator* (MVNO). There are four different classifications of MVNOs (Ojala, 2004), namely (1) classic MVNO, which offers a convergence between fixed and mobile communication. A classic MVNO may direct traffic out of the host network to the end customer and own network elements (such as gateways). The service range can be different from the network host's service range. (2) An enhanced service provider separates from the network host by developing and offering advanced solutions etc. (3) Enhanced reseller barely separates from the network host (mostly content services). (4) A reseller offers the same services as the network host.

Content providers

Any medium needs content in order to ensure success. Content thereby becomes a strategic resource for content providers. The strategy adopted by players in all kinds of network structures is to take control of strategic resources (as well as key competencies). Content providers are those who provide other carriers with content that is eventually transformed to content services offered either directly to end-users or indirectly via other actors in the network (cf. Lindgren, Jedbratt and Jönsson, 2002). Media companies that own content are usually considered to belong to this category, e.g. TV channels. For instance, Feldmann (2002)

considers the creation of media to be the core competence of media companies. Content providers can sell their content to different media types, e.g. TV, radio, newspaper, internet and mobile portals, but are at the same time dependent on network and/or service providers, who charge the end-users (cf. Karhu, 2007).

Content owner
Content rights are held by content owners, which may be the same actor as the content provider. For instance, Disney is a content owner as well as a content provider. Within the mobile service industry agreements with the content owners are a prerequisite for utilising content services, brands owned by other parties as well as media concepts (Järvelä, Lähteenmäki & Raijas, 2001).

Content packagers
Content packagers can be compared to publishers, television or radio channels. They are the digital equivalent to the above mentioned. The content packagers may eventually adopt an independent position vis-à-vis the customers, or act as middlemen between the content providers and the portals. For the mobile operators and portal owners it is difficult to handle contracts with a large number of content providers, which will lead to new middlemen appearing on the market.

Mobile portals
Portals are those that customers turn to when they are looking for content or services. Portals own a relationship with customers and are the digital equivalents of the book traders or newsagents. There are several different types of mobile portals: (1) mobile operators, (2) traditional portals, (3) mobile manufacturers, (4) mobile retailers and (5) new players (Lindgren et al., 2002). As the mobile marketplace is increasingly becoming an extension of the Internet, the presence of Internet portals becomes a vital part. However, portals have an inherent weakness in relation to the position of network and service operators, which are natural portals. Their weakness lies in their lack of experience in handling content and content-sharing partnerships (which Internet portals have been doing for years and thus, they have a competitive advantage).

Mobile retailers
Mobile phone retailers have a strong position on the market place because they have relationships with the end-users. Often, mobile retailers have strategies of their own, as they are able, for instance, to sell mobile phones pre-connected to their own portals (e.g. the European mobile phone distributor Carphone Warehouse who set up a WAP portal Mviva together with AOL). However, this is rarely the case in Finland, where for instance law forbids subsidization for GSM handsets. 3G (UMTS) handset bundling was allowed in summer 2006. All large mobile operators in Finland have their own mobile retailers, e.g. TeliaSonera Finland's Sonerapiste, Elisa's Elisashopit and DNA Finland's DNA Kauppa. Other distribution channels such as department stores, electronic stores etc. are also used by mobile operators.

System and platform providers
Manufacturers of mobile phones (such as Nokia, Samsung, and Motorola), supply the mobile networks with the physical infrastructure. But in order to deliver mobile Internet services, hardware and software are required to connect the mobile network with the mobile operator

sites and customer sites. The co-operation between manufacturers and service operators is thus self-evident.

Software companies
Recently software has played an increasingly important role, as mobile phones have become smarter. Software companies, such as Microsoft, aim that their products will become standards. There are recent trends on the market for hardware manufacturers to co-operate in order to create operating systems. For instance, Ericsson, Motorola, Nokia and Panasonic created an alliance together with Psion in order to form a consortium called Symbian. The idea of Symbian is to develop an operating system for various types of mobile devices (palmtop devices and mobile phones) (Nokia, 26.12.2003).

Technical enablers
In addition to the above mentioned types of actors or roles within the mobile telecommunications industry, there are a number of technical enablers such as network providers, application providers and technical integrators (Karhu, 2007). These actors technically enable service provisioning in mobile networks (Järvelä et al., 2001).

Mobile handset manufacturers
Mobile manufacturers provide the market with handsets and they also control which standards or technologies will be adopted due to the fact that they design and launch mobile handsets supporting e.g. UMTS or wireless Internet access (WLAN) technology. A commonly shared global standard, such as GSM, has been the discussion topic of mobile manufacturers for a long period and strategic alliances have been established with the aim of developing worldwide standards (e.g. Open World Alliance).

Regulator
A regulator can also be counted as an actor within traditional mobile telecommunications industry borders. A regulator sets the legal environment for actors operating within a particular industry. The Finnish regulator is referred to as FICORA (Finnish Communications Regulatory Authority). In addition, the Ministry of Transport and Communication (MINTC) acts as a regulatory body.

End-users/mobile service subscribers
It is important not to forget the end-users, or in this case, the subscribers of mobile communications services, which define any market success. There is a certain market-pull which constitutes the needs and wants of consumers on the market, both residential and corporate customers. Handset manufacturers are especially keen to follow up on the preferences of customers and are now, for instance, introducing Internet telephony (VoIP) and WLAN in many handset models. Operators have learned that the end-users are price and quality sensitive and many innovations have failed due to poor quality and insufficient marketing efforts (e.g. WAP). Price war among operators started as early as 2001 in Finland and has ever since characterized the market, leading to low willingness to invest from the operators' sides. Everything is connected, and thus the end-users must be seen as yet another important actor who forms the market and engages other actors.

II. The mobile communications value network

The ability to provide mobile services to end-users requires the collaboration between a number of actors within the mobile communications sector. The value chain has been more or less deconstructed into a value network. As noted by Karhu (2007), a single company may have different roles depending on its operating environment, the service, or country of origin. Järvelä *et al.* (2001) argue that mobile operators and handset manufacturers play the most important roles in the mobile telephony value network, due to the fact that they are big in size and a large part of the revenues generated accrue to mobile operators. Figure 1 illustrates a possible value network within mobile communications.

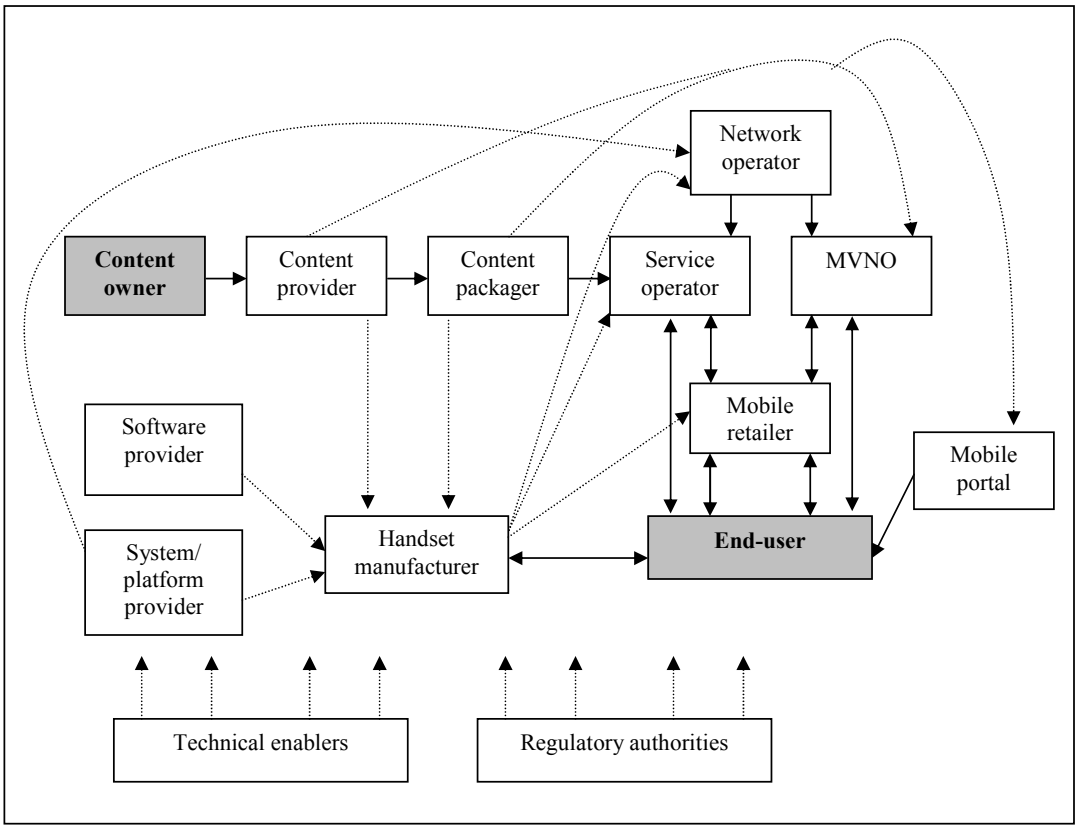

Figure 1. Mobile communications value network

1. INTRODUCTION

The telecommunications sector is a dynamic market, which has experienced major changes during the last few decades, such as automation, digitization, high speed Internet and the introduction of mobile communications. The industry is dependent on and sensitive to technological development, which makes it a challenging context to study. Players in the telecommunications industry are facing a number of challenges. Signs of stability in the telecommunications sector are rare: deregulation, technological development and globalization have led to increased competition and at the same time technology develops in an incomprehensibly fast speed. How do firms react to such changes? Comparing the structure and nature of the telecommunications industry in the 1970s and 1980s with the current situation shows that the changes which have occurred are colossal. From being independent companies with little or no customer-oriented approaches, telecommunications operators have been forced to make their organizational structure more flexible, re-evaluate their core competences, and become more customer-oriented. Global events have led some operators into financial crisis and very few telecom operators are today willing or able to invest in technology and/or service and product development; at least not without forming cooperative agreements with other firms, i.e. acting in business networks.

The access to resources is becoming increasingly important in concurrent business, as many companies decide to focus on their core competence or core business and are in need of resources in order to respond to pressure posed by technological development. This may involve outsourcing in order to increase profitability of the company or establishing collaborative relationships (partnerships) with firms from adjacent industries. In the mobile communications sector such trends are visible. For instance, mobile operators have outsourced maintenance and operation of mobile networks to equipment and handset manufacturers (e.g. Nokia and Ericsson); business networks (e.g. Forum Virium, Dimes) have been created in order to promote the development of innovative products and services for the ICT sector. A trend of firms engaging in a process of mergers and alliances to position themselves in telecommunications has already been acknowledged (Clements, 1998; Duysters & Hagedoorn, 1998; Gaines, 1998; Tarjanne, 2000; Gulati, Nohria & Zaheer, 2000; Bower, 2001; Lindgren et al., 2002; Borés, Saurina & Torres, 2003; Lind, 2004). Thus, firms in telecommunications are shifting from independent into interdependent units. Links or relationships between firms (hereafter referred to as actors) form business networks, in which actors are interacting in order to e.g. produce or deliver products or services. The relationships between the actors can be of various kinds, competitive and collaborative etc., and they are most often formed with a long-term commitment in mind. In the network the actors engage in activities in order to reach a common goal; increased productivity, flexibility etc., but most of all, access to other actors' resources.

Furthermore, the fact that technological development leads to e.g. fusion of technologies (such as camera or TV in mobile devices) has become the focus of many studies (Stieglitz, 2003; Lind, 2004; Bally, 2005; Hacklin, 2006) and is commonly referred to by the concept of *convergence*. Convergence as such indicates merging and integration and has been noted to take place on various levels within the telecommunications industry. A much quoted definition of convergence assumes that telecommunications is merging with media and information technology (IT). These three industry sectors are converging, with the presumed outcome of

e.g. one unified market (cf. European Commission, 1997). Another popular definition of convergence refers to a technological drift toward a common network transport fabric, e.g. pure IP (Internet Protocol) (cf. Shepard, 2000), thus indicating a specific kind of change process within the industry. Very little is known about the effects of convergence on the telecommunications industry and actors therein; most studies have focused on e.g. industry dynamics (Fransman, 2000; Amesse, Latour, Rebolledo & Séguin-Dulude, 2004), the role of innovation (Drucker, 1985a; Teece, 1986; Karhu, 2007), dominant designs (Anderson & Tushman, 1990), development of technological systems, technical improvements and developments (Aaltonen, 2003) and regulatory issues (Vesa, 2005; Richards, Foster & Kiedrowski, 2006), but few on trying to form an understanding of convergence, with a few exceptions such as Bohlin, Brodin, Lundgren & Thorngren (2000), Stieglitz (2003) and Hacklin (2006). Convergence both allows and forces firms to find new opportunities in a technologically changing world, which may lead to changes in roles and positions, both in the market place as well as within businesss. Technology bases of companies are becoming increasingly similar, which eventually means that companies compete with the same technological competencies. Convergence may also imply a need to establish business relationships with partners who possess the necessary technological skills or resources. Completely new value constellations may arise due to convergence processes and the changing industry structure. However, the meaning and importance of convergence in telecommunications has not been studied, especially from the point of view of the firm embedded in a larger industrial system and how convergence leads to dynamics within that system. The concept of convergence is intriguing in the sense that it is a part of the context in telecommunications. Convergence is acknowledged as a factor that influences the industry. Effects of convergence on a firm's behavior and strategies are, nevertheless, still a rather unexplored area. From a theoretical perspective there is little concensus in what convergence means for and how it affects the telecommunications sector in general. Similarly, from a managerial point of view, the effects of convergence on firm strategy and behavior in a specific industry have not been addressed adequately. Special competencies are required in order to be profitable in the telecommunications sector, competencies which are not solely based on technological knowledge, but also competencies enabling an interactive and cooperative approach towards other firms in the industry.

This study is important because studying business networks, nets and relationships within the mobile telecommunications sector does not only add to our understanding of how convergence is characterized, it also adds valuable information concerning our technology-oriented society and the way human beings act in a changing world. Through understanding how the convergence process affects the telecommunications sector and the way actors choose to engage in business nets and establish relationship e.g. across industry borders, we can draw conclusions on how the actors on the market chose their roles and strategies as well as position themselves within a network, develop their core competencies and/or create value. In order for a party to deliver value to other parties they need core competencies in technology and business processes (Prahalad & Hamel, 1990; Kothandaraman & Wilson, 2001). One way of reacting to changes in industry structure and surrounding business is through acting in business networks and establishing relationships to actors who possess the necessary resources, which make it possible to focus on core competences and value creation strategies. One actor's role may also be altered in a business net in order to cope with change, subsequently leading to change in position. However, in order to assess the influence convergence processes have on business net dynamics, convergence *per se* must be

understood. Current research fails to deliver a generic definition of the concept and there is no concensus among researchers concerning triggers, processes and outcomes of convergence in telecommunications. In order to understand business net dynamics in the Finnish telecommunications sector, convergence must first be analysed, i.e. what it is, how has it taken place and developed as well as which implications it poses for an actor's role and position, business net emergence and formation etc. By understanding convergence, one can also understand the industry and business context of telecommunications. So far convergence has not been studied from a business perspective, nor has the Finnish telecommunications sector been analysed from a convergence or business network perspective. The study offers an alternative interpretation of the industry's evolution during 1985 and 2005 and argues for the importance of engaging in business relationships in order to cope with convergence processes.

1.1 The problem area defined

The way actors on the market organize their activities together with other actors will eventually determine which kind of services and products are offered to the consumers. A couple of years ago, not many people expected to have a camera in their mobile device or the ability to access the Internet from the same device. However, co-operation between different actors has led to a number of such examples, where this particular form of convergence is apparent. To which extent does cooperation between actors in the industry take place in order to create innovative services and products? And to which extent do actors from adjacent industries participate in such networks? It is of great importance to understand the role of cooperation and acting in business networks in order to create an understanding of how the telecommunications industry develops and has developed so far. It has been argued that business relationships are the key element in technological development and that innovation is the result of interplay between two or more actors (Håkansson & Snehota, 1995). And as actors interact, they also create dynamics within the business network, which can be traced back to actions and reactions in relationships. However, when it comes to investigating the impact of external events on business networks (cf. Zerilla & Raina, 1996), nets and relationship, the research is scarce. Most scholars report that change initiates in business relationships, i.e. through internal events (cf. Henders, 1992; Håkansson & Snehota, 1995b; Halinen, Salmi & Havila, 1999). But exactly what kind of change does convergence indicate? The problems behind the notion of convergence have not been identified and we do not know in which ways business networks develop in an environment characterized by convergence.

The study focuses on the formation of and dynamics in emerging business nets in a telecommunications industry characterized by convergence. In the study the focus is on business nets, which are defined as local concentrations in business networks (cf. Easton, 1992). Business nets are parts of larger business networks, which may have no clear boundaries other than those specified by the viewer. Studying business nets allows a focus on a core group of actors and specifically the dynamics taking place in the net. While at the same time trying to form an understanding of convergence, business nets are investigated and treated as means for actors to cope with convergence. Convergence does not allow for a telecom operator to exist without interaction with other actors (also from adjacent industries). Today an actor in telecommunications must engage in and act in business nets and networks if it aims at surviving the convergence process. Convergence is thus considered to define the business environment and lead to dynamics within the telecommunications industry and

business networks. Convergence is regarded as a major explanatory factor for the change that will be described in detail in the next chapters. The issue that is of particular interest is therefore the *change* that has occurred in telecommunications. Also, business networks are dynamic and change occurs all the time (cf. Thorelli, 1986; Håkansson, 1989). Convergence may be seen as a driving force of network dynamics, activation of relationships and formation/reformation of business networks.

Knowledge of business network dynamics is thus important for firm strategies in terms of responding to technological developments, competitor strategies and predicting future business opportunities. A tool to study business network dynamics is through the use of *role* and *position* (cf. Anderson, Havila, Andersen & Halinen, 1998). Studying business net actors' roles and positions may deepen our knowledge of business net dynamics and the influence convergence processes have on the dynamics. Role and position therefore serve as indicators of the firm's intent and strategy and acting in roles becomes a means of orientating in dynamic business environments. The process of creating role and position can be treated as the will to take advantage of new possibilities (cf. Axelsson, 1992), and therefore dynamics in business nets should be studied with particular focus on role and position. Is it possible to influence position in a business net through acting in roles? Does convergence allow new roles for actors in telecommunications?

Mobile operators in Finland are studied in particular in order to investigate change in the telecommunications sector, with examples of business nets. The discussion is related to events in the overall industry structure seen from a certain period of time (1985-2005). In order to understand the implications of convergence on business net dynamics, the change that has occurred on an industry level and characterizes convergence must be understood. The study is based on interviews and presents the Finnish telecommunications sector as the main case, with three sub-cases allowing for an analysis of business net dynamics through role and position and convergence. The mobile TV case offers an analysis on a meso-level, i.e. business net (Hertz, 1998). Two mini-cases (Aina Group and MTV3 Handy) are analysed from the actor, or the single organization perspective. Also, references to the industry level are made throughout the analysis, thus touching the macro-level. The mobile TV case and mini-cases are embedded in the telecommunications case study (cf. Yin, 2003). The focus is therefore not only on the telecommunications industry in Finland, but also on three sub-cases, where convergence and business net dynamics can be observed. Actors' roles and positions are studied in order to evaluate the change mechanisms taking place in business nets in the mobile telecommunications sector. The study suggests that the external environment, which is mainly characterized by convergence, has a higher impact on the dynamics of business networks than so far has been reported.

1.2 Research objective, questions and delimitations

The main objective of this research is *to study change processes in an environment characterized by convergence, and their influence on business net dynamics, by taking the Finnish telecommunications sector as an example*. The aim is to produce theoretical and managerial knowledge of the implications convergence has for telecommunications, or more specifically, its influence on actors' business environment and interaction/cooperation patterns (i.e. business networks, business nets, partnerships, alliances, changes in roles and positions

etc.). Change in the telecommunications industry during 1985 and 2005 is mapped and analysed in order to form an understanding of the current industry structure and actor business environment. The empirical analysis of telecommunications industry change is used as a base for developing theoretical aspects of convergence processes and business net dynamics. Convergence defines the industry and denotes dynamics. Therefore, in order to clarify industry development in Finnish telecommunications and investigate the significance of convergence, critical event analysis is applied. Without understanding convergence and its role in industry development, business net dynamics are not fully explored. A sensemaking and processual approach allows for analysis of actors' perceptions of convergence and industry development at different points in time. Convergence thus becomes a tool for understanding business net dynamics in a telecommunications setting.

The research questions which guide this study are divided into three main themes with sub-questions. The first theme covers the telecommunications industry in Finland during 1985 and 2005 and the development into the industry's current structure. The second theme focuses on convergence, and links it to the discussion on acting in business nets and the industry evolution. The third theme covers the actor level by focusing on actors' activities in business nets and networks as well as their roles and positions within them.

A. Which critical events can be identified in the industry change process in Finnish telecommunications during 1985-2005?
   1. Which critical events have shaped the Finnish telecommunications industry into its current structure?
   2. What kind of interaction exists between actors in Finnish telecommunications at different points in time and how has it changed during 1985-2005?
   3. How has the Finnish telecommunications industry evolved 1985-2005, seen from an industrial network perspective?

B. What is the significance of convergence in the development of Finnish telecommunications?
   1. What are the theoretical implications of convergence for telecommunications actors?
   2. Which perceptions of convergence exist among (representatives of) actors in the Finnish telecommunications sector?
   3. How does convergence initiate change processes in business networks?

C. How do convergence processes affect the roles and positions of actors in a specific business network in the Finnish telecommunications industry?
   1. How are roles and positions determined in emerging business nets?
   2. How do convergence processes affect role and position in a business net?
   3. How can role and position be used as strategic tools for actors in telecommunications?

The research is limited to reviewing theoretical approaches to convergence and interaction between B2B actors within telecommunications; a network approach based on research by the IMP Group is used, with specific focus on the notion of role and position as means of understanding change mechanisms (chapter 2 discusses further motivations for delimiting the study to the industrial network approach). These theoretical bases will set the context for analyzing the empirical part of the study. The study is geographically limited to studying actors within the Finnish telecommunications industry. Many would argue that the

telecommunications industry is global and that no national borders exist. However, the telecommunications market in Finland was always characterized by competition and deregulation started before most other European markets (see chapter 6). These facts make the Finnish market different from other telecommunications markets. Also, analysis of convergence processes requires a mature and technologically developed market. From a time perspective, the study is limited to events and changes that took place in the Finnish telecommunications sector between 1985 and 2005. Technological advancements (automation, digitization, mobile telephony etc.) and deregulation within telecommunications started to have an effect on the industry during the 1980s, and therefore 1985 has been chosen as a starting point of the analysis. Since the study aims at understanding *how* and *why* change processes have occurred, it is methodologically limited to qualitative data gathering and analysis methods (critical event analysis, sense making, historical reconstruction, case studies). The aim is not to measure change; rather, to describe the different types of change that take place on an industry and actor-network level and outcomes. Qualitative research explores the broader context within which change takes place and can capture the full set of factors, which participants perceive as contributing to change or the outcome(s) (cf. Ritchie & Lewis, 2004). Technology development or specific convergence products are furthermore not a focus of the study.

1.3 Research approach

The research is interpretative with the aim of understanding change dynamics in business nets and thus contributing on a theoretical level with insights into business network dynamics as well as to convergence related research. Theoretical and empirical parts of the study complement each other in the sense that convergence and business nets in the Finnish telecommunications sector are analysed and compared to existing research in respective fields. Theory reflects reality in an ideal world, and the aim is to empirically study the telecommunications sector in Finland and compare it to theory in order to find answers to the research questions stated in the previous section. Also, the aim is to develop existing theory on convergence and business network dynamics based on the interplay between the theoretical and empirical parts of the study.

Based on a perspective, which is grounded in interpretivism and social constructivism, it is argued that convergence needs to be seen not as a variable to be measured, accounted for and controlled, but as a context within which interpretations of business net dynamics are formed and intentions to influence business nets are formulated. Reality is seen as a social construct (cf. Glaser & Strauss, 1967), which means that business networks are a way of organizing this construct (cf. Axelsson, 1992). Through interviewing individuals who represent organizations active in telecommunications, it is possible to form an understanding of how convergence processes and business net dynamics are perceived and understood, and thus also to learn about the implications convergence has on business net dynamics. Interviews have been conducted between October 2005 and April 2007 (a pilot study was conducted between October and December 2005), which together with secondary sources such as annual reports, industry reports, regulatory reports etc. constitute the empirical data used in the study. The empirical data has been codified and categorized through the use of Nvivo and analyzed through critical event analysis. The main case in the study is the Finnish telecommunications sector. From the empirical data sub-cases have been subtracted; one main sub-case (mobile TV) and two mini-cases (Aina Group, MTV3 Handy). During the interview period, they

emerged as the most suitable for remarking on the convergence processes taking place within Finnish telecommunications as well as elaborating on business net dynamics. The mobile TV case allows for the analysis of a business net formed in order to take advantage of convergence of technology, i.e. the unit of analysis is the business net formed as a result of convergence of technologies. The Aina Group mini-case allows for analysis of a single actor making sense out of the surrounding business environment, including convergence processes and interaction with other actors. The MTV3 Handy mini-case, on the other hand, focuses on role and position seeking as a result of interpretations of convergence. Table 1 summarizes the chosen cases and levels of analysis, indicating that business nets and convergence are analysed simultaneously in the case studies. The business net as a unit of analysis is studied with reference to events taking place on other levels (industry, business network and actor level), allowing for a thorough analysis of business net dynamics as a result of convergence. Convergence as a unit of analysis, on the other hand, is analysed on a technology level, industry level and in relation to role and position in business nets, depending on the case.

The business net as a unit of analysis	**Finnish telecommunications**	**Mobile TV**	**Aina Group**	**MV3**
Industry (macro)	x	x	x	x
Network/net (meso)	x	x	x	
Actor (micro)	x	x	x	x
Role & position		x	x	x
Convergence as a unit of analysis	**Finnish telecommunications**	**Mobile TV**	**Aina Group**	**MV3**
Technology level		x	x	
Industry level	x	x	x	x
Role & position		x		x

Table 1. Case selections and level of analysis

1.4 Key concepts and definitions

In the following section the core concepts of the study are presented and their definition is discussed.

Telecommunications

Telecommunications allows for the transmission of voice and data by means of electrical or electronic signals, e.g. telephone, radio, TV, telegraph, fax and radar. A complete, single telecommunications circuit consists of two stations, each equipped with a transmitter and a receiver. The transmitter and receiver at any station may be combined into a single device called a transceiver (SearchTelecom.com, 21.5.2006).

Industry

A much used definition of an industry comes from Porter (1980, p. 5), who states that an industry equals “the group of firms producing products that are close substitutes for each other”. Any definition of industry is basically a choice of where to draw the line between established competitors and substitute products, between existing firms and potential entrants and between existing firms and suppliers and buyers. It must be remembered that the

definition of an industry does not equal the same definition of where a company wants to compete. Industry definition and that of the businesses the company wants to be in must be decoupled. An *industry cluster*, on the other hand, means "geographical concentrations of industries that gain performance advantages through co-location" (Doeringer & Terkla, 1995, p. 225). Rosenfeld (1997 p. 10), defines an industry cluster as "a geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communications and dialogue, that share specialized infrastructure, labor markets and services, and that are faced with common opportunities and threats". Rosenfeld's definition thus emphasizes the importance of the role of social interaction and firm cooperation in determining the dynamic nature of a cluster. The interaction and functional relationships between firms and industries characterize a cluster (Doeringer & Terkla, 1995). Spatial proximity and geographic scope are included in most of the definitions of industry clusters.

Convergence
Generally convergence is defined as the merging of the three sectors of telecommunications, media and information technology (cf. European Commission, 1997). Convergence is sometimes referred to as a technological drift toward a common network transport fabric, e.g. pure IP (cf. Shepard, 2000).

Business network/business net
The difference between a network and a cluster, according to Forsman and Solitander (2003) can be seen in e.g. membership, which is restricted in a network and open in clusters. Networks are also based on formal partnerships, whereas clusters and based on informal interaction. A business network is defined as exchange relationships between multiple firms that are interacting with each other (cf. Möller & Wilson, 1995) or the web of contacts which exist between actors in an industry (cf. Håkansson, 1986). A business net is referred to as a local concentration within a business network (cf. Easton, 1992).

Change and dynamics
The Merriam-Webster dictionary defined dynamics (as a noun) as "an underlying cause of change or growth" and "a pattern or process of change, growth, or activity". Change, on the other hand, is defined in the same dictionary as "the act, process, or result of changing". Both change and dynamics aim at providing an understanding of events and actions within a specified and limited sphere, their origin, effect and outcome.

Role and position in a business network
Position functions as the framework for actions for actors in a business network and characterizes how a firm relates to other companies in the business network. Position also signifies how an actor fits into an industrial system (cf. Henders, 1992). In this study, position refers to a company's relative place in a business net. A role in business network settings describes what actors intend and how they construct meaning out of their position. Role is often referred to as the dynamic aspect of position (cf. Håkansson, 1987).

1.5 Structure and content of the study

The thesis is structured in the following way (see figure 2). Firstly, an introduction to mobile communications and its market structure is given in the prologue. The introductory chapter

introduces the reader to the problem area and context of the study. Chapter two proceeds with a discussion on possible theoretical frameworks for studying the proposed area and concludes with justifications of the chosen theoretical approaches, which are further elaborated and analyzed in chapters three (convergence related theories) and four (the industrial network approach with focus on business networks, dynamics as well as role and position). Chapter five describes the methods used and leads the reader into a discussion on methodology. Chapters six and seven provide understanding of the context within which actors are embedded; chapter six describes the evolution and development of the Finnish telecommunications industry during the time period of 1985-2005, while perceptions of convergence are reported in chapter seven together with two mini-cases. Chapter eight discusses the main case of the thesis, mobile TV. Chapter nine concludes the thesis in a summary and final discussion. The structure of figure 2 has been inspired by Voima (2001).

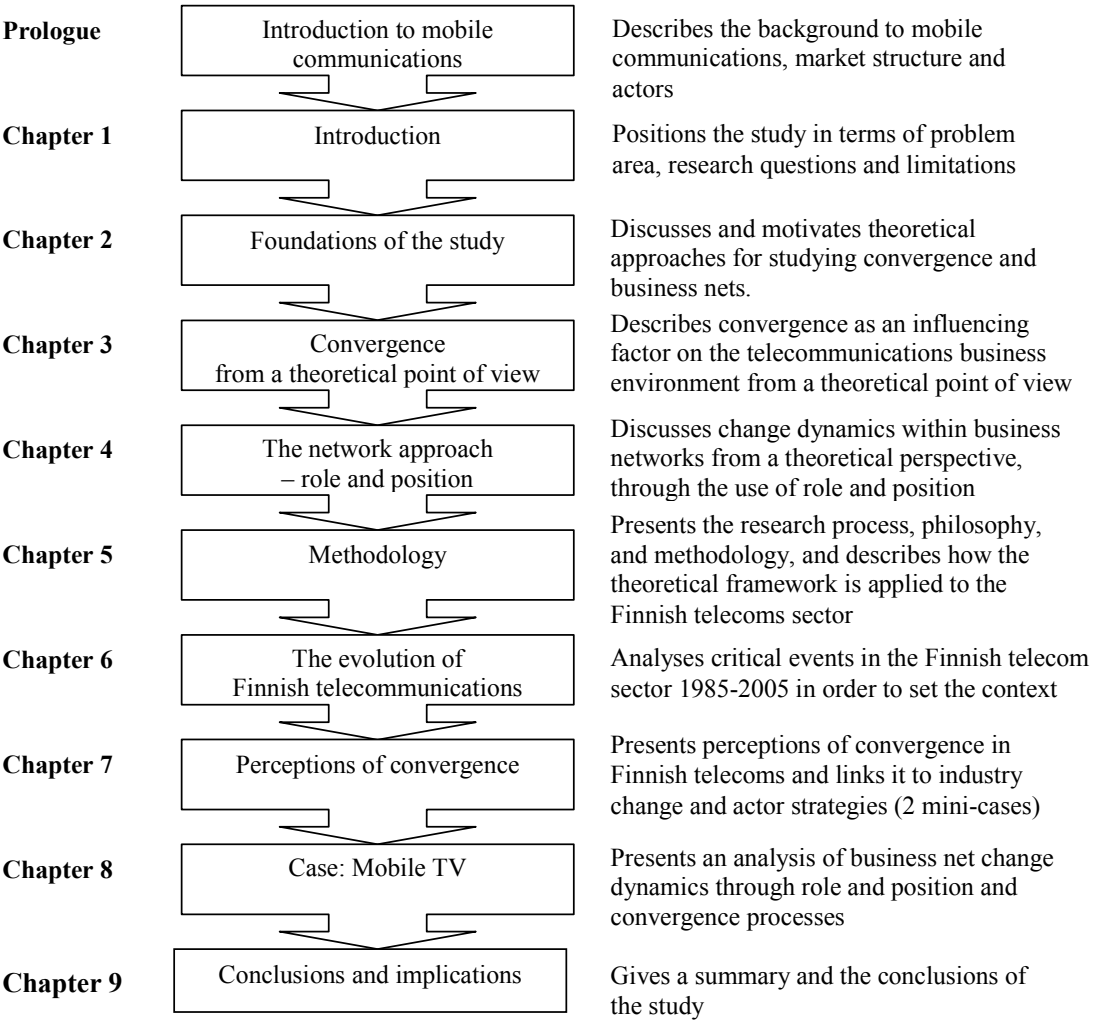

Figure 2. Structure of the study

2. FOUNDATIONS OF THE STUDY: EVALUATING RELEVANT THEORIES

The purpose of this chapter is to shortly present possible theoretical bases for studying convergence and business network dynamics. The chapter includes a discussion on different approaches and critically reviews the alternatives and motivates the selected theoretical framework, its levels and delimitations. The chapter is divided into three main parts with a discussion of the cornerstones in telecommunications. The main parts consist of presentation and discussion of alternative ways of studying (1) convergence and (2) business networks and (3) summarizing the discussion by developing a theoretical framework for this study. A mix between industrial marketing theory and convergence related theories is suggested as a theoretical framework.

2.1 Studying a technology sensitive field – tekecommunications

Telecommunications in general is a technology dependent industry. High-tech firms operate under conditions characterized by a high degree of technological uncertainty and technological changes occur rapidly. It can also be said that high-tech firms operate in emergent industries with "fuzzy" and rapidly changing industry boundaries. Traditional marketing theories may not be up to date with or able to address these changes in a rigorous way. Interdisciplinary theories thus serve as a good basis in attempts to understand technology-driven markets and environments. However, limiting oneself to only studying one aspect of telecommunications can lead to inadequate information about phenomena and events occurring in telecommunications. The interplay in the ICT and the telecommunications sector can be explained through three main aspects (Melody, 2006). First of all, technology and innovation therein leads to applications which are the heart of mobile communications. Applications enable products and services, which in turn relate to the market and the economy in general. Besides technology and the market, regulation plays a vital role in setting the rules (regulatory directives and policies) within the industry. These three areas are dependent on each other. Technology does not exist in vacuum; it is dependent on the market as well as on regulation. Telecommunications markets cannot survive without a technology component, enabling products and services as well as applications. Regulation on the other hand, affects both business and technology development of actors involved. Often, in techno-economic development, rules and regulations lag behind technical change (innovations) and sometimes even constitute an obstacle for such change (Edquist, 2003). In this study on telecommunications, special interest is taken in the business environment of mobile operators and other actors, such as media companies, with which the actors have relationships. I am not investigating consumer preferences or how well mobile operators serve them. Rather, the interaction and cooperation pattern between actors in mobile communications lies as focus in this study. However, I cannot fully understand the context without some reference to both the technology side and regulation side of the industry. I consider technology as something that is not only developed by organizations/firms, but also consumed by other organizations/firms. This means that convergence initiated by one actor will eventually have influence on other actors within and outside the industry borders. However, technology and technical development as such is not the prime means of understanding business network dynamics and therefore the study will not focus on a specific technology and its related convergence process. Convergence has a strong base in technology, but the means how to achieve technological convergence processes are not in focus. Regulation is also touched upon in this study, as it has

proven to play a big role in the development and structuring of the industry as a whole. Therefore, regulation is included in the study to quite a large extent, as it affects the way actors perform in the market and the way they form relationships to each other. Discussing whether regulation is "good" or "bad" falls outside the scope of this study. Rather, the implications of regulation are in focus.

2.2 Studying convergence – alternative theories

Greenstein and Khanna (1997) point out several theoretical bases, in the analysis of convergence which are useful and considered necessary by the authors. Greenstein and Khanna refer to theories concerning general purpose technologies (GPT), industry life cycle (ILC) and diffusion of innovation. These theories address how technologies emerge, grow, become dominant in order to eventually become ubiquitous in all sectors of the economy (Lind, 2005). However, one must keep in mind that these theories have a base in technology. An analysis of convergence processes in telecommunications through either of the above mentioned theories would result in knowledge about convergence processes on a technical/technological level, not necessary on a societal, industrial, actor, network or net level. The common factor for all these theories is *technology*. A technology is referred to as "the process of transforming basic knowledge into useful application" (Day & Schoemaker, 2000, p. 2). Hatch (1997, p. 127) defines technology as "the means of achieving something". A technology can focus on a component, an entire product or an industry. When (1) the knowledge base is expanding, (2) the application to existing markets is undergoing innovation, or (3) new markets are being tapped or created, scholars refer to *emerging technologies*. Emerging technologies thus have the ability to create a new industry or transform an existing one. Emerging technologies might include discontinuous technologies derived from radical innovations or evolutionary technologies arisen from the convergence of previously separate research streams. Technological determinism is an interdisciplinary example of how to analyze convergence. Technological determinism implies that technology drives society. Under this notion, convergence is not caused, for instance, by mergers and alliances of firms in adjacent industries, or the network formations which easily could lead to an increased level of convergence processes. Convergence already exists as such in society, and occurs when the time is right and the proper technologies can be integrated in order to start a new process of convergence. However, technological determinism implies that human beings have little or no control over technology development and convergence processes, whereas GPT and ILC and diffusion of innovation theories imply that human beings create reality through their actions and reactions, e.g. by being innovative and developing technology. Technological determinism will therefore not be included in the study due to its ontological stance.

2.2.1 General purpose technologies

Economic growth's most important driving force is technological progress (cf. Schumpeter, 1934; Langlois & Robertson, 1995). Technological progress in turn seems to be driven by a few major technical or organizational breakthroughs. Examples of *general purpose technologies* (GPT) (cf. Bresnahan & Trajtenberg, 1995) are, for instance, the steam engine, steel, railways, telephony, electricity, automobiles, plastics, computers etc. These examples have all formed long-term industry life-cycles and, mostly breakthroughs in engineering, have turned out to be widely applicable throughout the economy. GPTs typically generate cycles.

For analyzing such a learning process it is useful to consider the process driving technological progress. Christensen (2003) views the Internet as a GPT that gives rise to a wide array of new products, processes and services. The emergence of Internet services can be classified as a process of convergence through technology substitution or also, what Rosenberg (1976) has labeled technology convergence. The process of convergence also affects actors and players on the market, as firms from established industries (such as advertising, software, systems integration etc.) began to compete with pioneering firms that constituted to emerging industry of Internet services. GPT are technologies that may be modified and extended to address a seemingly unlimited range of applications in a wide array of activities (examples are the personal computer and the World Wide Web). The GPT notion tends to stress technologies as the key artifacts (e.g. the steam engine or the laser), which over time come to be adopted in several so-called application sectors. GPT offers information of convergence on a technical level and predicts the outcomes, but does not deliver knowledge about the market nor the actor level. If we seek to understand dynamics on a business net and actor level, the notion of GPT is an insufficient tool when analyzing convergence processes and their impact on the business environment in mobile communications. The GPT approach rather sees larger wholes and societal issues than focuses on individual actors and their relationships.

2.2.2 Industrial restructuring and the Industry Life Cycle

Every industry begins with an initial structure (Porter, 1980). This structure is a result from a combination of underlying economic and technical characteristics of the industry, initial constraints of small industry size as well as skills and resources of early entrants. Porter (1980) argues that industries change due to the fact that some forces are in motion, which create incentives or pressures for change - he calls this the “evolutionary process”. The evolutionary processes aim at pushing the industry toward its potential structure. Porter furthermore points out that it is widely accepted that industries tend to consolidate (or converge), but stresses that this is not always true as a general statement. It is not always clear which industry changes are occurring at the moment and which these changes will be in the future. Change in one element of an industry’s structure tends to trigger changes in other areas and there is up to now no one known way in which industries evolve. The interesting point that Porter makes here is that structural change in one industry is often accompanied by changes in this industry’s boundaries (see figure 3).

The structural change in an industry may also be influenced by a firm’s strategic behavior. The firm can seek to influence industry structure through the way it reacts to strategic changes of competitors or in the strategic changes it initiates. A company can also be very sensitive to external forces causing the industry to evolve, and this way influence the structure of the industry. The external forces that the company can benefit from are, for instance, licensing or other agreements with innovating firms on new innovations, regulatory changes can be influenced etc. Drucker (1985b, p. 77) argues that industries experience sudden change due to the convergence of technologies. Drucker furthermore points out that an industry “is ripe for basic structural change if the way in which it does business is changing rapidly”. Porter (1985) argues that technology is also an important determinant of overall industry structure.

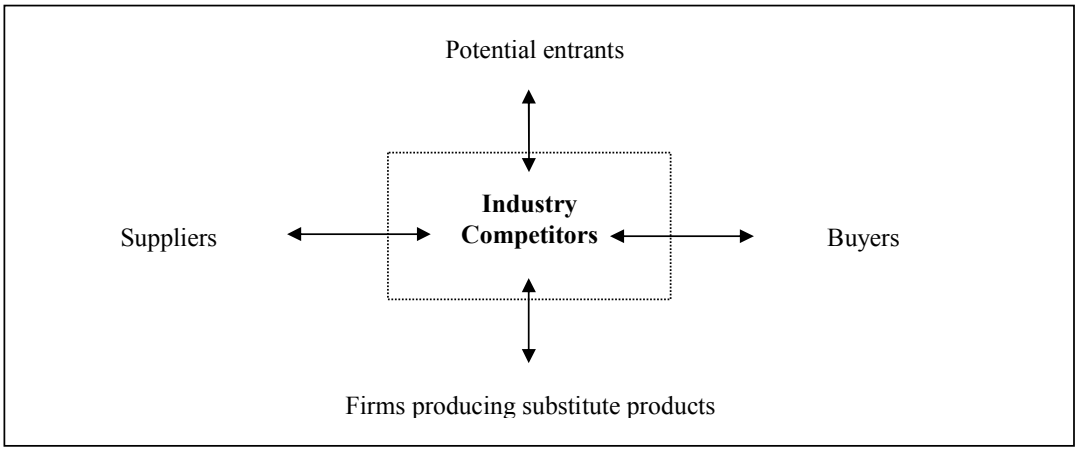

Figure 3. Industry boundaries (Porter, 1980, p. 187)

Industry growth occurs according to an S-shaped curve due to the process of innovation and diffusion of new products (Porter, 1980). The Industry Life Cycle (ILC) is often viewed as equaling the Product Life Cycle (PLC) and was introduced in the literature as an analogous metaphor to the PLC model from the 1970s (Lind, 2005). Porter, for instance, applies PLC to industries. An industry passes through a number of phases or stages (introduction, growth, maturity and decline – sometimes skipping one stage and passing right through to the next one) and as the industry goes through its life cycle, the nature of competition will change. The ILC implies increased specialization and industry fragmentation within the techno-economic paradigm (Lind, 2005, p. 9), "as the cluster of firms centered on the new GPT grows, economics of scale will make it viable to sustain ever narrower and more specialized business models". When an emerging industry grows, the incipient market definition will splinter. An increasing number of new sub-markets and supporting industries will be created. For instance, an emerging industry such as the computer industry will create sub-markets, or new industries, around software, hardware, systems integration, application software, operating systems, resellers, chip design firms, contract manufacturers etc. The ILO can be viewed as a causal driver of convergence processes (cf. Lind, 2005).

The implication of convergence on ILC is that there will be a continuous price fall of orders of magnitude for a technology or product. This price fall could be an important trigger for new actors to enter the new industries (Lind, 2005). The question is: is it possible to understand convergence through industry change and restructuring alone? What are the firm's roles in developing convergence processes, which may lead to changes in industry boundaries? ILC shows development on a macro level, whereas this study also focuses on a meso level analysis and therefore the ILO cannot singlehandedly explain convergence and its implications on business nets.

2.2.3 Diffusion of innovation

Schumpeter argued already in 1934 that economic growth is a result of innovations. By this he meant that new combinations of products, processes, markets, sources of supply and organizations result in innovations. The potential for innovation, Schumpeter further claimed,

was endless. The possibility of combinations was increased by greater connectivity among actors and ideas. Technological change thus occurs when the relationships among elements change or when new connections are established. Afuah and Utterback (1997) point out that as technology evolves, so do industry characteristics, products and critical success factors. Those firms that do not posses the right capabilities are forced to leave the scene. Carlsson (2003) further argues that the combination of digitization and the Internet seems to have much broader applicability than previous general purpose technologies ever did.

"An innovation consists of certain technical knowledge about how to do things better than the existing state of the art" (Teece, 1986, p. 288). Drucker (1985b) views innovation as the specific function of entrepreneurship and the means by which the entrepreneur either creates new wealth-producing resources or endows existing resources with enhanced potential for creating wealth. Freeman and Perez (1988) have created a taxonomy of innovations, which encompasses four categories of innovations. These categories are (1) incremental innovations, which occur more or less continuously in any industry or service activity, although at differing rates in different industries and different countries, (2) radical innovations represent the introduction of completely new products and processes and are discontinuous events, (3) new technological systems (systemic innovations) are far-reaching changes in technology, which affect several branches of the economy and gives rise to entirely new industrial sectors and (4) technological revolutions or new techno-economic paradigms represent changes in technological systems that are so far-reaching in their effects that they have a major influence on the behavior of the entire economy. The "long wave" view supposes that all industries will come to be influenced sooner or later by these technological paradigms and this can also be labeled as a process of technological convergence between industries (Fai & von Tunzelmann, 2001).

An important part of the innovation process is diffusion of innovation. Without diffusion, innovation would have little social or economic impact. Diffusion translates as "the process by which individuals and firms in a society/economy adopt a new technology, or replace an older technology with a newer" (Hall, 2004, p. 2). As a technology diffuses, technological convergence between industries will increase (Fai & von Tunzelmann, 2001). When the rate of innovation in a new technological area is at its highest, technological innovation will occur foremost in the industry that can most easily and readily exploit the opportunities which arise. This is the industry which has this area as its 'core competence' (ibid.). The authors furthermore argue that this will coincide with increased technological divergence between industries, or at least a slowing down in the degree of convergence.

Again, theories related to innovation, diffusion and management, focus largely on the technologies themselves rather than on the implications on a micro-level. Some considerations of implications on a macro-level occur. The innovation approach is an alternative theory for analyzing interaction as it is clear that interaction is needed between actors in some cases of technology development. The focus would however remain on a technological level instead of allowing for a rigorous analysis of the effects of technological convergence on an industry level.

2.2.4 Summary

In summary, one can say that theoretical approaches to studying convergence processes from a (1) business perspective and (2) on a meso and micro level of analysis do not exist. The industry life cycle studies changes on an industry level as does GPT to some extent. Development and diffusion of innovations are rather concentrated on the effects of innovation and the contribution convergence processes can make. The processual nature of convergence is rarely highlighted in research of the phenomenon. The effects of convergence processes in the micro and macro environment are in focus in this study and therefore none of the presented theories are purely and solely applicable, especially when the level of analysis is on a macro and meso level of business networks and industry dynamics. In this study convergence processes constitute the context or the environment for the studied actor. GPTs, innovation and industry development rather focus on cause and effect, offer classifications, categorizations and discuss change on a technology and industry level. The implications on an actor-level remain fuzzy and the theories take no stance in how e.g. convergence is perceived by practitioners within organizations, what convergence means for telecommunications or contributes to the interaction between actors. Table 2 summarizes the theoretical approaches reviewed as alternatives. GPT and diffusion of innovation do not provide adequate analytical tools to study convergence and business nets, whereas the theoretical review of convergence (see chapter 3) is partly based on ideas which are close to theories on industrial restructuring (e.g. Stieglitz, 2003). Finally, it can be stated that there does not exist such a theory as *convergence theory*, which means that the review of convergence is based on a number of research results originating in different research traditions and fields.

Proposed approach	Main idea of approach	Level of analysis	Applicability in this study
General purpose technology	Innovations transform industries	Technology	Does not take into account interaction between actors, implications of convergence for actors' environment and the processual nature of convergence
Industrial restructuring/ industry life cycle	Industry restructuring through technological change	Industry	Does not take into account interaction between actors, implications of convergence for actors' environment
Development and diffusion of innovation	Technology and innovations adoption, technological progress	Technology Society	Does not take into account interaction between actors, implications of convergence for actors' environment

Table 2. Comparison of approaches to studying convergence processes

2.3 Studying actors and links between them (interaction)

When it comes to studying actor behavior in a market, interaction as well as actor roles and positions, a few possible approaches are suitable; the industrial network approach (INA) with its various fields of focus, transaction cost approach, resource-based view, and institutional theory.

2.3.1 The industrial network approach (INA)

The International Marketing and Purchasing Group (IMP) is a research tradition, which focuses on relationships and networks on industrial markets. The research strand has developed since the 1970s and has resulted in models and theories such as the interaction approach (providing understanding of a single relationship – a dyad) as well as business network models (e.g. the ARA-model). Interaction indicates a process in which two participants carry out activities directed toward one another and exchange valuable resources (Hallén, Johansson & Seyed-Mohamed, 1991). Holmlund (2004, p. 280) very accurately describes the interaction/network approach as regarding "relationships as the result and the means for firms to work with other firms and to operate in a network setting".

Business network theory provides an understanding of the importance of developing and maintaining business relationships in order to ensure stability and the ability to make use of business opportunities through access to knowledge. According to Melin (2002), networks can be viewed as (1) a *focused organization* (or a group of organizations) and its structure of relations, (2) a *dyad* – a relation between two parties in a network and (3) a *network*, which constitutes of organizations linked together through relations. Establishing networks involves creating and developing trust, commitment, adaptation, co-operation, mutual goals and communications between actors in a business network. De Búrca and McLoughlin (1998, p. 89) consider the network perspective of B2B exchange relationships to primarily be concerned with "trying to understand complex inter-organizational relationships". Gadde and Mattsson (1987) argue that the network approach is principally concerned with analyzing the dynamics of networks, rather than their structural form. A basic assumption in the network approach (and model, cf. Håkansson, 1987) is that the individual firm is dependent on resources controlled by other firms and vice versa, i.e. there exist mutual interdependencies between firms. Due to the interdependencies of firms, using one asset in one firm is dependent on the use of other firm's assets (Johansson & Mattsson, 1987). Coordination of this dependency between firms takes place through firms interacting in the network.

A network approach in research offers conceptual tools to the study of dynamics in business markets. Industrial markets are described as networks of inter-firm relationships. Companies build exchange relationships with other companies, and through these they become connected to broader networks of business relationships (Halinen et al., 1999). Håkansson and Snehota argued in 1989 that the individual organization is often embedded in its environment and thus, a company's behavior is greatly constrained if not predetermined; it is not a free and independent unit. On the other hand, the network approach has been criticized for being too "loose" as a theory, neglecting quantitative research methods and for the lack of managerial prescription (Möller, 1994; Wilson, 1994; Wensley, 1995). Achrol and Kotler (1999) argue that information technology is driving the evolution of network organizations. As networks are adapted to knowledge-rich environments, they minimize idiosyncratic investments in e.g. technology. Indeed networks are more flexible and responsive to change in this respect. The INA is described further in chapter four.

2.3.2 The transaction cost approach

Ever since Coase (1937) opened up the discussion of what a firm is and why firms exist, other researchers have followed and developed Coase's ideas further. For example, Williamsson

(1975) explain the optimal boundaries of the firm by transaction cost or administrative costs of coordinating economic activities. A transaction cost is a cost incurred in making an economic exchange (search for information, bargaining etc.). In the transaction cost approach, firms face the choice of producing in-house, buying from the market or establishing relationships with other firms, if they wish to acquire resources. Transaction cost thus refers to the cost of providing for some good or service through the market rather than having it provided from within the firm. Transaction cost theory is still considered to be one of the principal theoretical approaches in management for understanding formation of strategic alliances (Hennart 1991; Pisano & Teece 1989; Shan 1990; Rumyantseva & Tretyak, 2003). Transaction costs, in relation to partnerships and cooperation between actors, may consist of costs incurred in searching for the best supplier/partner/customer, the cost of establishing a contract, and the costs of monitoring and enforcing the implementation of the contract. The level of analysis in transaction cost theory is on the firm. When it comes to applying a transaction cost approach in this study, the theory would fail to explain the dynamics between actors, how they perceive each other and the change that is occurring in the industry as well as convergence processes. Transaction cost theory is criticized for being static in nature (Blomqvist, 2002) and thus not explaining processual and complex developments of interaction between actors. The theory furthermore does not take technological development into account. Transaction cost efficiency is regarded as the motivation for cooperation and e.g. formation of relationships to other actors. Rumyantseva & Tretyak (2003), however, point out that the opportunism and counter playing incentives stressed in the theory do not cover all motivations and there could be other reasons for a company to participate in a network.

2.3.3 The resource-based view of the firm

Drawing on Penrose (1959), the resource-based view (RBV) suggests that "the firm is best viewed as a collection of sticky and imperfectly imitable resources or capabilities that enable it to successfully compete against other firms" (Silvermann, 1999, p. 1110). The RBV can be seen as an alternative perspective on business networks, as it focuses on the internal resources a company possesses and the way a firm gains competitive advantage through using those resources (Barney, 1991). Resources may be physical (equipment, patented innovations) or intangible (brand equity, operating routines). Barney (1991, p. 101) defines a firm's resources as "all assets, capabilities, organizational processes, firm attributes, information, knowledge etc. controlled by the firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness". Barney further divides different resources into physical capital resources, human capital resources and organizational capital resources. The RBV offers an insight into how resources are applied and combined in obtaining strategic advantage. The RBV is basically a model that is based on the notion that firms are heterogeneous in their resources (Wernerfelt, 1984; Teece, Pisano & Shuen, 1997). Especially mergers and acquisitions provide an opportunity to trade resources, which otherwise are non-marketable, and to buy or sell resources in bundles. For instance, a firm can buy a combination of technological capabilities. According to the RBV, success does not come from being well-positioned in an attractive industry, but rather from having firm-specific assets and competences that are difficult to imitate, replicate or substitute (Afuah & Utterback, 1997). These include reputation, patents, trademarks, specialized production facilities etc. The emphasis of the RBV is furthermore on a firm's efficiency in deploying these firm-specific physical assets, human assets and intangible assets, in order to shape its external environment and improve its strategic position. According to the RBV framework, a firm possesses a more

favorable position than another firm due to the fact that it has better capabilities to deploy resources for a desired end result (Lee, 2005). Lee refers to these capabilities as the ability to develop new products quickly, to thoroughly understand customers' needs and/or to take advantage of new technologies more effectively.

Chetty and Patterson (2002) states that the RBV considers the environment to be external to the company, whereas for instance the INA considers the network as the key "environment" of the firm. The environment, in turn, encompasses the micro-environment (other companies in the industry) and the macro-environment (broader societal, political and economic influences) (Johnson & Scholes, 1997). Companies may exchange resources with other companies if the aim is to gain greater benefits, or value of some sort (Ring & van de Ven, 1992; Bucklin & Sengupta, 1993). Reuben and Fisher (1997) point out that companies may form relationships if they lack internal resources. The lack of internal resources signals that the company is less able to deal with environmental pressures. Thus, environmental uncertainty increases and companies form relationships with other companies "in order to augment their own resources and to increase their collective competitive advantage" (Chetty & Patterson, 2002, p. 72; see also Miles, Preece & Baetz, 1999). Companies may choose to remain independent and let relationships remain superficial, indicating that no adaptation to the other company takes place. This is seen as one extreme of a continuum where the relationships exist (Ring & van de Ven, 1994). The other extreme is when companies develop a strong relationship consisting of repeated transactions or alliance. When compared to industrial network theory there are a number of issues that make the starting points different. The RBV differs from the INA by concentrating on the actions of a single firm (Easton, 1997), which does not fit into the objectives of this research. Furthermore, the INA suggests firms as being active in continuous and evolving business networks with all the companies that make up their environment, including partners and competitors (Chettty & Patterson, 2002). The INA sees business networks as informal and unstructured with sporadic transitions into formal networks (Håkansson & Snehota, 1989; Ford, 1998). The RBV, on the other hand, sees business networks as formal and with clearly defined boundaries (Ring & van de Ven, 1994).

The RBV is useful when studying convergence in the sense that it offers a starting point for developing strategies for a converged environment. For instance, Pennings and Puranam (2001) and Stieglitz (2003) have chosen the RBV as their theoretical perspective under which to analyze convergence. The traditional sources of competitive advantage (economies of scale, product differentiation, switching costs, distribution channels, government policy etc.) have lost their importance as barriers to competition in high tech industries. Grant (1995) notes that when the external environment is in a state of transformation, the firm itself in terms of its bundle of resources and capabilities may be on a much more stable basis on which to define its own identity. Grant furthermore argues that the greater the rate of change in a company's external environment, the more it must seek to base long-term strategy upon its internal resources and capabilities than upon external market forces. Therefore, when it comes to strategy formulation the RBV is a powerful tool when companies are facing convergence in their external environment. RBV furthermore offers useful tools to study the firm and its nature but is often criticized for its static nature. Eisenhardt and Martin (2000) argue that the RBV does not specifically focus on the industry dynamics or the related necessary dynamics in firm capabilities in rapid and unpredictable change. Teece *et al.* (1997) point out that the RBV focuses on strategies for exploiting existing firm-specific resources and not so much on the continuous need to develop capabilities or seeking resources for new business areas. The

RBV views the market as a group of buyers and sellers entangled with one another. The vendors often offer value by exploiting unique capabilities.

2.3.4 Institutional theory

Institutional theory offers a way to understand the industrial firm and how it is embedded in the social and economic environment. Selznick (1957) argued that firms must satisfy both internal and external needs if they seek to survive as organizations. External needs in this context correspond to requirements from the external environment, such as (in this study) regulation and policies in the telecommunications field. Institutional systems thus influence individual organizations (or collections of organizations). Institutional theory thus claims that all organizations are dependent on their external environment. It is a perfect tool if one seeks to understand why firms behave the way they do or why they are structured in a certain way. Rumyantseva and Tretyak (2003) mention external pressure originating from sociological and cultural requirements, as well as technological demands of society. These pressures govern the management of production, accounting and other activities in the organization. Institutional theory thus offers a possibility to view business networks from an institutional perspective, e.g. structure, roles, change and how they are affected by institutions. In telecommunications the regulatory authority can be seen as an institutional actor affecting the business area for mobile operators and related actors. The regulator depicts the rules of the field and actors adjust accordingly. The borders, norms of behavior and conduct, are thus set by the regulator, and the actors are highly dependent on this institution in their conduct of business. However, the regulation in telecommunications often lags behind technological development, thus leading to little influence over actors' behavior in many cases.

Applying this theory in a business context, it is believed that institutional pressures presumably motivate firms to pursue activities which eventually will increase their legitimacy and cause them to appear to be in agreement with the prevailing rules, requirements, and norms of their business environment (Oliver 1990; Rumyantseva & Tretyak, 2003). One way firms can do this is through participation in inter-organizational relationships. Similar to the RBV, institutional theory considers "dependence" to be a core concept, but in contrast to the RBV, institutional theory does not refer to material resource or transaction dependence, but solely to a social dependence or legitimation. Social linkages, networks, formal contracts and all other tools to avoid isolation are expected to predict firm's survival (DiMaggio 1986; Baum & Oliver, 1991). Firms could only legitimate reciprocally by belonging to particular networks.

Institutional theory also supports the fact that change that occurs in the context and environment affect the actors and the actors are indeed dependent on their external environment. Many strands of institutional theory are agent free and give the impression of being environmentally deterministic (Ramström, 2005). The INA views the organization as an active agent that builds and maintains relationships with other actors in the environment. Institutional theory also seems to be an inappropriate tool in analyzing dynamics, change and relationships between actors.

2.3.5 Summary

The INA offers the presumably best tool for analyzing dynamics in business networks and the roles and positions of actors involved. The approach also allows for analyzing convergence processes as actors are seen as embedded in their environment. Thus, the context affects the actors in one way or another. Neither the RBV nor the transaction cost approach takes this into account and the context in which an actor is embedded is not seen as a major factor in the theories. Institutional theory offers an alternative to study the firm in its environment. On the other hand, the institutional theory does not see an actor as proactive but rather as passive. The INA approach also offers different levels of analysis, whereas the other approaches mainly focus on analyzing the level of the firm. It should, however, be noted that the INA is partially based on the transaction cost approach, the RBV, stakeholder theory, interorganizational theory and industrial marketing.

Proposed approach	Main idea of approach	Level of analysis	Applicability in this study
Industrial network theory	Actors are connected through each other via relationships, forming business networks	Actor Network Net	Allows for analysis of actors as embedded in their environment and change
Transaction cost approach	Deals with the costs related to producing a e.g. a good and whether to produce it in-house or through partnerships	Firm	Does not take into account dynamics between actors or change in the environment
Resource-based view	Focus is on internal resources and the way a firm gains competitive advantage through using those resources	Firm	Does not take into account dynamics between actors or change in the environment
Institutional theory	Focus is on how institutions affect the behavior of a firm	Firm Society	Does not take into account dynamics between actors or change in the environment

Table 3. Comparison of approaches to studying interaction between actors

2.4 Toward a theoretical framework based on the INA and convergence related theories

When it comes to the theoretical framework a number of assumptions guided the development. First of all, it is difficult to find one general theory on convergence that explains both its origin, its implications in specific industries and emphasizes its processual nature. Knowing that convergence processes originate in technology, I assume that technology develops regardless of the business environment and aim foremost at identifying convergence processes and understanding what the effects of convergence processes are in telecommunications and business net contexts. Technological change is partly driven by companies' innovative efforts and thus convergence processes can not be seen as purely external processes. However, convergence processes can be seen as a driver of change and firm behavior (e.g. changing roles and positions). Therefore a theoretical review of convergence related theory focusing on telecommunications and the ICT sectors is much needed in understanding the process from a theoretical perspective. It turns out, as will be further discussed in chapter three, that we do not know much about convergence in a telecommunications setting and what we do know is related to technology: little research has been conducted concerning the influence of convergence on markets and firm capabilities for coping with technological development.

Thus, when trying to understand what convergence is in telecommunications I furthermore assumed that convergence is embedded in the field and is something that constantly develops and proceeds, both internally (organizations drive convergence processes in their R&D endeavors) and externally (other organizations drive convergence processes in their R&D efforts; regulation drives convergence; standards deployment etc.). I can, thus, not focus on a single or several perspectives from which I would analyze convergence, unless my aim is to understand the technological process of convergence. The purpose is rather to understand convergence processes in a business context and the role of these processes in business net dynamics, not how technology develops and emerges. I have chosen to theoretically review literature on convergence related to the ICT and telecommunications sectors in order to form a pre-understanding of the processual phenomenon. This review will be compared with empirical data on perceptions of convergence processes in mobile communications and which critical events have formed convergence from a business perspective. It is a rather inductive approach, but there is always a link between convergence processes and change, which furthermore supports choosing INA as the main theoretical framework.

The INA has been chosen because it is able to stress "the underlying technological interdependencies, linking changes in the network governance structure to changes in the technological, activity and resource structures and interdependencies" (Andersson & Mölleryd, 1997, p. 456). Before the actual liberalization of the telecommunications market had reached its end, the telecommunications industry was undergoing transformation from being a supply dominated industry to a demand driven industry. If we seek to understand the change in business networks and how convergence processes occur, we need to understand the structure in which these companies, or actors, are embedded. A network approach enables a thorough analysis of how companies have reacted to convergence processes and whether (and how) they are (or have been) able to exploit convergence processes in forming/acting in/repositioning themselves in business nets. A network approach also enables the analysis of which major network consequences have emerged out of convergence processes. An organization exists and performs in a context rather than in an environment (Håkansson & Snehota, 1989) and therefore combining network theory and convergence related theory will provide an extensive theoretical background in analyzing changes in the telecommunications sector as well as business networks within the sector. The levels of analysis are thus (1) industry (macro), (2) business network/net (meso) and (3) actor (micro). When market uncertainty increases, firms tend to interact more and an increased reliance on external partners who are known and trusted as reliable occurs (Lorenzoni & Lipparini, 1999). As Easton (1992, p. 11) puts it, "where any form of relationships may be held to exist among firms in an industrial system a network approach will be appropriate".

The study furthermore takes an approach of convergence as "embedded" in the context of the telecommunications sector. Embeddedness indicates being an integral part of a surrounding whole, and thus, for instance, business networks cannot be analyze in a telecommunications setting without reference to the context and its converged nature. Business networks being embedded in their business contexts has been acknowledged by e.g. Granovetter (1985), Törnroos (1997), Halinen and Törnroos (1998), Welch and Wilkinson (2002) as well as Brass, Galaskiewicz, Greve and Tsai (2004). For instance, Halinen and Törnroos (1998) argue that in order to understand the evolution of business markets, it is of importance to consider the embeddedness of specific business actors in different business networks. Types of embeddedness suggested are (1) temporal embeddedness drawing on the concept of time and

the actors' interaction in the past, present and future time), (2) spatial embeddedness, which draws on the concept of geography, indicating that an actor may be internationally, nationally, regionally, locally embedded in various business networks, (3) social embeddedness indicating the importance of personal networks, (4) political embeddedness, (5) market embeddedness, indicating the importance of e.g. the industry structure and context, and finally (6) technological embeddedness. Granovetter (1985) argues that actors behave and decide in a context of embedded ongoing systems of social relations. Given the assumption that convergence processes lie in the context and environment of mobile communications, the interplay between contextual processes and the actors comes in focus. Change that occurs in the context and environment affect the actors, as they are dependent on their external environment. Pettigrew (1990, 1992) also points out that in order to understand any processual phenomenon the contextual setting has to be taken into account. Institutional theory also supports this notion. However, the INA views the organization as an active agent that builds and maintains relationships with other actors in the environment. The INA also offers useful concepts and tools in analyzing change in market composition, which institutional theory does not. The interaction between actors in converged environments is not so much affected by institutions such as regulation, as the rules of conduct are well known and regulation often lags behind technology development. The INA as a theory is socially constructed and is therefore well suited from a sense-making perspective (cf. Weick, 1975), where actors collectively make sense out of their environment based on past and present experience as well as perceptions of the future. Thus, combining research on convergence with the INA seems appropriate as it allows the researcher to understand dynamics in business nets through analyzing roles and positions of actors embedded in their context. Furthermore, from an ontological point of view, the theoretical framework is appropriate in the sense that convergence is seen as a socially constructed reality and the INA assumes that business networks is a way of organizing activities and actors; thus also indicating that the INA studies socially constructed realities rather than exterior realities that exist regardless of the actors. Convergence processes are therefore included in the analysis as part of the context and environment where the actors are embedded. The theoretical framework thus constitutes industrial network theory, with special focus on the evolution of role and position within business nets and dynamics. Convergence processes are considered to be a part of the actors' context and motivation behind acting in networks, forming relationships, seeking change in nets, roles and positions etc. Figure 4 summarizes the approach for the study's theoretical framework.

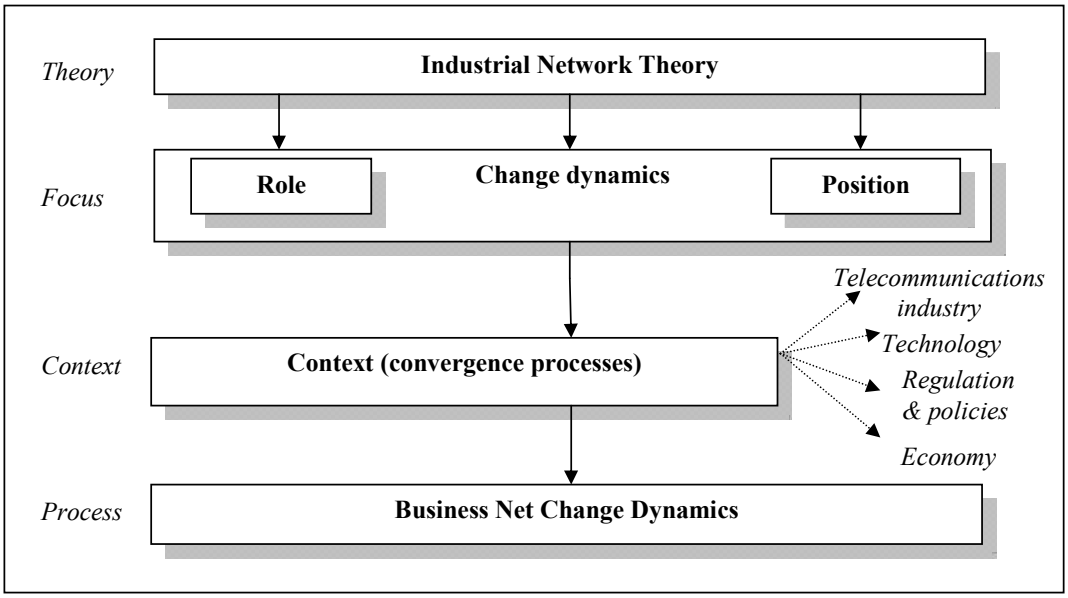

Figure 4. Main elements of theoretical framework

3. CONVERGENCE PROCESSES: SOME THEORETICAL CONSIDERATIONS

The restructuring that is occurring in the telecommunications industry is a response to both technological and regulatory upheaval (cf. Hertzel, Kiholm Smith & Smith, 2001). This field of industry has been the target for several interesting studies and research (cf. Lundgren, 1995; Mölleryd, 1999; Juntunen, 2005; Huurros, 2007) because of the challenges it poses: regulation and policies are constantly in need of updates, actors on the market change positions and roles in search for the next innovative products and services. Very often the effects of change are the centre for research. Sometimes the cause, the factor behind the change, is addressed, but very few concrete tools to handle, manage or even understand convergence theory have been offered so far. A reason for this could be the often perceived abstract nature of the concept. Lind (2004) notes that almost no academic articles have tried to define convergence and relate it to a theoretical framework. Often, the cause is identified, the process described shortly and focus lies more or less on explaining the results, the change and how to manage it in various technological contexts. Also, implications for actors in their internal and external business environment are rarely touched upon in depth. Empirical studies from an implications perspective are furthermore scarce. A few researchers recognize this fact, for instance, Steinmueller (2000), who would like to see questions answered about how convergence is influencing our lives and industry, the directions of convergence, and also how rapidly convergence is gaining in influence, i.e. the rate of convergence. So far researchers seem to agree that the concept of convergence is more often the object of hype than a clear analytical category, but this research suggests otherwise. Convergence can indeed be used as an analytical tool e.g. in studying industry and institutional change. Therefore, this chapter focuses on convergence related research, summarizes what we know (or assume in many cases) about the concept and proposes a model for studying the process of convergence. Convergence is considered one of the driving forces behind the change occurring in the telecommunications industry structure and business environment. The process of convergence is, however, not limited to any particular industry, even though I here explore convergence from a telecommunications perspective. The challenges in convergence theory lie in the definition and classification of convergence as well as in the task of linking the process view of convergence together with telecommunications business networks. Therefore, this chapter is primarily based on an extensive literature review and analysis of previous research in several different fields – from telecommunications, computing, business and innovation management to social and interdisciplinary sciences. One aim of this chapter is to place the process of convergence into the setting of telecommunications and to offer a definition and analysis of the concept, which can be applied to the sector in question. The following section aims at presenting the trajectories of convergence in previous research.

3.1 The concept of convergence

Convergence is not a single concept. In academic literature, there is no generic or commonly accepted definition of convergence. There are several good attempts at it (see e.g. Lind, 2004; Stieglitz, 2004; Bally, 2005), but most definitions fail to meet all the dimensions and levels, which can be identified in the notion of convergence. According to Fransman (2000), convergence has in some cases been an attempt to explain the radical changes that have occurred in the early 1990s, especially in the information, communication and entertainment

areas. The definition of convergence was an idealization necessary to explain the implications of market developments opened by technological opportunity during the past two decades (Steinmueller, 2000). A clear structure and classification of the different aspects of convergence is clearly required, in order to address the right process with the right concepts. For instance, industry convergence is a separate process from technology convergence, even though it is clear that both processes are related to each other. Articles written on the topic of convergence use the term without a systematic reflection about the definition they used, which is acknowledged also by Lind (2004). A few exceptions exist; for instance Pennings and Puranam (2001), Stieglitz (2003) and Greenstein and Khanna (1997) do reflect upon the definition of convergence. Most articles on the topic have taken an industry perspective and thus contribute to the misleading definition of convergence, indicating that industry convergence is equal to technical or technological convergence.

Ever since Rosenberg (1963) used the concept of *technologically convergent* technologies in his article covering the U.S. machine tool industry, several scholars have adopted the concept in their research and tried to show the importance (or the non-importance) of convergence in various industries. The concept of convergence has been actively used in the telecommunications, the computing, the broadcasting industry and various other industries since the early 1970s. In 1978 Nicholas Negroponte used three overlapping circles named the technologies of computing, printing and broadcasting. The area where these three circles overlapped each other was characterized by most rapid growth and innovation. Even though Negroponte ignored, or was unaware of the potential of the telecommunications sector, he was still among the early researcher to point out the effects of convergence on different industries (Brand, 1987). Some years earlier (1971), Anthony Oettinger had presented a rather strange term “compunications” to express the growing overlap of computing and telecommunications. Nora and Minc (1980) came up with the term “telematique” for the same process or idea. Neither of these concepts gained widespread popularity, but they surely were among the first attempts to describe the process of convergence which could be observed already in the 1970s. Another concept, which is closely related to the concept of convergence, is *digital convergence*. Digital convergence is often used in the same meaning as technological convergence or convergence in general. Mueller (1999) defines convergence as the digital takeover of communication and information, but bases his research on digital media and the effects convergence has on different media forms. One should, however, be careful in defining convergence as a process of digitization, since digitization means different things and has different outcomes for different industries. In media, convergence is defined as communications channels merging together either from a content, economic or technical perspective (cf. Eronen, 2004). This definition of media convergence implies a more technical and concrete view behind the convergence process.

During recent years, the concept has been labeled everything from a buzzword (OECD, 1992; Lind, 2004) to one of the driving forces behind technological change (Katz, 1996). However, one of the major challenges concerning the concept is that is has been used in so many contexts and settings that the concept of *convergence* has close to lost its meaning. This has given rise to the abandonment of the whole phenomenon and the labeling of buzzword over it. For example, Steinmueller (2000) and Stieglitz (2003) have emphasized the importance of a clear definition of convergence, whereas other scholars use the concept of convergence however it pleases them and fits into their purpose. Tarjanne (2000), on the contrary, would

like to see less concern about finding a generic definition of convergence and more focus on user needs implied by convergence.

3.1.1 Does a generic definition of convergence exist?

We cannot escape the fact that convergence means different things to different people. The Concise Oxford English Dictionary defines the word *convergence* as "come together from different directions so as eventually to meet". The Merriam-Webster dictionary defines convergence as "the unification of functions" or the movement towards the same point or the meeting of two or more elements. Similarly, the Longman Dictionary of Contemporary English defines *to converge* as to come together towards a common point. The Collins English Dictionary offers definitions of the concepts of *converge*, *convergence* and *convergent*. To converge means "to move or cause a move towards the same point". Convergence thus indicates moving towards or meeting at some common point or tending towards the same result, i.e. merging. Convergence as a noun, on the other hand, has an interesting definition, namely "the combining of different forms of electronic technology, such as data processing and word processing converging into information processing". The latter definition of convergence immediately poses some questions, as the definition implies a technological notion behind the concept. The important part is "the combining of different forms of electronic technology", which implies a level of technological convergence in the convergence notion. Bohlin (2000) points out that in literature, primarily what is being conceived as merged relates to technology, i.e. the integration of communications, broadcasting, telecommunications and computers, but in a secondary sense a number of other areas come into play. These areas are services, markets, related actor configurations (industry alliances and mergers), policy and regulation. Therefore it is difficult, if not even impossible, to consider convergence processes as purely technical or technological.

The seemingly most quoted source for a definition of convergence comes from the Green Paper on Convergence issued by the European Commission (EC) in 1997. The whole report is based on telecommunications, media and information technology increasingly using the same technologies. It is strongly pointed out that convergence is not just about technology, but also about services and new ways of doing business and interacting with society. The EC (p. 1) defines convergence as

> "*the ability of different network platforms to carry essentially similar kinds of services or the coming together of consumer devices such as the telephone, television and personal computer*"

Several other scholars deploy this definition, e.g. Paija (2001). Convergence occurs at different stages, namely (1) technology and network platforms, (2) industry alliances and mergers, (3) services and markets and finally, (4) policy and regulation. The definition of convergence thus implies several different dimensions to the concept. Convergence can be addressed as industry convergence, or as service convergence, network convergence, infrastructure convergence and so forth. The OECD (1992) presents two definitions of convergence, i.e. "the growing overlaps between the technologies, services and firms active in each sector" (p. 93) and "the blurring of technical and regulatory boundaries between sectors of the economy" (p. 13).

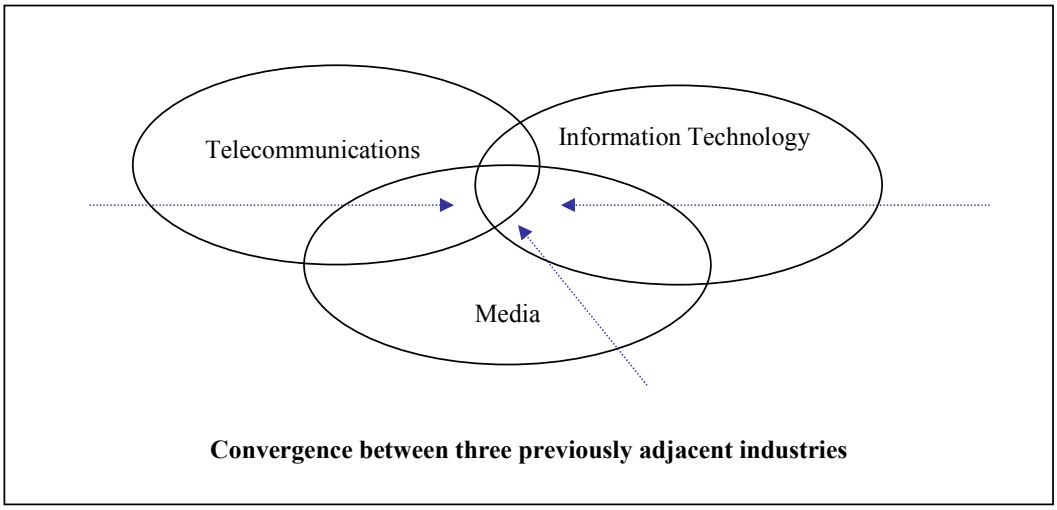

Figure 5. Traditional illustration of ICT convergence

The most popular definition of convergence is presented as a figure, where several different areas (blobs) move towards each other (indicates the process of convergence) and finally these blobs create one single, unified market, sector, industry or simply, one complete entity (see figure 5). Many of the definitions of convergence are based on this idea of areas coming together and boundaries between industrial sectors blurring. There are as many different models on which areas are merging together as there are studies done on the topic. Duysters and Hagedoorn (1998) predict convergence of telecommunications and computer industries to lead to a single information and entertainment industry. Fransman (2000, p. 39) defines convergence as "the blurring of borders between telecoms, computing and media". Adner and Levinthal (2000) define convergence from a technological perspective as the unification of formerly distinct technologies into a common application domain, which one of the antecedent technologies is applied. In the latter definition we are already applying convergence on technologies, which forms technical or technological convergence. Yoffie (1996) also defines convergence as the coming together of previously distinct products which employ *digital technologies* and that way Yoffie positions himself at the product level, possibly indicating that convergence is a technical fusion, or possible equals digitization. Mueller (1999) also offers an alternative point of view for convergence by stating that it is misleading to define convergence as the coming together of different technologies or industries. Mueller, as already mentioned, assumes that convergence is in reality a takeover of all forms of media by one technology, that being digital computers.

Borés *et al.* (2003, p. 1) define technological convergence as "a process by which the telecommunications, broadcasting, information technologies and entertainment sectors (collectively known as ICT – Information and Communications Technologies) may be converging towards a unified market". This is one example of a study that defines technological convergence as industry convergence drawing on blurred boundaries leading to a unified market. Steinmueller (2000) suggests that convergence is a technological development that has become a principal "focusing" mechanism for the engineering development of modern telecommunications and for market restructuring aimed at hastening

the pace of technological advance. Steinmueller continues that convergence is more than a matter of telecommunications engineering and the restructuring of information and communication technology industries. Convergence is a process, which challenges the "pre-existing boundaries between all of the industries whose performance has historically or may have the potential to become intimately linked to communication" (p. 384). In clear words, convergence has the ability to influence not only the information and communication technology industries, but also all industries in which information is or can be a key component.

In the media sector, convergence is defined similarly, but kind of with a twist. For instance, Herkman (2002) proposes two functions for convergence in media. (1) It describes the changes occurring in media production. These changes are related to e.g. convergence caused by digitization. (2) Another way to use the convergence concept is as a political-economic concept, by which an organization's management decides in favor of large organizational changes and technical investments.

Author	Common characteristics	Level
Collins English Dictionary OECD (1992) EC (1997) Adner & Levinthal (2000) Shepard (2000)	Combining of technologies and consumer devices, blurring of technical boundaries, shift toward IP-Technology	Technology
Yoffie (1996) Mueller (1999) Herkman (2002) Eronen (2004)	Digital convergence, digitization, media industry specific	Technology/ digitization
Fransman (2000) Steinmueller (2000) Borés, Saurina & Torres (2003)	Blurring of industry and market borders between telecoms, IT and media	Industry

Table 4. Overview of definitions of convergence

The above mentioned definitions already show the complexity in finding one generic definition of convergence or classifying it in a general way (see table 4). One predicts that market areas merge together, whereas others predict that technologies increasingly will be integrated with each other. On one side, technology cannot be separated from the market and thus it forms an important part of convergence. On the other side, if convergence is defined as the coming together of markets and industries only, the notion of technology and technological change as a driver for convergence is left unexplored. This might give a distorted view of convergence. If the driving forces and their characteristics are left unexplored, the process of convergence itself, the implications for the business environment and individual organizations, will be more difficult to understand. It is in this sense important to define convergence for telecommunications in a coherent way in order to enable analysis of the telecommunications industry and its context. Conceptualizing convergence also allows for analysis of change processes, e.g. in business nets. Implications of change processes in telecommunications can be made visible provided that the concept of convergence is commonly understood. In the next sections the drivers as well as typologies of convergence processes will be described before a final critical review of previous research on convergence.

3.2 Key drivers of convergence processes

According to Lei (2000), convergence occurs when advances or innovations commercialized in one industry begin to significantly influence or change the nature of product development, competition, and value-creating processes in other industries. This also indicates industry convergence as *the* convergence process. It is necessary to lead a discussion on the distinction between technological and industry convergence and systematically distinguish them. Convergence of technology may trigger a process of industry convergence in telecommunications. Gambardella and Torrisi (1998) argue that the forces driving technological convergence may not be the same as the forces driving the convergence of industries or product markets. Wirtz (2001), with focus on the media and communication markets, suggests drivers specifically for *industry* convergence. Firstly, the organization's role in driving convergence processes is discussed. Is it possible that organizations drive convergence processes? Secondly, *technological drivers* are identified and encompass (1) digitization, (2) development of intelligent network structures and (3) technical convergence of media platforms. Thirdly, *deregulation* acts as a major driving factor of convergence of industries. Fourthly, *demand-related drivers*, i.e. changes in user preferences, are identified as (1) personalization of customer relations and (2) systematic solutions. The technological drivers are initiated by innovative companies and the demand-related drivers are initiated by new and innovative products. The roots for deregulation is said to be found in the demand for more opportunities from different industries. In the following section the driving forces of convergence processes are identified and divided into three main forces, the organization as a driver as well as technological and socio-economic drivers of convergence. The distinction is made based on the fact that the latter two dimensions are by far the most used terms when describing convergence related issues. The organization as a driver of convergence has so far been sparsely discussed in literature. Kaluza, Blecker and Bischof (1999), on the other hand point out that there is no consent on the major driving forces behind convergence. Therefore, the presentation of drivers is entirely based on mapping existing theories and extracting ideas on drivers of convergence.

3.2.1 An organization as a driver of convergence processes

Andergassen, Nardini and Ricottilli (2003) view the reason for technological convergence as the searching for technological opportunities in other economic sectors. They explain that as technical change is actively sought by firms and organizations a creative destruction takes place and enables a process of primarily technological convergence to occur. The searching efforts performed by companies and the spending and spilling over of information by the same companies, *triggers the process*. The spreading of information through cognitive neighborhoods allows firms to gradually acquire full knowledge, which eventually leads to innovation waves. Technological change implies creative destruction, which is described as "a process through which innovations are embodied into new capital goods and principles of production render existing plant obsolete and thus drive the economy towards a wave of scrapping and replacement" (Andergassen et al., 2003, p. 2). In other words, the authors suggest that *innovation* generates a process of technological convergence. It is notable that the authors refer to a specific type of convergence process, namely that of technology. Also, they explicitly mention "other economic sector" as the target for the search of technological opportunities, which indirectly indicates that organizations cross over industry borders when seeking market opportunities. Gong and Srinagesh (1996) argue that the trend of convergence

is driven by technological advances and changes in the political and regulatory setting and does not, for instance, view organizations as the active parties. Andergassen *et al.* (2003) seem to view organizations as active parties, creating convergence through their actions and reactions. Thus, they trigger the process of technological convergence. On the other hand, the authors do not take a stance concerning other types of convergence processes and whether and when they are triggered during the same actions and reactions by actors. Similarly, Duysters and Hagedoorn (1998) do not view firms as being rapid and flexible adapters to change. Inertia may prevent organizations from quickly reacting to change and thus transforming strategies and structures according to new demands of the environment. Organizations most often act according to "routines" (Nelson & Winter, 1982), which (similarly to human genes) determine a firm's behavior. Nelson and Winter (1982) argue that future behavior is based on current characteristics, which then reduces its speed of adoption. However, Duysters and Hagedoorn (1998) point out that there is no reason to view organizations as unable to change. Lant and Mezias (1992) mention that change mechanisms are mainly triggered if the performance of an organization is well below its aspiration level. Firms with a successful past are often more resistant towards change than other firms.

Another issue where organizations have the opportunity to affect convergence processes is related to cooperative agreements, partnerships and alliances. So far no research has been able to verify whether strategic cooperation is used to deal with patterns of convergence and whether cooperation promotes convergence processes. Attempts at this have been made by, for instance, Andersson and Mölleryd (1997), Duysters and Hagedoorn (1998), Athreye and Keeble (2000), Bower (2001), Fai and von Tunzelmann (2001), as well as Borés *et al.* (2003).

3.2.2 Technological divers

In most cases convergence is used as an explanatory factor for a certain activity or effect taking place in a certain setting. Rosenberg (1963) derived the concept out of showing that there exists a process by which different industries come to share similar technologies. The nature and the usage of the final product show that the different industries became very closely related, or technologically convergent. Product markets, which previously were unrelated from a market perspective, became closely related from a technological perspective. Firearms, sewing machines and bicycles in the 19th century are examples of such industries. Therefore, technology is the common ground on which convergence can be based according to Rosenberg, and he also implies that without the process of technological convergence, some firms would never have been established. The consequences of technological convergence were in the Rosenberg study the development of new techniques and their diffusion, once developed. What should be highlighted in Rosenberg's study is the fact that he started his study through the observation of industry convergence and traced the source of the integration of industries to technology. Therefore, the definition of convergence proposed by Rosenberg inevitably takes a stand point, in which technology and industry convergence is one and the same. Borés *et al.* (2003) see a confluence of technological and economic factors behind technological convergence. The evolution of communications and information technologies are listed as key factors on the technological side. The economic side shows the very important factor of liberalization as the key factor. The definition derived out of this is thus "any type of terminal can access any type of data, which in turn is able to be transmitted through any kind of pipe" (ibid, p. 2). The main catalyst of this process is therefore the Internet, which is here regarded as one of the driving (technological) factors of convergence

processes. This definition is what seems again, somewhat technically oriented. However, in the same article the author speaks about alliances and co-operation as means to stay in the market place.

The technological drivers identified in secondary sources are (1) technological change and digitization as well as (2) the Internet and transition to IP technology, which are studied in detail next.

Technological change and digitization

Technological change has been identified as the main driving force of convergence (OECD 1992; Katz, 1996). Technological change often occurs through periods of technological convergence, according to Athreye and Keeble (2000), who then reverse the order, i.e. convergence causes technological change rather than the other way around which is prevailing in convergence related research. Katz (1996), on the other hand, argues that there is a danger in over-emphasizing the role of technology. Katz states that while technological change is important, other important forces of change result from a shift in policy makers' attitudes toward competition in telecommunications markets. Shepard (2000) also argues for the fact that although technology is an important part of convergence, it is only a piece of the process. In telecommunications, especially when it comes to end-users, they do not want to buy technology but rather the services that telecommunications enable. Technology, thus, becomes nothing more than a mere enabler or facilitator. Technological change can furthermore create considerable uncertainty for managers of companies (Hertzel et al., 2001). The uncertainty can be based on, for instance, unpredictability of regulatory responses to new technology. Gong and Srinagesh (1996) furthermore argue that technological advances are blurring industry boundaries and also enabling competition between firms which did not previously compete with one another.

From the supply-side, convergence is enhanced by the discovery of new technologies, which map into needs already being satisfied by existing technologies. Teece (1996), talks about "technology bundling" or "fusion", which according to Pennings and Puranam (2001) can be viewed as the preceding archetype of convergence. Fusion involves recombination of existing technologies in new and innovative configurations. Examples include the coming together of various technologies, such as optics and electronics. Firms should be able to see possible opportunities when bundling various technologies.

Digitization, on the other hand, was detected in telecommunications in the late 1950s and early 1960s when the pulse code modulation (PCM) techniques were developed and applied to transmission and later on, to switching (OECD, 1992). Rockenhäuser (1999), Ono (2000) as well as Borés *et al.* (2003) point out that the possibility of digitizing all type of signals has given rise to technological convergence. Bohlin (2000) points out that a prerequisite for convergence in communications is digitization, and Noam (2000) argues that digital convergence may lead to trade wars. Instead of leading to harmony and harmonization, digital convergence may create disruption. The process of digitization as driving convergence processes has specifically been put forward by the OECD (1992), who considers convergence taking place through three main *processes*, namely *technical*, *functional* and *corporate* convergence. Technical convergence is based on the ability to digitize information. Once the digital information flow is made possible between the communications media and terminal equipment of each industry, it would no longer be relevant to treat them as separate sectors.

Convergence is according to the OECD evident in corporate strategies as the activities of individual firms overlap each other. Convergence may in this case mean cross-ownership of facilities from different fields by the same company or cross-provision of services by the same company.

The Internet and IP technology

The EC (1997) expresses the underlying trends for convergence in (1) digital technologies, (2) network technologies and (3) Internet technology, saying that market developments and new technology applied in business and various technological platforms could provide a basis for convergence to develop. The Internet is a symbolic and prime driver of convergence (cf. EC, 1997, Borés et al., 2003). Fransman (2000) argues that the evolution of the Internet has been facilitated by processes of technical convergence, as much as the Internet has been the cause of further convergence. Similarly, Tarjanne (2000, p. 40) views the Internet as the key driver of convergence as it is "a major manifestation of technologies coming together; a new medium that stretches across borders". The Internet provides clear evidence that convergence is indeed happening. According to Kavassalis and Lehr (2000), the Internet Protocol (IP) technology, which supports the Internet, is fundamentally different from other communications infrastructure technologies; applications can utilize multiple media, or media can support multiple applications. The Internet permits the decoupling of application and infrastructure development. This in turn supports the emergence of new types of intermediate goods markets and new types of facilities and service providers. The Internet functions as a platform independent of the traditional telecommunications, broadcasting and cable platforms (Ono, 2000).

3.2.3 Socio-economic drivers

Pennings and Puranam (2001) point out socio-economic developments towards global diffusion of transportation, telecommunication, foreign direct investment (FDI) and foreign trade to have contributed to the convergence process. Furthermore, deregulation offers an explanation to the increase in convergence during the past decades. Hacklin and Marxt (2003) identify competition, liberalization, deregulation and globalization as the main driving forces behind *technological* convergence, which is responsible for reshaping entire markets (Achrol & Kotler, 1999). Yoffie (1997), suggests that the trend towards convergence is determined by (1) semiconductor, software, and digital communications technologies, (2) governmental deregulation and finally, (3) managerial creativity. The driving forces behind convergence as Yoffie puts it imply that a convergence process on the technology/technical level is initiated by such forces. This would mean that the environment would first need to show characteristics of favorable regulation in order for convergence to occur on a technical level. Many scholars consider convergence processes to be initiated by technological advancements, rather than the other way around (e.g. OECD, 1992; Katz, 1996). The socio-economic drivers identified in convergence related literature are (1) liberalization, (2) regulation and (3) globalization.

Liberalization

Before liberalization telecommunications was considered a so-called natural monopoly all over the world. It was generally considered that more than one provider on the market would increase the costs per unit for a service and therefore also the prices. It was the role of the authorities to regulate the natural monopoly in such a way that prices were held close to cost per unit. The goal of regulation was thus to benefit consumers or end-users (Tavaila, 1989).

During the 1970s the belief in natural monopolies started to crumble in the U.S, first on the equipment market, then data communications and long distance calls. The most famous example is American telephone and Telegraph (ATT) which aggressively defended its position in long distance calls and was sued based on anti trust legislation and later on broken up into separate companies (baby Bells). In 1984 British Telecom (BT) in Great Britain was privatized when 51% of BT's stocks were sold. Yanovsky (2002) as well as Borés *et al.* (2003) consider liberalization the key driver of convergence. Liberalization has a great influence on world telecommunications and represents the weakening of total rejection of state control over all types of economic activities and commercial parameters. The origins of liberalization were traced to the sixteenth century, when European rulers realized that a government-owned postal monopoly could be a cash cow (Noam, 1989). When the telegraph and the telephone were invented, several governments aimed at bringing these new forms of communications infrastructure under the cash cow umbrella. This resulted in the creation of the government-owned Postal, Telegraph and Telephone (PTT) monopolies. Noam points out that the monopoly was profitably fed by a domestic equipment industry, which was overseen by government bureaucrats. This resulted in the formation of the "postal-industry complex", which then started to fall apart due to liberalization forces. Noam (1987) has listed a dozen reasons for liberalization. The cases for the erosion of the postal-industrial complex are (1) the growth in the service economy, which resulted in an explosive growth in telecom demand and the creation of telecom expertise at the firm level, (2) reduction of the centralized network's economies of scale and scope, (3) users' demand for a wide range of differentiated products instead of the PTT's limited offering of standardized products, (4) new niche users with specialized needs, such as travel agents and airlines, (5) increasing control of the network by the user at his premises, (6) new technologies, (7) internationalization of transactions and the reduction of transmission costs, (8) merging of technologies, especially computing and telecommunications technologies, (9) government programs restricting the PTT's monopolizing practices, (10) the emergence of value-added services, (11) saturation of basic service and finally, (12) emerging wedge between postal and telecommunications services.

Rockenhäuser (1999) defines liberalization as the dismantling of national defaults, which impair the action space of supplier and buyers in a given market. Such defaults can be, for instance, regulation concerning market entry, price and production. The full liberalization of the European telecommunications market was established 1st January 1998. The U.S. introduced a similar "Telecommunications Act" already in 1996 in order to deregulate the markets. For the first time, end-users could freely choose their provider of fixed telecommunications services. The liberalization process sparked the convergence process especially in telecommunications and enabled existing service providers in what today are separate markets to cross over into one another's industries. The policy of promoting competition has the ability to also promote convergence.

Regulation

The role of a regulatory authority is to monitor, enforce and reform regulation. The role also includes promoting the development of the information society and ensuring effective and secure communication connections and services (FICORA). However, e.g. Schenker (1997) points out that the old rules do not work anymore and instead of trying to make existing legislation fit to new services, a better solution would be to initiate reforms. Regulatory change is a significant factor in the current moves toward convergence. In many countries regulatory constraints have for a long time slowed convergence, if not blocked it outright.

According to Katz (1996), telecommunications companies had the technological and business capabilities to enter for example cable television for years, but the regulatory framework prohibited them from crossing over industry boundaries. Such issues may have delayed the convergence processes in many sectors, e.g. between computing and communications.

Also, Blackman (1998) addressed the question of how regulation should adapt to convergence and suggested that market failure is a possible threat unless regulation adapts. The EC (1997, p. 2) points out that "there can be no automatic assumption that convergence in technologies, industries, services or markets will necessarily lead to a need for a uniform regulatory environment". However, García-Murillo (2005) argues based on case analysis that, for instance, the UK has moved towards a converged regulator and laws in order to eliminate absolute rules which hamper investments and slow competition in the ICT sector. Lately, similar arguments have been raised also by Richards *et al.* (2006), who pose the question whether a converged regulator is the best solution.

Globalization

A related theme in the discussion of the implications of convergence processes has been the impact of this force on the process of globalization. One can also view globalization as a key driver of convergence (Theilen, 1994), meaning that different forms of activities previously carried out at local or regional levels, are increasingly being carried out at a continental and world scale. One of the main evidence of globalization is the decreasing (almost close to irrelevant) role of national borders when communication services are provided. However, one of the motive forces for globalization is technological progress (Yanovsky, 2002).

3.2.4 Forces restricting convergence processes

Barriers of technological convergence (EC, 1997) encompass (1) access restrictions (to users, to network and to content), (2) high prices in telecommunications services and (3) market fragmentation within the European Union (EU). Other potential barriers are (4) market entry and licensing restrictions, (5) frequency spectrum allocation, (6) the existence of multiple regulatory bodies and (7) varying approaches in countries in achieving the public interest objectives (Clements, 1998). Duysters and Hagedoorn (1998) investigated convergence and came to the conclusion that one factor behind the relatively low degree of convergence may be inertia. The authors strongly argue for the notion of both external and internal inertia, which forces reduces the ability of firms to deal with changes in their technological cores. Convergence processes within firms are said to have little or no effect on the core competencies of major IT companies (von Tunzelmann, 1988). However, this research was conducted during the early 1980s and might therefore not give an accurate picture of the situation today.

Technology-focused studies taking a convergence approach do not generally mention organizational structure or the unwillingness of organizations to adapt to change as alternative reasons for resisting convergence. Adapting to convergence may also be impossible with a firm's current organizational structure, such as for instance, having different departments for mobile, fixed and Internet services, which may make the offerings of fixed-mobile convergence (FMC) services slow, inefficient and perhaps impossible. A good example is mobile operator Elisa, which has consolidated its organization in such a way that it allows cooperation between various previously separate departments such as mobile, fixed and

Internet with the aim of providing complete and converged solutions mainly to corporate customers.

3.2.5 Summarizing the drivers of convergence processes

Convergence is a process which is started from the combination of several forces. Firstly, technological developments drive the convergence process forward, but without the liberalization of telecommunications markets and changes in regulatory policies these technological developments would not have been able to affect the markets the way they have today, and especially with a rapid pace. On the other hand, liberalization would not have led to the market settings we have today unless it was for the technological developments that have occurred during the past few decades. The interplay between technological and socio-economic developments must not be forgotten. Innovative companies ride on the waves of convergence and find new opportunities in new and unfamiliar markets. But one can assume that because the companies have the same technological bases they are able to compete and develop their competencies relatively quickly. All driving forces invite to a discussion about which came first, the chicken or the egg, or in this case convergence or e.g. liberalization. It is the opinion of a number of researchers (Katz, 1996; Gambardella & Torrisi, 1998; Borés et al., 2003) that the driving forces indeed are forces that put convergence processes in motion (see figure 6). This occurs, according to my own perception, inside companies as well as outside them (by competitors, change in end-user preferences, liberalization, deregulation, and the emergence of the Internet). Everything is not in the hands of organizations even though organizations mostly are seen as active parties. Andergassen *et al.* (2003) argue that technological change is actively sought by firms and organizations, which makes the process of change partly endogenous and a consequence of economic activity itself.

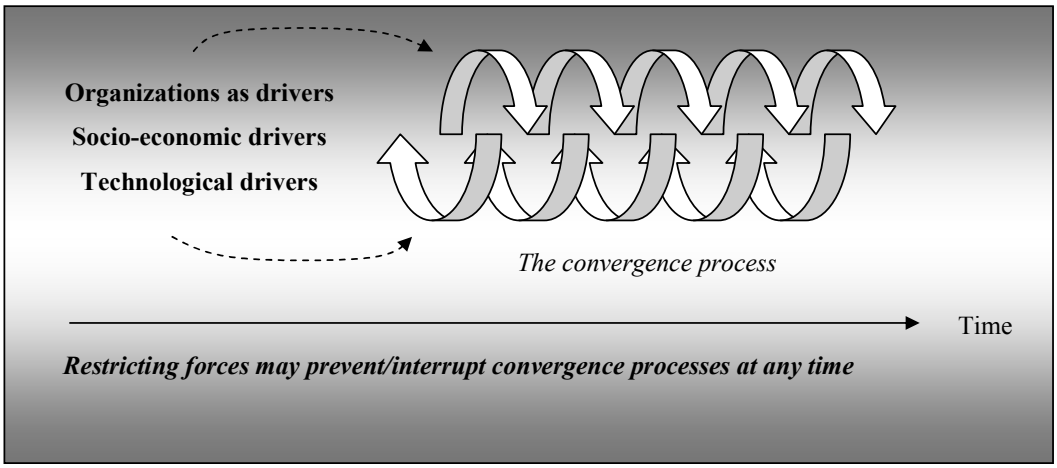

Figure 6. Driving forces of convergence processes

Technological change is a major factor which affects the environment as well as individual companies, as most technologies enable a company to enhance internal processes and communicate more efficiently. Digitization has the same effect, as data can be digitized and distributed to almost any type of terminal regardless of place and time. The Internet is a good

example of a convergent technology, which has opened up entirely new doors hiding new opportunities for both companies as well as end-users. Among economical factors that can be derived out of digitization is the reduction of costs. Rockenhäuser (1999) points out that technological development in microprocessor and communications technologies decrease costs, which eventually will open up doors for new entrants into a given market. This leads to new opportunities for all players involved with digitized products and services. On the other hand, no lunch is for free and the opening up of markets leads to a fierce competition among players. Here companies may rely on managerial creativity in order to survive on the market and compete efficiently with new entrants as well as established competitors. Globalization in turn leads to the fact that competition is done all around the world, not only locally. Regulation is furthermore one of the key drivers of the convergence process. For example, liberalization falls under this category and is closely linked to convergence of any type.

3.3 Classifying convergence

One of the clear and easy to understand typologies of convergence was developed by Fransman (2000). Fransman refers to convergence *processes* and presents five different areas. These are convergence of (1) (infrastructure) networks, (2) industries/markets, (3) products/services, (4) firms and (5) technologies. On an infrastructure network level, convergence refers to the process of increasing interconnection and interoperability between infrastructure networks. For instance, the Public Switched Telephony networks (PSTN), Integrated Services Digital Network (ISDN) or mobile networks connect data networks with each other (the Internet). As the firms are offering similar services to the same customers, convergence occurs between some industries and markets, which are coming together instead of being separated. An example of industry and market convergence is Internet voice telephony (VoIP), access to the Internet via cable TV, mobile devices etc. Products are converging in some cases as they offer functionalities that prior were characteristic of separate products sold in separate markets by separate companies. Fransman mentions television via personal computers (PCTV, also known as IPTV) as an example, as PCs are able to receive and display television signals and images. At the level of the firm, convergence occurs as firms position themselves to take advantage of new market opportunities or tries to guard against new threats through mergers, acquisitions, joint ventures and other strategic alliances. The final example of a convergence process is that of technologies. Fransman distinguishes between three cases. The first case encompasses technologies, which themselves are converging. The second case is where “supra” technologies are developed which serve the function of integrating other technologies which remain different. In the third case the convergence of technologies is not the important part. Rather, the increasing competition between technologies that results from convergence at other levels is more of importance in this case. Table 5 shows types of convergence which can be applied at different levels and in different situations.

Convergence Area	Kind of convergence	Example of convergence
Networks (physical infrastructure)	Interconnection/interoperability between networks	Telecom (PSTN, ISDN) & data & broadcasting (cable, terrestrial & satellite) networks
Industries/Markets	Previously separate industries based on separate markets now offering similar products/services to the same customers	Internet telephony
Products/Services	Products/services incorporating some of the functionalities of other products/services previously sold in distinct markets	1. PCs becoming video-enabled 2. Hybrid PCTVs 3. Voice over Internet
Firms	Firms, previously separate industries/markets, converging in terms of markets, products/services, technologies	Joint ventures/strategic alliances between computer hardware & software, telecoms, broadcasting companies
Technologies	1. Digital technology providing a "common currency" 2. Technologies integrating other technologies 3. Technological competition as a result & response to convergence	1. Computing, switching, transmission → now digital 2. TCP/IP 3. Fixed versus mobile telephony, Voice on the Internet versus on the telecom networks

Table 5. Convergence types according to Fransman (2000, p. 37)

The EC (1997) and Tarjanne (2000) similarly present different *levels* of convergence. Firstly, the potential for change as a result of the "phenomenon" of convergence can be seen at three different levels. These three levels are (1) technology, (2) industry and (3) services and markets. On the technology level, due to digitization, different networks and devices can perform similar functions. Hence, technology convergence implies that traditionally separate sectors enter into each other's domains. On the business or industry level of convergence, mergers and alliances between players are becoming increasingly important. Mergers and alliances are established between players that some years ago would have been unheard of. At the service level of convergence, a new range of services is increasing, including information services, electronic commerce and interactive entertainment. There is however, no expectation that convergence on one level leads to the same degree of convergence at other levels. Basically, technology is seen as *the enabler of convergence*. The EC further argues that common adoption of digital technologies by relevant sectors has set the trend of convergence in motion. Transmission technologies have led to the convergence of networks and various platforms, for instance Internet Protocol (IP). Furthermore, the EC views the developments in technology and network platforms leading to increased mergers and alliances within the industry.

According to von Tunzelmann (1988), patterns of convergence are generally thought to occur at different levels. These are (1) product-market level (convergence between computer and telecommunications technology), (2) technology level (convergence of infrastructure and platforms) and (3) firm level. The firm level shows to what degree firms from different markets are affected by the process of technological convergence.

The Swedish government has addressed the concept of convergence in a report from 1999 (SOU). The report presents four *types* of convergence, namely (1) network convergence, which occurs when separate physical infrastructures are able to carry all types of services. (2) Service convergence appears when the boundaries between communication services and content services are lowered and two adjacent service classes can converge into one. (3) Appliance convergence indicates the process when user gadgets and terminals comprise new functions and is eventually used for all purposes. (4) Market convergence is seen as the consequence of the three previous convergence types and means that market players are able to enter new markets and industries where network, service and appliance convergence enable this. Thus, technological convergence serves as a basis for industry and market convergence according to the Swedish report.

Figure 7. Supply- and demand-side convergence

Pennings and Puranam (2001) propose a division of convergence into different *classes*. Their suggestion is (1) supply (technology and firms) versus (2) demand (needs and customers) (see figure 7). On the demand side different technologies become similar in terms of the needs they can satisfy, whereas on the supply side, different technologies come together to create new functionality or improve efficiency of existing products. The division or classification of convergence only takes into account technological convergence. The classes are based on technology rather than any other type of convergence. Similarly, technological convergence is said to have both a *technical* and a *functional side*. The former refers to the ability of any infrastructure to transport any type of data, while the latter refers to the fact that a consumer is able to integrate seamlessly the functions of computation, entertainment and voice in unique devices (Pennings & Puranam, 2001).

Basically, these different categorizations of convergence all seem similar, but at the same time they are quite different from each other. This division of typologies and taxonomies of convergence has led to the formulation and explanation of convergence at different levels. Typical terms used in the typology are *level*, *type*, *class* and *process*. Table 6 summarizes different classifications of convergence. The typologies presented have the technology and industry (convergence of industries, markets, products and services) in common in most cases. The different types of convergence all have different implications on business and actors on the telecommunications market, even though some times the difference between the convergence types is practically nonexistent. Based on the similarities found in classifications of convergence processes, two main "dimensions" of convergence processes have been distinguished. These are *technology* and *industry* and will be analyzed in depth in the following section, each presenting a number of specific levels, i.e. market and service/product level in *technology* as well as industry, firm, market and service/product level in *industry*.

Convergence typology	Convergence area	Author	Comments
Levels	- Product-market - Technology - Firm	Von Tunzelmann (1988)	Does not give concrete managerial tools. Takes convergence of telecommunications and computers as basis for analysis.
Levels	- Technology - Industry - Services & markets	European Commission (1997) Tarjanne (2000)	Technology is seen as an enabler of convergence. No reference to industry or market convergence. No consideration of end-user implications or co-operative patterns between companies other than M&As.
Types	- Network convergence - Service convergence - Appliance convergence - Market convergence	SOU (1999)	Views market convergence as enabled by previous and separate convergence processes.
Processes	- Network - Industry/market - Product/service - Firm - Technology	Fransman (2000)	Comprehensive typology encompassing several aspects of convergence.
Classes	- Supply side - Demand side	Pennings & Puranam (2001)	Takes a pure technology perspective.

Table 6. Summary of convergence perspectives and classifications

3.3.1 Technological convergence

Basically, technological convergence originates from technological change and the emergence of new technologies. The emergence of a new technology is actually more complex than the migration of a single technology from one application domain to another (Day & Schoemaker, 2000). Alternatively, technologies may undergo a fusion, in which the resulting technology is applied to a new domain (Adner & Levinthal, 2000). Technology fusion "blends incremental technical improvements from several previously separate fields of technology to create products that revolutionize markets (Kodama, 1992). Similarly, Rockenhäuser (1999) points out that the convergence of technologies from adjacent industries is a highly complex process which requires a fixed grade of maturity of the concerned technologies.

Steinmueller (2000) points out that convergence is a broad development, which suggests the possible emergence of new "techno-economic" or "socio-technical" paradigms for exchange and communication involving the more intense utilization of machine-mediated communication among people. Convergence has the ability to create profound discontinuity in the economic and social life of our societies. The following section offers aspects and implications of convergence in a business setting, based on previous research. Different types of convergence have different business and economic implications.

Infrastructure/network convergence
At the level of telecommunications infrastructure networks, e.g. PSTN, convergence may imply "sharing" of resources. Convergence of *networks* indicates a convergence of technologies, which provides the possibility to converge different infrastructure network services (Yanovsky, 2002). In the case of telecommunications this would concern switches, concentrators, satellites, cable, interfaces, ducts and poles (OECD, 1992). Noam (2000) distinguished *convergence of delivery technologies* as one type of convergence, which is similar to infrastructure or network convergence. In this scenario, Noam argues that cable TV operators would enter telephony and vice versa, local telecommunication companies would invade long distance etc. Industry structure is ultimately determined in large part by the market forces driving the competition at the bottom layer, namely the physical infrastructure (Gong & Srinagesh, 1996) and therefore network convergence on an infrastructure level will ultimately contribute to industry and market convergence processes. Borés *et al.* (2003) also point out that convergence has implications for both demand and supply. For instance, telecom companies competing with cable companies need to upgrade their infrastructure. In reality, nobody can tell whether these investments will be obsolete tomorrow.

Functional convergence
Functional convergence encompasses both product convergence and service convergence. Both Katz (1996) and Yoffie (1997) note that different products are becoming closer substitutes as their functions are increasingly integrated and bundled into innovative products. This can be termed product convergence, but is already known as e.g. technology integration (see e.g. Iansiti, 1998). Technology integration implies the fusion of technologies from different industries. Greenstein and Khanna (1997) have studied product convergence in detail and suggest two primary kinds of product convergence, i.e. (1) convergence in substitutes and (2) convergence in complements. When two products converge in substitutes a customer considers two products to be interchangeable with each other. Convergence in complements is when two products work better and more efficiently together than separately. The products basically perform a combined function, which none of them could do alone and the combination creates a service that did not exist before.

Convergence of services provides new enlarged functional means for the user (Yanovsky, 2002). Shepard (2000) defines service convergence as the combination of technology/technological leadership and company ability which eventually affects service offerings. The OEDC (1992) views convergence as the emergence of new "hybrid" series and the use of existing services in new ways. Andersson and Mölleryd (1997) put mobile telephony into a wider context on interconnected technologies and point out that the convergence of telecommunications, data processing and cable industries lead to an increased convergence of different services. Thus, the authors speak of convergence with the outcome of service convergence, which ultimately affects the whole industry and transforms the industry from being a supply dominated industry to becoming a demand driven industry.

Market convergence
Pennings and Puranam (2001) systematically investigate the concept of market convergence, proposing that the convergence phenomenon, as they call it, should take a centre stage in the research and theory of technological change, innovation and corporate strategy. Market convergence is a major challenge for innovation and economic growth, while it is simultaneously causing market disequilibrium and firm mortality. Convergence between

previously adjacent markets can, according to the authors, be seen as the erosion of boundaries that define and isolate industry-specific knowledge. Cross elastisticies, that produce the separation of markets, no longer hold.

Some markets will disappear and give rise to new markets (Borés et al., 2003). The coming together of technologies, which enables convergence in markets to take place, is more demand driven than supply driven. The EC (1997) suggests that convergence is evident in technology and to some extent in the activities of companies pursuing mergers and acquisitions (M&A) in order to address the new markets. The EC also proposes that technological convergence gives rise to market convergence. Gambardella and Torrisi (1996) found that even though technological convergence causes merger activities, those companies that did not go in for such collaborative and/or acquisition activity and retained a stronger focus on particular product markets appeared to perform better. Based on this they argue that there are limits to convergence and its implications; technological convergence does not necessarily mean a convergence of product markets.

Mergers and alliances

Most literature on convergence in the ICT sector shares the belief that convergence will lead to mergers and alliances (Malerba & Torrisi, 1992; Duysters, 1995; von Tunzelmann, 1995; Gambardella & Torrisi, 1996; Gaines, 1998; Athreye & Keeble, 2000; Bower, 2001; Borés et al, 2003). Borés *et al.* (2003) argue that many firms are engaged in a process of mergers and alliances in order to *position* themselves in a converged environment. The nature of competition is changing due to technological uncertainty, market uncertainty and huge, risky investments. Alliances are established either through horizontal cooperation (e.g. in order to reach economies of scale) or via vertical cooperation (focuses on a single actor's place in the value chain in order to offer bigger profit margins). Duysters and Hagedoorn (1998, p. 357) argue that companies from different industries and technological fields combine their efforts as a part of a concrete process of technological convergence. However, the authors also think that firms were basically unaffected by technological convergence during the period of 1980-1993 and criticize firms for still doing the same instead of redefining their core competences and core business. The same authors also tested whether firms tend to converge through means of strategic technology alliances, but this hypothesis could not be confirmed. According to Bower (2001) a company bets that a new industry is emerging and tries to establish a position by culling resources from existing industries (whose boundaries are blurring). In his study on the U.S. M&As over $500 million in size between 1997 and 1999, Bower found that industry convergence is behind four percent of all M&As. Duysters and Hagedoorn (1998) point out that in the past decade, the number of strategic alliances made by firms has increased substantially, especially in high-tech industries. Lind (2004) notes that the vision of convergence has justified a number of mergers and acquisitions within the ICT sector. Many of these eventually failed even though several resent mergers appear to have survived in what Lind calls a "post-convergence" marketplace by creating viable business models in the re-defined "converged" market. The OECD (1992) point out that convergence is not a merging of equal partners.

The acquisition of knowledgeable companies is an attractive option for companies dealing with convergent technologies (compare e.g. the merger between Sony and Ericsson in mobile telecommunications). According to Aldrich and Auster (1986), acquisition strategies are obstructed by at least three main problems. Firstly, information distortion and opportunism

may mislead the acquiring company. Secondly, creative and innovative companies may lose their flexibility (and possible their creativity and innovativeness) if incorporated in a large and bureaucratic structure. The third problem is related to externalities and the difficulty of divesting those assets which were not sought for in the first place. Unsuccessful acquisitions may very well fall on insufficiently adapted technology bases, where the new technology does not fit. Tarjanne (2000) argues that industry players clearly are forced to rethink their strategies as market structures and value chains are being transformed. These actors know that they alone do not have all the necessary skills to compete in a converged market and therefore alliance activities have been taking shape. Tarjanne identifies alliances mainly on the horizontal level between similar players such as network operators (cf. TeliaSonera).

Change in core competencies and core business

Competencies and capabilities are often categorized as separate but related constructs. Prahalad and Hamel (1990, p. 81) have contributed with the most often used definition of core competencies: "corporate wide technologies and production skills that empower individual businesses to adapt quickly to changing opportunities". Very often companies cooperate in order to provide new, hybrid services or systems. Building and marketing these hybrid systems often require disparate talents that no single company possesses (Adler, 1995). "A firm's core business stems from the underlying natural trajectory embedded in the firm's knowledge base" (Teece, 1988, p. 264). A firm's core business is bounded by competencies in production, marketing and R&D. Similarly, if a technological improvement occurs, it is likely to affect the core business of a given company.

Blurring market boundaries between telecommunications and computer markets have changed the core competencies of the traditional suppliers and induced the entrance of firms from adjacent markets (Duysters & Hagedoorn, 1998). According to Pennings and Puranam (2001), as convergence processes lead to the blurring of industry boundaries, they also pose challenges for firms in terms of strategy (new technologies, consumers and needs). The authors strongly point out that the ability of firms to refashion their capabilities to new demands is prohibited by path dependence (see also Teece et al., 1997). According to path dependence theories, firms should stick to the coherence imperative, while the process of convergence suggests otherwise and requires the firms to diversify by venturing into new and uncharted markets. With this in mind, firms attempt to extend their capabilities by means of external sources, such as internal corporate ventures, alliances, R&D partnerships and M&As (Chesbrough & Teece, 1996: Nagarajan & Mitchell, 1998). Different converging scenarios lead to different strategic responses.

Vertical integration versus horizontal integration

Technological change has implications for the vertical structure of companies. Convergence also leads to an increased vertical integration in the form of alliances enabling actors to acquire skills needed to address new markets (Clements, 1998). Gaines (1998) noted that convergence is promoting a trend towards vertically integrated companies and alliances. In technologically advanced markets, a motivation for vertical integration is often the need to fill a new opportunity (Kavassalis & Lehr, 2000). Vertical integration is often viewed as a strategy to protect, exploit, or extend market power and may also be used in order to develop complementary skills. Teece (1986) suggests that innovators may have strong incentives to integrate into related stages (backward, forward, and lateral). Such integration helps to better capture value in "weak appropriability regimes", i.e. when technology is almost impossible to

protect and can be used by other actors (imitators) on the market. Teece (1988) argues that when a stream of innovations (technological change) has significant systems ramifications, vertical integration is likely to facilitate the commercialization of an innovation. Utterback and Suárez (1993), on the contrary, claim that what surviving firms really seek is control over the value chain and vertical integration is one way of achieving such control. Tarjanne (2000) argues that vertical integration is taking place to a lesser extent and mainly between players in different sectors that seek to match complementary skills or perhaps move into higher margin areas.

Regulatory and policy issues

Regulation may act as a triggering factor in the convergence process, but the process itself is also capable of influencing the outcomes of regulation. Convergence leads, according to many scholars, to the blurring of frontiers between traditional sectors of telecommunications and e.g. media, broadcasting, computing etc. All of these areas have different regulation, which further puts constraints on the way convergence should be handled. The dilemma posed by convergence, according to Clements (1998), is what regulatory regime will be appropriate to the new environment. Cawley (2000) stresses that convergence is ultimately about the emergence of widespread broadband networks and thus a regulatory framework, which responds to an evolving technical and market situation, needs to be created. In a new and converged marketplace, only the necessary and appropriate parts of policy should be carried forward. Noam (2000) furthermore distinguishes between different types of convergence and one of them is that of regulation. Noam presents that little convergence has happened in regulation, especially in the U.S.

The regulation of telecommunications and converging sectors is spread across a number of sectors. For instance, in the EU, policy-making is the responsibility of the EC and its directorate, while regulation is handled by national regulation authorities (NRAs). Each member state thus retains the right to decide its own details. Tarjanne (2000) points out that no single regulator is likely to solve the problems in the converging marketplace alone. There is thus a need for international co-operation in regulatory issues. Incentives for regulatory change in the EU arise mainly from the convergence problems as new types of services no longer fit the traditional categories of telecommunications and media regulation. The EC (1997) has suggested three basic options for regulation in a new converged context, namely (1) build on current regulatory structures, (2) develop new structures for new activities and (3) introduce new structures to cover all activities. For the opportunities provided by convergence to be fully realized, they should not be constrained by inappropriate regulation (Clements, 1998).

End-users

By the end of the 20th century, literature on convergence had traditionally not raised the question of how convergence affects end-users. Recently, however, some thoughts on the effects of convergence have been dedicated end-users (cf. Reding, 2006). According to Reding (2006, p. 5), convergence means “the possibility if accessing the same services and content (email, music, television) using different terminals over different types of networks” for end-users. Katz (1996) argues that convergence is not driven solely by the rate at which providers adopt new technology, but the rate of end-user adoption or acceptance of new capabilities can be equally, or even more, important. Tarjanne (2000) is strongly of the opinion, that for convergence to succeed, people will have to become the centre of focus, or the driving force

for development. The work should be concentrated on creating customer value and on enhancing the range of things people can do with technology. Both businesses and customers will benefit from a widening choice of platform-independent services at decreasing costs. Tarjanne emphasizes that it is the demand for information, services and goods that in the end will determine in which direction the converging market will develop. Similarly, Steinmueller (2000) implies that the rate of convergence is related to whether and how individuals incorporate technology into their lives. The widespread appeal and acceptance (or popularization as Steinmueller calls it), will influence the individual processes of resistance, adjustment and accommodation to information appliances and services.

3.3.2 Industry convergence

The concept of industry convergence is some times used to characterize industrial dynamics in the new digital economy (Katz, 1996). Convergence is very often defined as the process by which hitherto different industrial sectors come to share a common knowledge and technological base (Gaines, 1998; Athreye & Keeble, 2000; Fai & Tunzelmann, 2001; Lind, 2004; Lee, 2005). Wegberg (1995) distinguishes among convergence on the supply side and convergence on the demand side and takes a specific industry perspective. The former indicates that industries increasingly use the same knowledge base, whereas the latter indicates that convergence leads to industry boundaries becoming blurred both within the industries and between them. Technological and industry convergence can be seen as separate phenomena, which coexist on the same time continuum of convergence processes. Shepard (2000, p. xvi) argues that the concept is generally used to reference "that inexorable technological drift that seems to be underway toward a common network transport fabric such as the Internet or pure IP protocol", thus indicating infrastructure convergence as a basis of industry convergence. Choi and Valikangas (2001) similarly present convergence as the blurring of boundaries between industries by the convergence of value propositions, technologies and markets. This definition indicates that the authors see *technological* convergence as equal to *industry* convergence. Porter, on the other hand, mentioned the industry convergence process already in 1985 (p. 100) by arguing that "in industries such as financial services, computers and telecommunications, technological change is blurring industry boundaries and folding whole industries together". Therefore, industry convergence is referred to as a concept, which is used to link industrial sectors due to the commonality in their technological (and thus knowledge) bases, even though from a consumption point of view the industries may seem unrelated. It is true that technological convergence has implied rapid redefinition of industry boundaries and the boundary effect has received much attention in economic research. Both Porter (1985) and Hamel and Prahalad (1994) argue that technological innovations are capable of changing the boundaries of traditional industries. Technological convergence leads to industry convergence.

According to Stieglitz (2003), industry convergence consists of three stages. In the first stage two existing industries are unrelated from both supply and demand point of views. An outside event is able to trigger a process of convergence. This event might be, for instance, the invention of a new technology. In the second stage, the industries converge, which eventually changes industry boundaries, market structures and corporate strategies. In the third and final stage, the industries are related from a technological or product market perspective. The industry structure might be stabilized or characterized by a new process of convergence. Stieglitz' industry convergence model is based on previous research by Greenstein and Khanna (1997) and Pennings and Puranam (2001). Greenstein and Khanna developed a model

for convergence with two types of convergence, i.e. convergence in substitutes and convergence in complements. Pennings and Puranam developed this taxonomy further by adding a second dimension to the substitute-complement dimension by introducing two categories: (1) supply side convergence and (2) demand side convergence. Thus, a 2*2 matrix with four categories was constructed for the industry and technology convergence concepts. Stieglitz (2003), on the other side, has named the supply-demand side convergence dimension technology- versus product-based convergence. The industry convergence process suggested by Stieglitz seems very simplified, and does not discuss the individual organizations' roles in the process nor does it go into detail concerning the triggering factors of industry convergence other than "technology".

Gerum, Sjurts and Stieglitz (2004) indicate that industry convergence is an important concept if one seeks to understand technology and product evolution in general. Stieglitz (2004b) has categorized industry convergence in four types (see table 7). These types differ in their impact on industry dynamics and business strategy. Technologically convergent industries produce different goods and services, but still use similar technological competences. Stieglitz starts off by distinguishing between two generic types of convergence of technologies. The first type encompasses new technologies replacing distinct technologies in established industries. This is referred to as industry convergence by *technology substitution*. Substitution occurs when an old technology has reached maturity and a new, more effective technology reaches a point on its learning curve where it economically replaces the old one (Gaines, 1998). The second type of technological convergence occurs when various technologies, which were previously associated with different industries, are integrated or fused together. This gives rise to entirely new markets according to Stieglitz's research and is referred to as *technology integration* (cf. Iansiti, 1998). The second dimension of Stieglitz industry convergence model encompasses product-based convergence. An established product from one industry evolves into integrating product features similar to those of another product in a different industry. This *product substitution* is pursued by firms who want to expand their established products with new features from other industries. Hence, they create hybrid products based on their existing technological capabilities. Industry convergence by *product complementarity* evolves when two formerly unrelated products develop into complements. These create higher utility for its users when used simultaneously or together.

	Substitutes	**Complements**
Technological Convergence	Technological Substitution	Technology Integration
Product-Based Convergence	Product Substitution	Product Complementarity

Table 7. Types of industry convergence (Stieglitz, 2004, p. 18)

Stieglitz puts forth examples of how industry convergence relates to e.g. the evolution of mobile telecommunications. Industry convergence by technological substitution led to the emergence of the second generation digital access technologies, such as GSM. UMTS, for instance, is an example of industry convergence by product complementarity, where mobile terminal meets wireless networks and Internet services. However, product complementarity of formerly separate products also leads to new actors entering the market and exploiting the technological (and other) opportunities in the success of innovations. The model of four different types of convergence can be used in analyzing corporate strategies and competitive dynamics. Stieglitz (2003) proposes that these issues are shaped by different types of industry

convergence. Empirical processes of industry convergence often combine two or more types of industry convergence and are paralleled by other sorts of innovative activities, which have nothing to do with convergence.

According to Pennings and Puranam (2001), *all convergence* processes have the impact of eroding boundaries between industries, which in turn poses strategic challenges for firms and forces them to face new technologies, consumers and needs. Industry convergence fundamentally changes both market and competition conditions as well as consumer preferences and vice versa. Intramarket competition is increased, leading to a higher density of competition and new competitors from outside the market. Gong and Srinagesh (1996) argue that the prevailing trend in telecommunications is toward industry convergence and market competition. Lind (2004) also notes that convergence leads to a re-definition of industry boundaries. Lind (2004), on the other hand, presents the idea that even though convergence redefines industry boundaries, the result of convergence is not a merging of separate industries into one big *converging industry*. Rather, it creates a full eco-system of new specialized sub-industries. The definition that Lind (2004, p. 2) uses is still in line with previous research, namely "merging of hitherto separate markets, removing entry boundaries across industry borders". Similarly, Christensen (2003) argues that convergence does not mean that all industries eventually end up as one big inter-linked industry. Rather, a more frequent and on-going process if redefinition of industry borders will evolve. In 2005 (p. 1), Lind proposed an alternative definition of convergence, namely "convergence is a market/industry definition generated by technological change". This definition indicates that market re-definitions which take place during convergence are closely related to technology and technological change. Thus, separating the market from the technology, as most often is the case in market or industry convergence research, is impossible, as the markets for these technologies mutually shape each other.

There are furthermore several research studies done in previous years, which address the process of industry convergence, without explicitly mentioning or referring to the term convergence. One such study is that of Langlois and Robertson (1995), who discuss redefinition and restructuring of industries. Industry redefinitions are referred to as the merger of two separate industries into one, and fragmentation of one into two, due to change in technology and/or firm boundaries. The term convergence is, however, never used in the study. On the other hand, Noam (2000) presents the expression "inter-section convergence". However, the concept is never defined, but could be similar to industry convergence or market convergence. There are furthermore, according to Porter (1985), industry boundaries that have been narrowed down by technology. Technological change may allow a firm to tailor the value chain to a particular segment, which eventually can become industries. An example of this is portable cassette players, which turned out to become a full-fledged industry in the 1980s. The outcomes and effects of industry convergence as identified and theoretized in existing literature are summarized and discussed below through (1) new markets and the boundary effect, (2) new players and increased competition, and (3) value chain deconstruction.

New markets and the boundary effect

As telecommunications networks increasingly accommodated computers in the 1970s, previously existing technological and market boundaries became vague. Here the blurring boundaries between computer and telecommunications markets started to challenge the core

competencies of the traditional suppliers and this provoked the entrance of firms from contiguous markets. According to Fai and von Tunzelmann (2001), the convergence process indicates that as time passes by, industries move out of technological fields which were of importance in a past period into other areas which are more important in a later period. Mendonça (2003), in line with Fai and von Tunzelmann, proves that there indeed exists an accelerating pattern of convergence. He notes that companies from different industries patent outside their traditional fields of technological expertise, thus crossing over traditional industry or sector borders. Similarly, Lee (2003) notes that new product markets emerge when previously disparate technologies converge. As boundaries between initially adjacent industries become blurred, established firms must decide whether and when to enter emerging markets. We are talking about historical markets with dissimilar functions and actors, who service different needs. Boundaries in well established industries are rigid, well-defined with a reliance on existing capabilities. In emerging industries the boundaries are permeable and the use of partners to overcome the lack of capabilities and reliance on external sources is gaining ground.

Just and Latzer (2000) point out that convergence leads to new problems regarding the definition of relevant markets. Market structures change due to liberalization of telecommunications markets and the proliferation of services resulting from convergence. This also affects the assessment of relevant markets. The relevant market is an area characterized by effective competition and is defined by all products that are substitutable for each other from the point of view of the consumer (Heinrich, 1994).

New players and increased competition

Another widely known strategic implication of convergence and a "new competitive landscape" is an increased reliance on corporate networks and strategic alliances (Gomes-Casseres, 1996; Kaluza et al., 1999). Since government barriers on different markets were lifted, a large number of telephony and cable TV companies entered (and are still entering) growing markets and hence, the new players are threatening the market position of established actors. Numerous competitors in the industry are dependent on products becoming more and more substitutable. In such a case, companies increasingly need to compete on price (Kaluza et al., 1999). Also, according to Clements (1998), convergence encourages the arrival of new players exploiting niche markets. Day and Schoemaker (2000) point out, that players in established industries are familiar, whereas players in emerging industries, or emerging technologies, most often are new or unknown. New players on the market force traditional actors to enter, for instance, the entertainment market in order to maintain profitability. The arrival of new players exploiting niche markets is addressed by the EC (1997), which suggests that this stage of industry convergence could be the bridge between what is already happening at the technology level and what will eventually occur at the level of services and markets. This clearly indicates technological convergence as leading to industry convergence. In established industries, the domain of play is clearly defined, while emerging industries have a formative or evolving domain of play. Fransman (2000) suggests that convergence will create new opportunities for both incumbents and new entrants in the firm in the form of new technical possibilities and new market opportunities. The competition will, however, be increased in three forms, namely between companies, between products/services and between technologies (e.g. Internet telephony competing with traditional fixed telephony; fixed versus mobile services; ADSL versus cable modems). The increased competition can on the other hand result in new threats to incumbents and to shakeouts.

Competition in an industry reflects the changes in products and processes stemming from technological evolution. The success of a firm is rooted in the structure of the industry in which it operates, as well as its position in the industry and its local environment (Afuah and Utterback, 1997). Gong and Srinagesh (1996) suggest that vertical and horizontal integration may be a natural outgrowth of competition in the converging industries. The increased competition, on the other hand, implies that new entrants are applying new technologies to compete with incumbents and incumbents from previously adjacent industries are competing with one another.

Value chain deconstruction

In 1985, alongside the work of Porter, the value chain became popular. The value chain is a concept which is used in order to describe the process by which a new idea reaches the market (Botkin & Matthews, 1992) or materials are moved sequentially down a supply chain (de Montalvo, van de Kar & Maitland, 2004). It is furthermore a business model that enables the organizing of operations around the value adding activities that result in better service or product (Olla & Patel, 2002). According to Porter (2001) a value chain is thus defined as the set of activities through which a product or service is created and delivered to customers. Today, firms tend to be present in one or more elements of the value chain. Some argue that a shift towards convergence will lead many of today's current players to consider extending their activities beyond their core businesses, and it is pointed out that this trend is already visible in some recent mergers and acquisitions (EC, 1997). Nevertheless, today Porter's model of a value chain has in many ways lost its significance, as the process view[1] seems to be a more appropriate tool for modern companies (see e.g. Davenport, 1993).

One important way of navigating the value chain is through partnerships. Ideally, companies specializing in one phase of the value chain would prefer to partner with companies who are able to manage other parts of the value chain (or phases of the process). In most cases companies strive at creating value. Maitland, Bauer & Westerveld (2002) emphasize that the concept of value creation is connected with that of the value chain and both are often associated with the areas of strategic management and marketing. However, there is also research suggesting that the value chain is evolving into a set of partnerships to deliver value (Sabat, 2002) or that value chains are evolving into value nets or networks (Bovet & Martha, 2000; Freeman & Louçã, 2001; Kothandaraman & Wilson, 2001; Li & Whalley, 2002). The value network is derived from the value chain concept and each construct will furthermore differ. The value creating network as a concept, as presented by Kothandaraman and Wilson (2001), implies that network formation is based upon an assessment of potential partner's abilities to add significant value to the market offering while presenting low risk and superior management. Bovet and Martha (2000) define the value network as a dynamic network of partnerships and information flows. Therefore, the concepts of value chain and value networks are closely related to each other and could therefore be a useful tool in exploring the change in the management of technology and innovation. The value network is, according to Christensen

[1] Based on the process view, in contrast to the functional view, a company can be decomposed into customer-centric core processes and support processes. The question is then whether the company should carry out the process(es) in-house or through externalization. The notion of deconstruction is partly based on New Institutional Economy, consisting of frameworks for transaction cost theory, property rights theory, the principal/agent theory etc. Deconstruction will result in companies adopting different roles based on specific success factors that (should) correspond with specific core competencies (Hamel & Prahalad, 1994).

and Rosenbloom (1995), the context within which the firm identifies and responds to customer needs, procures inputs and reacts to competitors. As firms gain experience within a network, they develop their capabilities, structure and cultures to fit that position better by meeting the requirements of the network.

Every company that is active in a certain market has stages in its value chain specific to that market. Wirtz (2001) suggests that formerly industry-specific value chains will be unbundled so that the core stages of each individual chain can be extracted and rebundled to a new value chain within the market that results from industry convergence. The value chain of this new market is thus structured through a reconfiguration of value chains from the previous market. The deconstruction of value chains into networks eventually transforms industry boundaries and creates new competitive spaces. As the value chains deconstruct into value networks, a multitude of entry points into value networks emerge. New players from other industries appear, as they see new opportunities form in the light of the technological convergence process backed up by the opening up of markets, as well as their reconstruction. The environment that players are facing is increasingly complex and market positions are threatened. One means of coping with the new challenges is for the companies to put effort into developing their dynamic capabilities or positioning themselves within the value networks in an appropriate and productive way. Value networks are about combining resources that an individual firm cannot provide all on its own (de Montalvo et al., 2004). The interaction among actors in a value network is, for instance, goal oriented and there exists interdependence among the actors involved. de Montalvo *et al.* suggest three types of partners in a value network, namely (1) structural partners who provide essential resources (indispensable to the value network and the service it provides), (2) contributing partners who add network-specific resources (crucial to the value network) and (3) supporting partners who contribute generic resources (which are required for the provision of the service but are not irreplaceable). The research by de Montalvo *et al.* takes a resource-based view of value networks providing mobile Internet services and based on case studies suggests that content providers are of lesser importance in a value network as they never appear as structural partners and can be replaced fairly easily. De Montalvo *et al.* also noted that network operators usually act as structural partners who control the value network.

3.4 Convergence processes in telecommunications

The first signs of the convergence process could be detected already in the 1950s and took off in the early 1970s. At this time a large number of powerful digital components were brought to the market at relatively low cost. This is often labeled the *first wave of convergence*. The *second wave of convergence* occurred during the mid-1980s, when analogue telephone systems were gradually transforming into fully digital networks (Duysters & Hagedoorn, 1998). The rise in distributed computing and the digitization of the telecommunications network led to a number of telecommunications firms gaining skills in software and micro-electronics. This raised the interest of computer manufacturers in telecommunications technology and led to the expectation of convergence into one giant information and entertainment industry. However, as most researchers give the increase in computer components over industry borders and the decrease of prices in information goods as reasons for the process of convergence to initially take place, Yoffie (1997) proposes that from 1970 to 1990 the progress in computer and communications technologies did not lead to convergence, because it happened within established industry boundaries. Companies such as IBM and

Sony tried to force convergence to happen via mergers, acquisitions and alliances, but the success was very small. The main idea was to create innovative core competencies by merging complementary competencies through mutual learning processes (Hamel, 1991). However, Hertzel *et al*. (2001) argue that it was apparent in the early 1990s that, for instance, the convergence of the telecommunications and cable TV industries was inevitable. In the telecommunications industry, the first signs of convergence appeared through the introduction of stored program control (SPC) in the field of digital switching, which made it possible to replace mechanical control systems by more flexible software-based control programs (Duysters & Hagedoorn, 1998).

Bohlin (2000) suggests a number of critical steps or phases in the evolution of convergence. Until 1970, initial ideas on integration between computers and communications were developed and between 1970 and 1979, specific convergence-related concepts were launched. Bohlin (2000) refers to concepts such as ISDN, Computers & Communications (C&C), télématique by Nora and Minc (1978). Various integrated network solutions were then being tested and initially implemented between 1980 and 1991. From 1992 to 1995 high-level policy statements on telecommunications and converged information networks were given and in 1995 the Internet became the main convergence medium as well as policy topic. As of 1999 convergence between Internet-based mobile and fixed networks has appeared and the development carries on constantly. Convergence will, according to Bohlin (2000), not stop with ubiquitous computing and mobile Internet: new technologies and applications will emerge.

According to Lind (2004), the vision of technological convergence had great impact on corporate strategy in the 1980s and the 1990s. The EC indicated in 1997 that convergence is leading to the creation of new market structures and new roles for market players. One indicator of convergence is the willingness of market players to exploit the opportunities and possibilities which are provided by the new platforms. Outsourcing and alliances are other factors, which are caused by convergence (see e.g. Fai & von Tunzelmann, 2001). The convergence of the telecommunications sector and the computing sector has been noticed by a number of researchers through out the years (Edwards, 1999; Athreye & Keeble, 2000; Bohlin, 2000). Telecommunications has almost always been one of the blobs converging (cf. EC, 1997) or the setting for technological advancements that enable convergence processes. The rapid development in telecommunications, mobile telephony, broadband, VoIP, mobile TV etc., all contribute to telecommunications becoming the "it" setting for convergence, linking the industry to the IT, media and/or broadcasting areas. Perhaps the most significant driver for convergence between computing and telecommunications is the fact that analogue systems have evolved into digital systems. In telecommunications, the cost of voice and data transmission has decreased enough to influence the diffusion of products and services. There are several opportunities for all actors involved in the market, but it has to be kept in mind that even though the market is growing, competition has widened. There are more technological alternatives available today, which can satisfy the same demand. Convergence thus means that since end-users have the capacity to access any kind of contents using any type of terminal, one question still remains: are the firms technologically ready? This definition of technological convergence implies that any telecommunications company would have the ability to provide any kind of services to its clients.

Fransman (2000) proposes several important implications for convergence. Among others, convergence is suggested to have major implications for industrial structure, for industry and technology evolution, for the fortunes of the populations of firms in the industries affected by convergence and for the fortunes of individual firms. Borés *et al.* (2003) point out that the final effect of convergence on different firms will be conditioned by market, technological and regulatory issues. Pennings and Puranam (2001) suggest a few strategic responses to convergence, namely organization design, social capital and interfirm arrangements. The responses are dependent on the forms of internal and external capability development. For the actors in the industry now coming to a convergence it can be anticipated that "the strategic positioning in these marketing networks will be of significant importance" (Andersson & Mölleryd, 1997, p. 454). A process of role and position seeking will prevail in markets coming to convergence, which makes e.g. partnering and acting in business networks an important strategy (Duysters & Hagedoorn, 1998; Athreye & Keeble, 2000; Bower, 2001; Fai & von Tunzelmann, 2001; Borés *et al.*, 2003). Katz (1996) also points out that the implications of convergence on economic welfare include the expansion of the set of potential service offerings, but above all, convergence affects market structure and competition (e.g. industry border cross overs). However, implications of convergence processes in telecommunications are not many, if one seeks to implement convergence in business strategies. Information on technology substitution, innovation and product development gives fire to the industry, but information on implications of convergence on business environment, competition, strategies etc. seem to be scarce. How do telecommunications actors react to convergence processes? Do they recognize convergence as an important influencing factor within the industry? Are convergence processes benefited in some way by actors, and in such a case, how? These are just a few of the many questions one can state when it comes to understanding telecommunications in the light of convergence processes and answers cannot be found in current research.

3.5 A critical review of convergence theory: towards a model of the convergence process

The EC (1997) expresses fear of Europe failing to take advantage of the opportunities provided by convergence. Europe could be left behind as other major trading blocks reap the benefits of convergence. The strategic implications of convergence have only recently become the focus in research and are therefore not widely known for sure, rather only assumed. Convergence gives few guidelines for concrete strategic actions for a given firm, as Lind (2004) points out. However, it is of great importance to understand the very essence of such a process like convergence, which has the possibility to affect every corner of an industry and markets. According to presented research, convergence processes affect those industries where communication plays a vital role. Therefore, the players within a "communications industry or market" are bound to be affected by the process of convergence. The convergence process implies increased cooperative activities (e.g. mergers and acquisition), increased competition, re-evaluation of industry boundaries, core competences and business activities, merging on several levels (service, product, market, network infrastructure), value chain deconstruction and changes in regulatory issues that provide the framework for actors in telecommunications to act. The blurring boundaries are well documented in convergence research (cf. OECD, 1992; Fransman, 2000), but I would like to ask the question whether it always has to be industry boundaries blurring or if it also is possible that firm boundaries are blurring and thus changing. Mergers and alliances have been reported to increase in converged environments, which in itself indicate blurring boundaries of firms.

According to several researchers, a clear definition of the concept *convergence* does not exist (cf. Kaluza et al. 1999). At least a pure definition creates difficulties for researchers. Most often, the concept is used and defined in a way which might not do the research setting right. A coherent usage of the concept can not be found in the majority of the existing literature of today. In fact, many articles and books written on the topic do not systematically reflect upon the definition of convergence and what it means for the business environment. Rather, research focuses on what convergence means on a technology level. If organizations are to succeed well in a converged environment it must be understood exactly what convergence means and implies in terms on business strategies, competitor analysis and investments in technology and product/service offerings. Some scholars do not distinguish between convergence of technologies and convergence of industry. As Lind (2004) notes, at first glance it seems like the existing academic literature on convergence deals with diversification and/or vertical integration. It has already been noted that most articles have taken an industry perspective of convergence. This makes some sense as the "converging strategies" are a response to the blurring and need for re-defining industry boundaries. Strategies concern firms restructuring and reorganization as a reaction to the outside forces of industry re-definition and re-restructuring. One of the main focuses in the convergence related research has been on industry convergence. The integration of industries is not a new phenomenon, but the reason behind the consolidation may differ.

Convergence is a process of change. Change processes, which are initiated by e.g. advancements in technology, consumer preferences, liberalization forces, lead to certain outcomes, such as new consumer devices or a technologically efficient device able to perform tasks which earlier required two or more separate devices. Based on the many examples of defining convergence by researcher in various fields and a theoretical review of studies of convergence, the following definition of the term convergence is suggested[2]:

> *Convergence is a change process initiated by technological, socio-economical and organizational forces, removing or changing traditional industry borders, framing and enabling new resource constellations and eventually leading to industry convergence in the form of sub-industries, new business ecosystems and new markets.*

The challenges in understanding convergence processes lie in figuring out how different processes are inter-linked with each other. Based on theory derived out of previous research we know that technology is the enabler of convergence processes. We also know that the drivers of technological change can be found in technology (technological change and breakthroughs, digitization of data, the Internet) and socio-economic forces (liberalization, regulation and globalization). One should not forget the fact that organizations as actors may contribute to the emergence of convergence processes through their actions and reactions in the business environment. Convergence may generally be divided into technological convergence and industry convergence, which in turn have different characteristics and some times lead to different outcomes. The interaction between the technology level and the industry level is what drives convergence processes and change in telecommunications. Technological advancement in telecommunications has led to a need to change and adapt,

[2] The definition based on the theoretical review will be critically evaluated against empirical findings in chapter 7.

which triggers change processes in the form of convergence dynamics to occur. Based on the theoretical review of convergence theory a model can be developed that rests on the interaction and link between the technology-level and the industry-level of convergence processes. The model suggests that technology convergence leads to industry convergence, but does not disregard the fact that some technology convergence processes do not necessarily end up as industry convergence. Rather, a process of technological convergence may remain on the technological level or infrastructure level. Forces determining when industry convergence occurs are driven by both the demand side and the supply side of a market: end-users and providers. When organizations engage in industry convergence related activities (M&As, increased cooperation, vertical integration, functional convergence) they are the ones driving the industry convergence process. Changes in consumer preferences create a demand on the products and services offered by organizations and affect their business strategies.

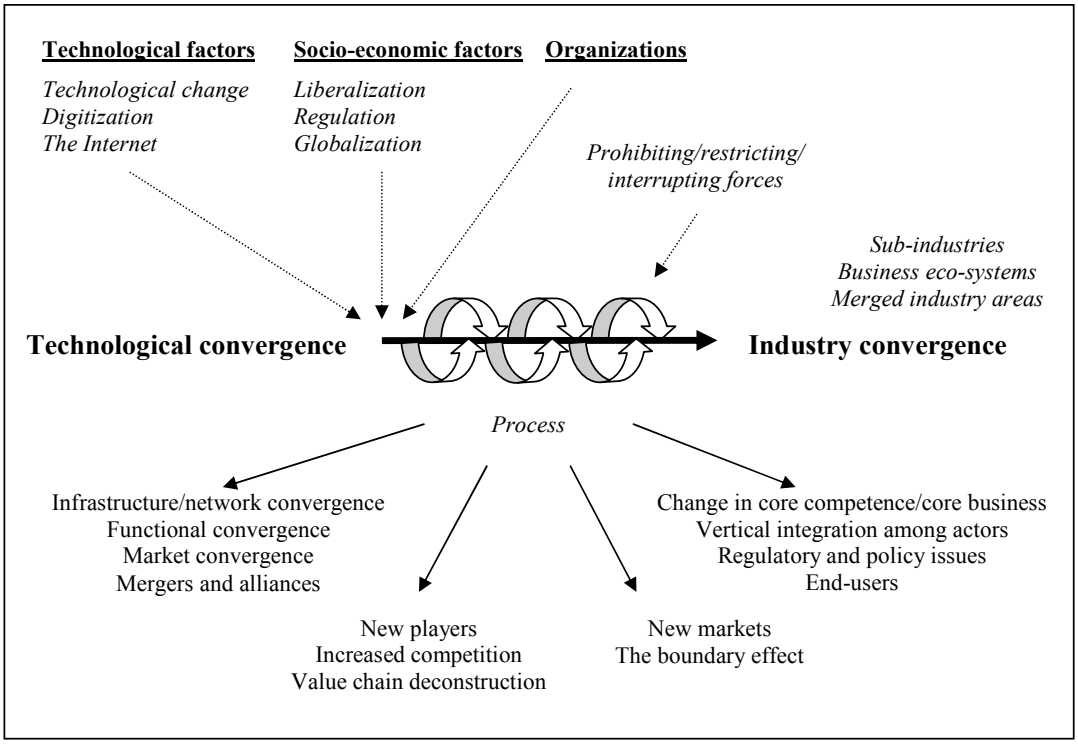

Figure 8. The convergence process

The theoretical model (figure 8) explains and presents the reasons and possible outcomes of convergence in an industry based on communication. Thus, the model implies that (1) convergence is driven by technological and socio-economic factors and roganizations as indicated by the arrows at the beginning of the convergence process line in the figure above. (2) Technological convergence leads to industry convergence (the think black arrow surrounded by circular arrows in figure 8 points at a process view). Discussions that interlink the technology and industry level of convergence have been led by, for instance, Rosenberg (1963), the OECD (1992), the EC (1997), Steinmueller (2000) and Andergassen *et al.* (2003). Forces restricting, prohibiting and/or interrupting convergence were discussed in section 3.2.4.

(3) The convergence process *is* the process of convergence from a technological level to an industry level and finally, (4) the convergence processes has different outcomes depending on the stage it is in. Industry convergence as such may in turn lead to the creation of sub-industries, new or modified business eco-systems and/or merged industry areas. The model serves as a basis for understanding convergence when moving over to analyzing perceptions of convergence by practitioners in Finnish telecommunications. The theoretical discussion further opens up new questions concerning organizations', actors', roles in the process and how they make use of convergence processes as well as how the process affects their business. It is well known that firms position themselves on a market or within an industry in order to take advantage of new market opportunities. Where, then, in the convergence process must firms position themselves in order to do so? Which roles and positions should the actors take in order to be successful?

3.6 Summary

The first strand of convergence related research is that everything can be reduced to bits (The Economist, 2000). Technology is seen as the enabler of the convergence process and in most cases, industry convergence is included in the definition of convergence. Technological convergence as such occurs on a technical level and is fueled by technological drivers (change, digitization and the Internet) and socio-economic drivers (liberalization, regulation and globalization). Some definitions of convergence focus entirely on advances in technology, such as Shepard (2000), who perceives convergence in relation to the migration from PSTN networks to IP-based networks in telecommunications. This will open up doors for several different types of change processes. However, the migration to an IP-based infrastructure can also be seen as a separate convergence process on the technology level, rather than a convergence process taking place on an industry level, in which possible other convergence processes may start or take place simultaneously. Summarizing the different definitions and theories on convergence, one can argue that what we know about convergence today sums up to one convergence process, moving from the technology level to an industry level. In the process several different outcomes are possible, and have been accounted for by other researchers. What starts on the technology level affects business strategies, technical infrastructures, markets, services and products, core competences, value chains and networks, competition, regulation, cooperation patterns between actors and last, but not least, end-users. Industry convergence may occur as a pure merger between two or several industries. It may also lead to the emergence of sub-industries (cf. Lind, 2005), new business ecosystems or perhaps, new types of business networks where actors draw on each others resources in order to survive and thus increase interdependence towards competitors and other actors within the same product/service market. Convergence, therefore, summarizes in a change process, affecting several industries simultaneously. This chapter has suggested that the term convergence should not only be associated with technology, but also with industrial and institutional structures, as well as social and cultural norms that shape and are shaped by convergence. The following chapter raises the issues of role and position dynamics as well as acting in business networks as a means of coping with and handling convergence processes.

4. BUSINESS NETWORKS AND NETS: ANALYSING DYNAMICS THROUGH ROLE AND POSITION

The industrial network approach is examined in detail in this chapter, focusing on business net dynamics. First, the idea and logic behind the industrial network approach is presented, followed by thoughts on dynamics within business networks and how business network dynamics can be studied through the use of the concepts role and position. The chapter is summarized into a critical discussion on the industrial network approach and studying business net dynamics. The concept of network is used when reviewing the literature, wheras the analysis in later chapters is conducted on the level of business *nets*. Some researchers delimit their focus to nets, which are local concentrations in the network and may be characterized along different dimensions such as product, process, technology, geography etc. (Easton, 1992). One specific firm may nevertheless be a member of multiple nets. Möller and Svahn (2003) as well as Möller and Rajala (2007) refer to business nets as intentionally developed with specific goal(s). Anderson, Håkansson and Johanson (1994) define a focal business net as consisting of all the actors, which a focal firm perceives as relevant and within the focal firm's network horizon. Ritter and Gemünden (2003) note that a net may also refer to subnets or portfolios of relationships focusing on innovation or knowledge transfer.

4.1 Business networks – what are they?

In terms of defining business networks and describing their essence, Axelsson and Easton (1992) refer to networks as models or metaphors describing a number of entities which are connected. Business networks have also been defined as "the web of contacts which exist between suppliers, customers, and producers in industry" (Håkansson, 1986, p. 14), "sets of two or connected exchange relations" (Cook & Emerson, 1979, p. 725) and "exchange relationships between multiple firms that are interacting with each other" (Möller & Wilson, 1995, p. 9). The network approach on one hand states that a firm can develop or expand its business through interactions with other firms and, on the other hand that a firm influences and is dependent on factors in its environment, both external and internal. According to Håkansson and Ford (2002, p. 133), in their most abstract form, networks are defined as "a structure where a number of nodes are related to each other by specific threads". In a complex business market, the nodes in a network are business units and the manufacturing and service companies and the relationships between them are the threads. The threads and the nodes in the business context have their own particular content, including resource, knowledge and understanding in many different forms. The goal of networks is to gain flexibility to cope with rapidly and intensively changing markets. Networks provide an opportunity to develop skills and resources, which are needed in order to e.g. identify, and progress, innovations to commercial success (Cravens, Piercy & Shipp, 1996). Bengtsson and Kock (2000) argue that two firms can be involved in and benefit from both cooperation and competition simultaneously and present the concept of "coopetition", where two competitors both compete and cooperate with each other.

When it comes to network theory, two points can be identified concerning all firms; (1) they can be expected to seek means to develop their business and (2) they do not exist in vacuum or isolation. Companies do not survive or prosper only through their own individual efforts. This

is due to the fact that each firm is dependent on the activities and performance of other companies. Every working company exists within a complex network of interactions between companies as they exchange information, expertise, goods and services, payments and loans and other strategically important resources with each other (Wilkinson & Young, 2002). An important fact is that networks are critical for firms in the process of knowledge acquisition and verification as well as access to external resources (Welch, 1999). Because the firm gets access to strategically important resources through its relationship to other firms, the performance of the individual firm is dependent on the nature and quality of the relations it manages to develop with these other actors (Wilkinson & Young, 2002). The industrial network approach states that firms are directly and specifically dependent on those firms, with which it has exchange relationships, but the firm is also indirectly and specifically dependent on those firms which its counterparts have exchange relationships with, meaning other firms operating in the network where it is engaged (Johanson & Mattsson, 1984). In order to understand networks, their structure and processes, one should also have an understanding of the constituents, relationships, as noted by Salmi (1996). There are, however, also risks and problems involved in business networks. A network may turn out to be very "stiff". A network's strength and social relationships may turn out to be the doom for the net work. Social embeddedness may freeze dynamic exchange relationships, actors may not notice what is going on in the environment before it is too late (Paija, 1998). Networks offer firms collective benefits according to Möller and Svahn (2003). The division of labor allows network members to specialize in the value-creation activities supported by their own distinctive competence. In fact, today no firm can pursuit major innovations or systematic production offerings alone because of the dispersion of knowledge and technological resources and therefore the role of vertical and horizontal networks increases.

A network allows the firm to specialize in those activities of the value chain that are essential to its competitive advantage, enabling it to exploit all the benefits of specialization, focus and possible size. Other activities are given to other members of the network because they can carry them out more efficiently. Concurrently firms in the network enjoy the added flexibility of not having fixed commitments to activities, which are not essential to them. Also, efficiency is fostered because firms are still able to make alternative arrangements if better trading terms (quality, quantity and price) can be obtained elsewhere, regardless how close a relationship is between buyers and sellers and how long it has endured. Also, by outsourcing activities to other members in the network, firms are able to lower its cost for those activities it keeps inside because it can reap economies of scale and develop distinctive competences (Jarillo, 1995).

4.1.1 Interaction in business networks

Ford and Håkansson (2006) argue that an interactive view of business also encompasses the notion that we cannot understand business activity by looking at it from the perspective of one single company and its aims and actions. Actions of a single company are based on its interpretations of specific others and on its anticipations of the possible re-actions of those specific others in the future. Ford and Håkansson propose to look at five issues on interaction, namely time, interdependence, jointness, relativity and subjective interpretation. With *time* the authors indicate that interaction is not evenly distributed over time. There is no such thing as a new network and a new actor or a newly developed relationship does not create a new network. A new actor will, according to Ford and Håkansson, not even have but a limited

effect on the existing network. It must be kept in mind that new actors and relationships always emerge from something that pre-exist them. An actor or relationship is always related to others that already exist. *Interdependence*, on the other hand, indicates that it is only through interaction that the actor's resources can be transformed to capabilities that are of value to others. *Relativity* refers to the fact that interaction creates a relative and dynamic structure over time where actors are related to particular others. These are in turn also related to particular others. Every actor in a network has a specific position and its interactions reflect this. In the short run these positions provide the multiple and relative contexts for interaction and in the long run continuing interactions change position and structure in the network. *Jointness* indicates that when companies interact with each other their individual development will be affected by that interaction. Jointness thus reduces the importance of an actor's own intentions and increases the importance of the combined intentions of the parties interacting in relation to each other. *Subjective interpretation* means that the actions that actors perform will be based on their individual interpretation of the actions of others and the world around them. This has close connections to the concept of network pictures.

4.1.2 Business relationships

One basic assumption in the industrial network approach is the existence and significance of business relationships. Interest in industrial networks is fundamentally a result of empirical evidence that actors in industrial markets establish, develop and maintain lasting business relationships with other business actors (Håkansson, 1982; Turnbull & Valla, 1986). One fundamental requirement for the establishment and development of a relationship is that there is mutual orientation of two firms towards each other (Johanson & Mattsson, 1984). These relationships are strategic resources in several ways, e.g. a company's resources are important resources in themselves; direct relationships connect a focal company to the rest of the network of which it is part; and finally, the relationship combines the physical and organizational resources of a company with those of its counterparts (Gadde, Huemer & Håkansson, 2003). A firm may furthermore have indirect relationships, which Easton (1992, p. 15) defines as "the relationship between two firms which are not directly related but which is mediated by a third firm with which they both have relationships". An indirect relationship may be vertical (firm to customer's customer) or horizontal (firm to competitor through mutual customer). It should also be remembered that networks are opaque: everybody is aware of the existence of business relationships but no one can have a clear view of other relationships than their own (de Búrca & McLoughlin, 1998).

Business relationships are likely to be complex and long-term. According to Easton (1997), relationships are based on four elements, namely (1) mutual orientation, (2) dependence, (3) bonds and (4) investments. Their current status, or form, depends on the previous interactions between the companies. Business relationships are connected to each other and the development of any one relationship between two companies will depend on a number of factors. These might be previous events in the relationship, knowledge gained about each other throughout the period of the relationship, current events in the relationship, expectations and of course, what happens in the wider network or relationships in which they are directly involved (Håkansson & Ford, 2002). A central point in the industrial network theory is the understanding that firms develop relationships to each other through continuous exchange processes (Johanson & Mattsson, 1984). Most exchanges take place within earlier existing relationships, although occasionally some new are established, leading to a disruption of old

relationships. There can also be dependencies between companies, which can be, for instance, of technological nature. The companies use the same technology, deliver to customers with a certain technology or buy from suppliers using the same technology. Business relationships are, in fact, a key element in technological development. For a relationship to work, both sides' technologies must be aligned and fit with both companies' total activities and other relationships (Ford, 1998). The process view indicates that as partners interact, they gradually learn more about each other, and therefore the relationships are changing all the time. In other words, networks are stable but at the same time changing (Johanson, & Mattsson, 1984). Networks are thus *dynamic*, i.e. actors, relationships, needs, problems, capabilities and resources change over time.

Bengtsson and Kock (1999) found four different types of horizontal relationships which may exist at the same time. These are (1) *coexistence*, which implies that there is no economic exchange in the relationship, since it is more or less based on information and social exchanges. There are no bonds between the actors, who however are aware of each other. (2) *Co-operation* encompasses frequent business, information and social exchanges. There is a possibility of all types of bonds to emerge; social, legal/economic and knowledge being the most common ones. (3) *Competition* indicates that power and dependence is equally distributed among the competitors, based on their positions in the business network. The goals of the actors are believed to be similar and can only be achieved through business (acquiring resources) with the same buyer. (4) *Co-opetition* relationships, on the other hand, include both economic and non-economic exchanges. Power is determined according to an actor's position and strength in the business network. Actor's co-operation is based on trust and/or formal agreements.

4.1.3 A business network model – the ARA model

In the industrial network approach, both sellers and buyers are seen as active partners, and they seek to explore different benefits from, in essence, various economic exchanges. Most firms are dependent on distributors and suppliers for goods and services, since companies have only limited set of resources by their own, and the firms resources can often be changed rather slowly and at considerable cost. Therefore companies must develop relationships with other actors to enhance their own resources and to gain the benefit of those others. As a consequence of this interaction with other actors, the companies will be bound together by *actors*, *resources* and *activities* creating high interdependency between them (Håkansson & Snehota, 1995) (see figure 9 below). The model aims at making possible an integrated analysis of stability and development in industry (Håkansson & Johanson, 1992) and suggests that different actors in the industrial system carry out activities and control resources. When actors perform activities, they use (change or exchange) resources. Activities are linked in activity chains and resources are tied to activities as means used by actors when they perform activities. The propositions of the network model (Håkansson & Snehota, 1989) can be summarized as follows. Firstly, business organizations often operate in a context in which their behavior is conditioned by a limited number of counterparts, each of which is unique in pursuing its own goal. Secondly, an organization engages in continuous interactions, which provides a framework for exchange processes. Relationships enable the access and exploitation of resources of other parties and link the parties' activities together. Thirdly, capabilities of an organization are developed through its interactions in the relationships that it maintains with other parties. Thus, the identity of an organization is created through relations

with others. Fourthly and finally, an organization's performance is conditioned by the totality of the network, which constitutes interdependencies among third parties.

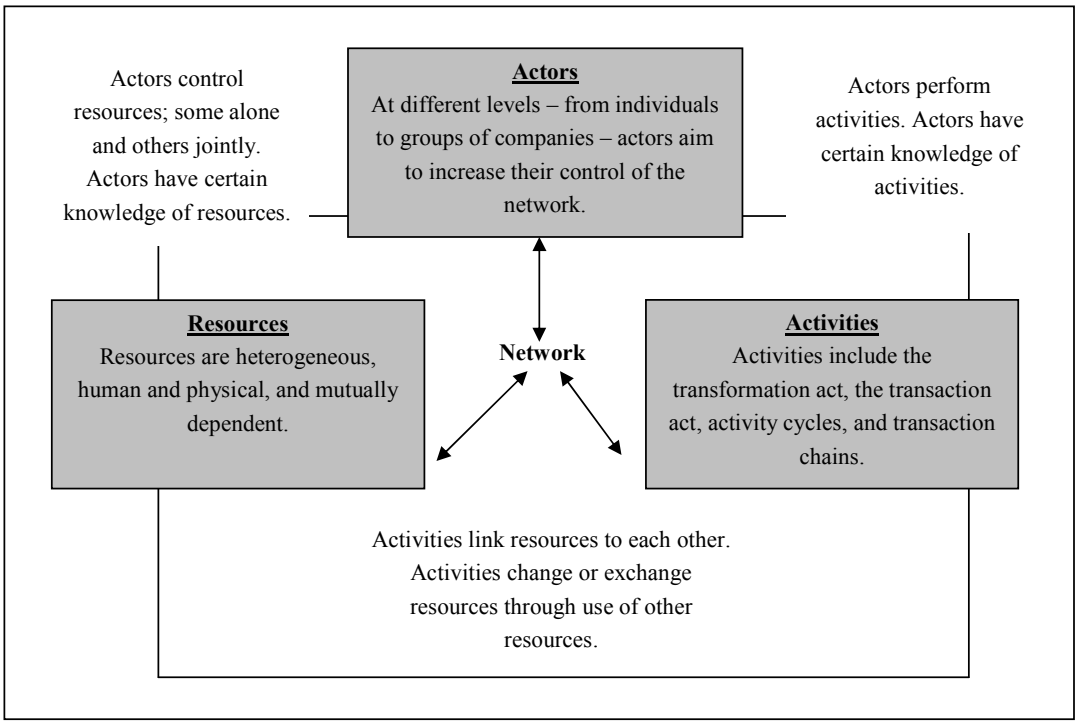

Figure 9. Network model (Håkansson, 1987, p. 17)

Actors

Actors are defined as "those who perform activities and/or control resources within a certain field" (Håkansson, 1987, p. 14). Actors can be individuals, a group of people, a division within a company, a company, or a group of companies or any type of organization or even an individual who is relevant for understanding the network. This indicates that there are actors at different organizational levels in a network. In 1992, Håkansson & Johansson developed five general characteristics in order to clarify the description of an actor. Firstly, actors control resources. Secondly, actors develop relationships through resource exchange processes. Thirdly, actors base their activities on control over resources. Fourthly, actors are goal oriented in the sense that they aim at increasing control over the network and fifthly, actors have differential knowledge about activities, resources and actors in the network. Moreover, actors are connected and controlled through different kinds of bonds (Håkansson & Johansson, 1988; Håkansson & Snehota, 1995), which develop over time and through which the companies are bound together, for instance *economic* (e.g. special credit agreements and terms of payments, *legal* (e.g. long term contracts), *technical* (common technology, product and process adjustments), *cognitive* (e.g. knowledge about the counterpart), *social* (e.g. mutual confidence and personal liking) and *planning* (e.g. logistics coordination). A network can provide both opportunities and constraints to its participants on both the individual and the organizational level (Powell, Koput, Smith-Doerr & Owen-Smith, 1999).

Activities

Actors perform activities meaning that the resources are "combined, developed, exchanged or created by use of other resources" (Håkansson, 1987, p. 15). There are two main categories of activities: (1) transformation activities and (2) transaction activities. The former are always carried out within the control of one actor and are characterized by one resource being improved by the use of other resources. Transaction activities form chains of activities, and create relationships with other actors. Activities are linked to each other in various ways and make parts of a repetitive activity cycle, where a number of independent activities are repeated (Håkansson, 1987).

Resources

According to Håkansson (1987), resources consist of (1) physical assets (machinery, material etc.), (2) financial assets and (3) human assets (labor, knowledge and relationships). Knowledge and experience of resources are vital for the company. By combining resources new knowledge can emerge which gives possibilities for new and improved combinations. New information on how to handle resources can provide companies with competitive advantages as they change or break old activity cycles and lead to development and change in the network. Håkansson furthermore points out that resources have value only in combination with other resources.

4.2 Network dynamics

Several researchers have, through the years, argued that business networks undergo change, e.g. Thorelli (1986), Håkansson (1989), Powell (1990), Håkansson and Johanson (1992), Easton and Lundgren (1992), Hägg and Johanson (1983), Hertz (1996; 1998), Anderson *et al*. (1998), Anderson, Andersson, Havila & Salmi (2000). It has been argued through the years that a network is not only a dynamic structure, but also a stable one (cf. Benassi, 1995). Benassi (1995) argues that a network is stable due to its architecture being constant, i.e. not varying, although its components can vary. The network is stable because the firm's propensity to interact with others does not change. A firm knows that its assets and competencies can be valued only if they can be combined with others and not directly controlled. Zerillo and Raina (1996) argue that firms desire to avoid conflict leads to stability in a relationship. Resistance to change is furthermore referred to as inertia. It must be kept in mind that firms do not always possess the ability or the desire to change and to adapt. The authors further consider several factors that cause inertia, for instance (1) internal considerations such as investments in plants, equipment and specialized personnel. Such things are not easily transferable and might cause a firm to stick to existing network formations. Also firms attempting to enter a network must consider the switching costs involved in such a transition. Each network member is faced with this cost. Furthermore (2) internal information deficiency indicates that one network member might fail to see the need for change and thus make it much more difficult for the new member to enter that particular network. Zerillo and Raina also point out that (3) parties of a network must have a substantial motivational investment to entertain change. New entrants often misinterpret the point where a network member is willing to consider change. (4) Political equilibrium indicates that change involves redistribution of resources that may threaten an existing power structure. Accepting a new member to the network is likely to change the power structure of the network and the dominant network actor might block such an adoption. (5) Established procedures among

network members means costs if change is adapted into the network. Also, external pressures might prevent a firm from entering a network (legal and fiscal barriers).

4.2.1 Network emergence

Networks are emergent and cumulative in character. For instance, networks are viewed as a result of historical interaction between firms and thus emerging. Axelsson (1992) argues that collective actions and common goals shared by the network members can occur, but they are not necessary in order to form a network. When it comes to causes of network formation, Zerillo and Raina (1996) mention the following reasons for network formation in the first place: (1) firms must establish relations out of necessity, (2) asymmetry means that firms want power over each other, (3) reciprocity, (4) efficiency, (5) stability and predictability and finally (6) legitimacy. Zerillo and Raina further note that most fail to take into account the fact that in the network they are trying to enter, someone is currently performing that function. Once a network is in its place, it becomes a self-sustaining system that may be much more resistant to change than would first appear (Anderson et al. 1994). Thorelli (1990) argues that network dynamics consist of entry, positioning, repositioning and exit. By position Thorelli means the location of power for an actor to create and/or influence a network.

Thus, networks are emerging phenomena that emerge as a result of interaction (practices) rather than as a result of some master-plan. For instance, when Anders Lundgren (1995) studied digital image processing in Sweden during the time period of 1975 and 1989, he came to the conclusion that new technology and business networks emerge in three stages, which are linked to each other, namely (1) genesis – identification, (2) coalescence legitimation and (3) dissemination – adaptation. In the first stage the necessary changes are taken inside the network in order to develop new technology. This usually takes place through research projects, executed either independently or together with partners in the network. The changes are evident in equipment, processes and in knowledge possessed within the firms. The second stage begins when the pioneers of the new technology have identified each other and been able to mobilize cooperative relationships with partners who are needed in developing different applications. This may lead to several development networks and the stage is characterized by cooperation. In the third and final stage, the development network is expanded to include components necessary for commercializing the technologies, products, services or applications that have been developed. What Lundgren's research shows is that the development of innovative technologies occurs through a network process (compare e.g. Miettinen, Lehenkari, Hasu & Hyvönen, 1999; Möller, Rajala & Svahn, 2004).

Möller and Svahn (2003) specifically explain the emergence of new business nets and their research is mainly based on Lundgren (1995). Möller and Svahn similarly propose three phases of net and business area formation (see figure 10), namely (1) exploring for future business which is characterized by competition between the actors and collaboration in the exploration and making sense of the application potential for emerging technologies. The phase is explorative and colored by the search of ideas, understanding and interpretation of signals. Net relationships can be of assistance, as they may increase the amount of ideas and partners may help interpret signals. The phase is completed when a specific application idea has been developed to such a degree that it offers a direction for further work on development. Phase two, (2) mobilization for applications concerns actors competing and collaborating in constructing dominant designs and applications. Actors are competing on who gets to start e.g.

a strategic net, in which the focused idea is developed into one or several commercial applications. This phase is also characterized by technical cooperation. In phase three, (3) mobilization for dissemination covers actors competing and collaborating in scaling up production and distribution nets in the competition to create markets. This phase is all about developing markets and actors are building production nets and distribution channels to serve their customers. The increasing size of the ellipses reflects the expanding nets required to transform an idea to an innovation, and turn an innovation into a viable business.

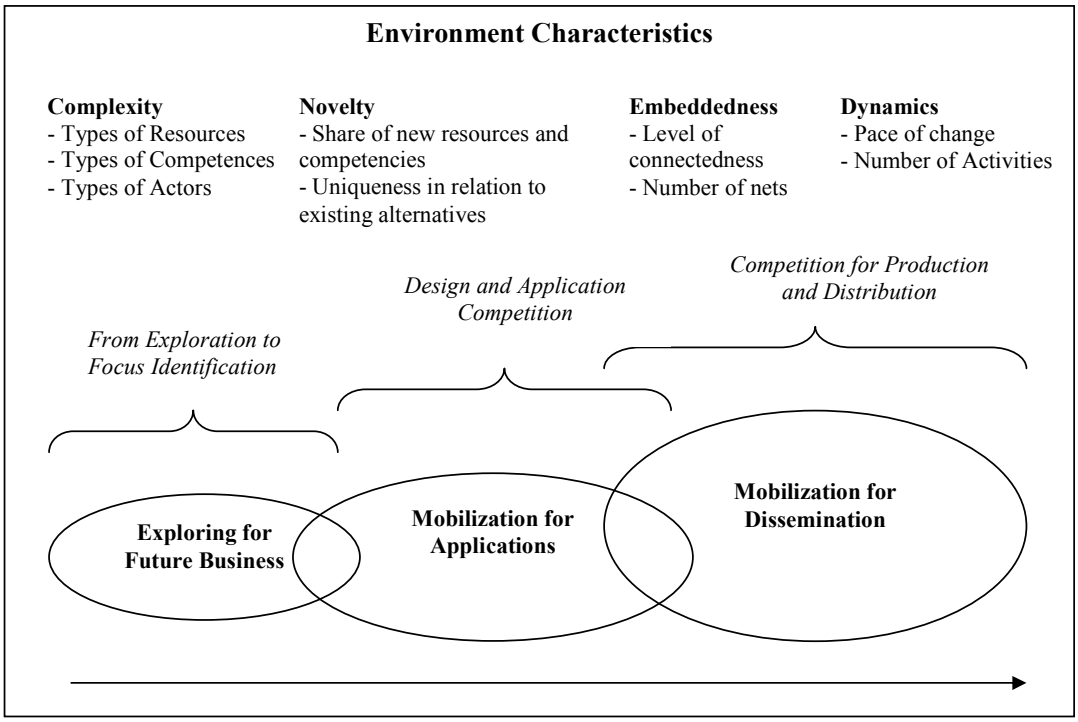

Figure 10. Stages of birth for new business nets (modified from Möller and Svahn 2003, p. 10)

Möller and Svahn (2003) also suggest that the degree of complexity, novelty, embeddedness and dynamics, shown on the top of the framework in figure 10, influence the execution of the meta tasks which constitute the phases of new business area emergence. The degree of *complexity* is determined by how many different resources, capabilities and actors are needed in developing and commercializing an innovation. The larger this combination is, the more difficult it is to realize. *Novelty* is determined by how many new capabilities and know-how is needed to develop an innovation and to translate it into a business model. It also involves the degree of unique applications offered to customers compared to existing products and services. *Embeddedness* describes which actors, on which level and how many, are needed for developing a new business model. The connection to local know-how is of importance. Finally, *dynamics* involves the development speed of capabilities and information as well as the speed, with which new actors replace old value creation models with new ones. Contrary to the above mentioned models on network emergence, it may be noted that there are no *new*

networks *per se* (Ford & Redwood, 2005). When a company emerges it does so into an existing network. However, Möller and Rajala (2007) argue that emergent networks are based on intentional actions by the actors that construct them.

4.2.2 Dynamics on a business relationship level

Activities and resources are not coordinated and combined spontaneously: they are purposefully directed by individual actors aiming at systematically influencing one another (Gadde et al., 2003). In fact, Gadde *et al.* continue that the more the actors try to influence one another, the greater is the potential for development. Therefore, ambitions of influencing and controlling others are important driving forces for network dynamics. Freytag and Ritter (2005) point out that there exists a paradox in this matter, as a company's relationships are the basis of its operations and development, but at the same time they also restrict its ability to change. Relationships are indeed built to increase stability and decrease uncertainty, but simultaneously relationships are mostly seen as the source of change. Therefore, it is important to note that stability and change co-exist (cf. Anderson et al., 1998; Freytag & Ritter, 2005).

In terms of the origin of change in business networks, Gadde, Håkansson and Öberg (1989) discuss the issue of organization theory which suggests that change originates in the external environment of an organization. According to Pfeffer (1978), change arises in the environment and the individual organization tries to adapt to change. Based on Pfeffer (1978) Gadde *et al*. (1989) draw the conclusion that organization and also distribution theory assign a passive role to the organization, emphasizing that firms do not only respond to change – they often also initiate change through their actions and reactions. Gadde *et al*. thus directed the discussion and research focus on change originating in the relationships between actors, affecting the business networks. Research on business network dynamics within the IMP tradition has therefore tended to focus on change originating in the relationship level rather than focusing on which events in the surrounding external environment stand a chance to cause changes (dynamics) in business network structures. This section reviews research on business net dynamics and summarizes the approaches within the IMP tradition.

Change sequences identified by Easton and Lundgren

Change in relationships, for instance, has been elaborated by Easton and Lundgren (1992), who have identified five change sequences. Firstly, company C requests/initiates change in the exchange relationship with B, which B in turn rejects/nullifies and thus refuses the request for change, i.e. it is not passed on as B acts as a gatekeeper. This sequence is termed *reflection*. Secondly, *adaptation* implies that change is managed between the organizations, i.e. change is managed by negotiations in the dyad, thus not influencing the rest of the network. Thirdly, if B accepts the change, *absorption* occurs, as B absorbs the impact within the boundaries of the organization. B thus handles these within own firm boundaries, i.e. the change does not have an effect outside the receiving actors. *Transmission* indicates that B transmits the change, or the effects of the change, to one or more members of the network (e.g. to A), wherein B as a nodal actor wishes to minimize the impact of the change upon itself. Finally, if B accepts the demand for a change and is both willing and able to change both the transformation and exchange activities it undertakes, this is called *transmutation* (absorption and transmission are combined). Furthermore, Easton and Lundgren (p. 94) mention *amplitude modification*, which "captures the extent to which the size, rather than the character of the change presented to the

node is modified". *Dissemination* occurs when a change is required from a nodal actor which in turn requires the network to support that change. This means that the nodal actor may involve many or a few other network members in the process.

Hertz' domino effects

Hertz (1998) points out that the impact of change can also arise through indirect relationships. Most effects of the change will be unexpected and reactions therefore difficult to plan. Hertz (p. 6) has termed this the "domino effect", which implies that "successive changes in relationships and nets have effects on the positions of organizations in a net as well as on the total network of an industry". The basic elements of domino effects are (1) connectedness, (2) speed and (3) sequence of changes. Connectedness is a prerequisite for the domino effect to start while speed is seen as a contributing factor. Sequence of changes on the other hand is considered to be the process. All of these stages are triggered by initial change. Domino effects in networks of interconnected organizations could therefore be regarded as change (establishment or breaking) of relationships, triggering a sequence of changes in other relationships. Hertz continues by saying that when changes occur in a single dyadic relationship, it means changes on a micro level. Changes of nets, on the other hand, equals changes on a meso level, while changes of networks equal changes on a macro level. Domino effects are triggered by radical changes taking place in an integrated and complex network. Also Hertz notes that relationship changes act as the base for changes in both nets and networks.

Gradual, incremental and radical changes in relationships

Halinen et al.'s (1999) distinction of change in relationships and networks are based on whether change happens within existing relationships or in the development of new ones, as in Hertz's (1996) typology of gradual and radical changes. Halinen *et al.* point out that the knowledge of how networks change and the underlying forces behind their change is still very limited. So far, incremental evolution has been seen as the main mode of network change. Håkansson and Snehota (1995b) regard change as a result of a continuous networking process, the connecting of actor bonds, activity links and resource ties within a business network. For instance, Easton (1992) views radical changes as possible but unusual. It must therefore be kept in mind that networks are stable, but not static: relationships change in response to the relationship external events and due to the transactions which help to define them. Networks do thus not have lifecycles. Rather, they change over time, merge and shift in focus and membership. Hertz (1996) strongly points out that in an industrial network there is a constant process of change as closeness and distance between firms are continuously shifting.

Kamp (2005), on the other hand distinguishes between incremental and radical change. Incremental change is referred to as adjustments within ongoing business relationships and overall stability of a network's "deep structure", while radical change is seen as changes of entire relationships including their termination and substitution of partners causing modifications in a network's "deep structure" (by deep structure Kamp means the fundamental choices which business actors have made regarding who they are connected to).

4.2.3 Dynamics on a business net and network level

Gadde *et al*. (2003) point out that one special characteristics of a network is its indeterminateness, as the usual distinction between a firm and its environment is not

advocated (Snehota, 1990) and the set of actor bonds is not given. A network does not have a natural centre or clear borders. A network is rather dynamic over time (Håkansson & Snehota, 1995a), indicating that they are loosely connected systems of actors and relationships in which no firm can dominate (Wilkinson & Young, 2002). Nevertheless, network development is not random, but based on network logic (Gadde et al., 2003), which is often difficult to interpret. However, a network may be much more resistant to change than would first appear (Andersson et al., 1994). The fact that firms do not always possess the ability and desire to adapt leads to inertia, i.e. resistance to change (see e.g. Burns & Stalker, 1961). Dynamics in networks can be understood on a basis of the interplay between a stable and a change-process dimension in networks (Anderson et al., 1998) or as Homans (1951, p. 334) puts it "[…] stability itself can only be described in terms of change". Networks are therefore in a continual process of change as relationships are established, change in their nature or perhaps cease to exist. Anderson *et al*. (1998) claim that dynamics in business networks can be understood on a basis of the interplay between the positions and roles of the actors. Henders (1992) also came to the conclusion that positions are constantly changing and it is possible to describe change by comparing an actor's position at time t_0 and time t_1. Processes of change can be either slow or radical, as Hertz (1996, 1998) already noted. According to Tikkanen and Tuominen (2000), a change process can generally be divided into manageable portions, namely (1) conception of a need to change, (2) process of transition and (3) operation of new practices or desired state. In the first stage, organizations seem to have two different strategies; either reactive response to external or internal pressures or proactive initiated change through a belief in the need for change to meet future competitive demands.

Most IMP contributions dealing with change in networks distinguish between different types of change, or different degrees of radicality and vary in content depending on the contribution (Aastrup, 2000). For instance, Lundgren's (1992) continuous and discontinuous changes are based on a distinction between change taking place in existing activities and established structures or only loosely coupled to these, whereas Håkansson and Snehota (1995) as well as Håkansson and Henders (1995) base their distinctions on the idea that network change often follows a certain pattern, path or logic. Gradual or evolutionary change follows a certain direction or pattern while radical or revolutionary change is a basic reorientation or path-breaking change. Freytag and Ritter (2005) point out that change on one level of a network introduces change on another just as stabilizing one level of a network may include change on another level.

Hertz (1992) points out that in a network perspective, change develops mainly through the mobilization and coordination of activities and resources. Hertz further notes that change at the relationship level is a prerequisite for change in nets. A change initiated by one actor must, in order to have any effect, be met by adaptations of at least some of the other actors (Håkansson, 1992). The process of breaking old activity cycles and forming new ones must be preceded or accompanied by changes in the industrial infrastructure as well. Mattsson (1987) states that the lack of balance between resources is an important driving force for change in networks and that resource distribution in networks may tend towards some sort of equilibrium, which puts the network development in process. Furthermore, Mattsson (1987) discusses change in terms of expansion and contraction of the size of the network. Håkansson (1992) further distinguishes between continuous and discontinuous change, the former referring to the processes of change founded on existing activities and the established structure

of the network and the latter referring to the processes of change only loosely related to the existing structure in the network.

Net joining, splitting, drifting away and drifting closer
Hertz (1996) presents the concept of joining of nets, splitting a net, drifting away and drifting closer as the primary types of changes in industrial networks. *Joining of nets* means that "a large and major part of two nets are changed through joining two nets" (p. 185). This scenario takes place through the establishment of a number of new direct relationships between the two networks, e.g. the formation of a strategic alliance, in which a number of organizations are cooperating between the nets. *Splitting a net* indicates that a firm leaves a number of direct relations within a very short period of time, e.g. breaking of strategic alliances or when a large group of companies in an integrated net exits almost at the same time. *Drifting closer* and *drifting away* are referred to as forms of developments of existing relationships between actors that belong to different nets, which over time are moving closer or further away from each other. Hertz continues that drifting closer or away may be an effect of either strategic action or a way to solve an *ad hoc* problem. Fombrun (1982) similarly noted that there are two basic types of evolutionary changes in networks, namely convergence and divergence (or contraction), indicating that convergence seems to be dominating. When cooperation with actors outside the network becomes increasingly important, contradiction and divergence occurs, which eventually results in a split of the net.

Structurizing and heterogenising; mobilization and coordination
Another process which changes the whole network is created through the interactions between individual companies, namely *structurizing*. This process indicates that certain relations and dimensions of the resources are given a higher priority at the expense of others (Håkansson, 1992). *Heterogenising* indicates the reconfiguration between companies already working in a network or through links to companies belonging to the network. Moreover, *mobilisation* and *coordination* (ibid.) are mentioned as processes, which influence each other. Mobilised resources must be coordinated within and spread through the network in order to lead to changes in activity cycles. Mobilization of resources and actors is a prerequisite for the emergence of new networks or rapid re-directions of established networks. Mobilisation refers to "the process of acquiring resources to achieve changes in industrial activities" (p. 160). The process encompasses newly created interdependencies or old ones changed. *Network integrative mobilisation* is the process of expanding or extending the network in accordance with existing activity cycles, while *network changing mobilisation* is the process of establishing new activity cycles or the breaking of old ones or the combining of two or more previously related activity cycles. The latter process involves either discontinuous changes in the network structure or the emergence of new networks and is more likely to occur during unstable periods in the evolution of networks. The second factor, coordination refers to the organizing of activities and relationships, also called functions and flows, within a network in order to increase the effectiveness of the activity cycle. It is furthermore a process of mutual adaptation and learning and changes the structure of and affects the distribution of power in networks.

Confined and connected change in networks
Halinen *et al*. (1999) present different concepts describing change in networks. Firstly, *confined change* indicates that the change takes place in relationships rather than in the whole network. A *connected change*, on the other hand, is a change in one relationship that is

received and acted upon by other actors in the network. Dubois (1998) argues further that a change in a network always involves changes in both companies and relationships. In fact, a company seeking change is always dependent on the approval and actions of others to achieve the change.

Change in a network at the level of a triad

Smith & Laage-Hellman (1992) furthermore discuss options for actors to transform or change the network structure at the level of the triad. Five patterns of transformation are identified. (1) By-pass which refers to the situation in which an actor wants to either avoid an intermediary actor (avoidance) by interacting directly with the third party or influence an intermediary actor through this third party (flanking). (2) Combination which refers to the strategy in which the focal actor chooses to pool resources and co-ordinate activities with a second organization in the context of their common relation to a third party. (3) Bridging which refers to the strategy in which the focal actor uses an intermediary actor as facilitator or access to a third actor. (4) Displacement which basically is a focal actor replacing a former partner with another. (5) Separation which occurs when a focal actor establishes an indirect relation as a replacement of a direct one. Two degrees of separation can be distinguished – elaboration and blocking. According to Aastrup (2000) these 'patterns of transformation' are basically categories of options possible for the single actor to initiate change. In this case the context is a triad, but this logic or understanding is applicable also for network levels beyond the triad (at least in principle).

External factors affecting business net dynamics

According to Zerillo and Raina (1996, p. 216) either internal or external factors may be the cause of change. Internal reasons for network change can include "a firm's recognition that the make or buy decision favors a change from a hierarchical arrangement to that of an exchange partner". Also, a relationship with certain network actors may require extensive formalization and contractual explication. This may cause for the members who interact with a specific party to seek alternative exchange partners (Van de Ven & Walker, 1984). Alternative exchange parties are also sought by such member that cannot agree on their scope of activities and responsibilities. External reasons for network change also exist. Often external parties must intervene in the network to initiate change (Van de Ven, Venkataraman, Polley & Gardu, 1989). Other parties that have an interest in the network or is indirectly connected to it may step in to change the current structure due to different reasons. Secondly, an external network may begin to encroach on a focal network and thus force the focal network to change or adapt. Thirdly, actions in the external environment might lead to change in the functions to be performed (government legislation, interest group protests etc.). Also, many of the factors that prevent change can also be a cause of network change. This can be for instance the government, legal or legislative mandates or increasing motivational investments by one party.

Summary

In summary, stability and change are two inseparable, coexisting features of the networking process. Change in business networks can be caused by both exogenous and endogenous factors. Exogenous factors encompass changes in the general economic conditions, social, technological and cultural developments and eventually lead to the creation of new basic conditions. Actors within the network will adapt to these external changes and initiate changes in their relationships, which in turn will be transmitted as counterparts react to others. Endogenously initiated changes will furthermore take place from a network point of view.

There will always be some good reasons for at least some of the actors to initiate changes in at least some of their relationships. Business relationships will never be in anything that can be described as 'equilibrium'. Changes initiated, for whatever reason, affect others and cause reactions and counter-reactions (Håkansson & Snehota, 1995). "[...] no change is created without activities undertaken by an actor, regardless of the occurrence of new conditions in the environment" (Gadde & Håkansson, 1992, p. 170). Actors in a network should thus be seen as important initiators of change rather than passive adapters to the environment. All change in a network must be supported by one or more actors in a network, who also actively participate in the occurring change. It must, however, be kept in mind that changes in networks result from actions and reactions and that these are closely linked to stable evolutionary processes of the total network.

According to Aastrup (2000), the basic idea in these contributions is that change emerges from micro-level, i.e. from initial actions that, depending on the reactions, might have effects in the larger network. Therefore, changes in networks can, in principle, be traced back to actions and reactions in relationships. Aastrup continues that change in networks according to the critical realist position should be viewed as processes transforming or reproducing the network structures. This is the case dealing with radical change, continuous change as well as stability. All kinds of change (or stability) should be accounted for, and should be viewed as ontologically similar. The different types of change can be viewed as nothing but empirical categorizations (Havila & Salmi, 1999). Table 8 provides examples of previous research focusing on business network dynamics and the origin of change.

Author	Relationship level	Network/net level	Origin of change
Gadde, Håkansson & Öberg (1989)	x		Internal
Easton & Lundgren (1992)	x		Internal
Håkansson (1992)	x		Internal
Hertz (1992)		x	External
Hertz (1996)		x	Internal & external
Zerillo & Raina (1996)		x	External
Hertz (1998)	x		Internal
Halinen, Salmi & Havila (1999)	x		Internal
Kamp (2005)	x		Internal

Table 8. Examples of views of origin of dynamics in business nets and networks

4.3 The concept of network position within the INA

Much of the discussion around positions is based on the contributions of Mattsson and Johanson (cf. Mattsson & Johanson, 1987; Mattsson & Johanson, 1992), where they deal with elements of network positions in discussions on investment processes in networks and firm strategies in networks. In the model position describes the relationships between activities of the firm in the network, its constructed resource base (internal and external) and its opportunities for future action. According to Henders (1992), position was seen as the main determinant of the opportunities and constraints facing the firm. In 1983, Hägg and Johanson determined that position (1) characterize the relation an actor has to other firms, (2) are results

of earlier activities in the network and (3) constitute the base which gives the development possibilities and constraints of the firm in the network.

A network position is a relative concept as no two parties' positions are alike (Håkansson & Snehota, 1989). Each company in a network has a unique position in relation to the other actors, but the position of a company is perceived differently by the various actors in the network (Gadde et al., 2003). Ford, McDowell and Tomkins (1998) define network position as consisting of a company's relationships and the rights, limitations on behavior and obligations which go with them. Easton (1992) notes that network position provides a language to talk about network changes as positions in networks are primarily concerned with the nature of network connections. Thorelli (1986) defines network position as a location of power to create and/or influence networks. According to Mattsson and Johanson (1992) as well as Koon Huat Low (1997), network position describes how the individual actors in the network are related to each other in a network structure. Time and commitment are necessary to shape the positions of a firm and position changes are not easy to achieve and sometimes even impossible. Henders (1992) offers another broad definition by describing position as how an actor fits into an industrial system. Johanson and Mattsson (1997) continue that network positions are the result of investments in exchange relationships and that a position characterizes the actor's links to the environment. The concept offers a tool to characterize network structure and network distance between actors. A limited definition of position refers purely to the network level while an extended definition of position refers also to the network level but in addition to the role the actors have in the production system (Mattsson, 1997). In addition, position has been argued to form a framework for actions (Henders, 1992). This means that firm actions are dependent on position. A firm acts according to its network position, i.e. the framework for action. This creates a view that actions, for example, might be circumscribed by position. Aastrup (2000), on the other hand, argues that network structures determine the actors' abilities to act, not the act itself. Based on these arguments, position can be viewed as a resource used by a network actor in order to access e.g. specific roles, through which capabilities are developed, knowledge gained, resources combined in ways that respond to convergence pressure etc.

A firm's current position is determined by earlier activities in the network both by the firm itself and by other firms. Network positions characterize a company's relations to other firms and are consequences of the earlier activities in the network. Mattsson (1984) presents four main characteristics of network position. The first characteristic describes the function firms are held to perform and the activities they are expected to undertake. Secondly, if the net changes the expectations change and so does the network position held by a firm. The third characteristic presents that network positions may be defined at different levels of analysis. Furthermore, macro and micro positions have been distinguished as the fourth characteristic. Macro position stands for the relationships between firms and micro position refers to the firms' relationship to the network as a whole. A fifth characteristic was added by Mattsson in 1987, namely the strength of the relationship. One should also keep in mind that positions are historically determined in that they are viewed as consequences of prior activities (cf. Johanson & Mattsson, 1985). Positions also reflect the cumulative nature of networks (cf. Forsgren, Hägg, Håkansson, Johanson & Mattsson, 1995) and balance between past and future (Easton, 1992). Therefore, building and developing positions in networks consumes time, resources and commitment.

Each firm has a position directly dependent on its relationships with counterparts and indirectly dependent on the counterparts' relationships with others in the network. Henders (1992) points out that an actor cannot get in position. Rather, an actor has a constantly changing position and tries to position itself better with respect to the network. Positions are not a dot in space, waiting to be filled, according to Henders who sees positions as existing only when they are filled. Positions are thus dynamic and disappear as the processes of the network continue. Hertz (1996) notes that establishment of new relationships and changes in old ones affect a company's network position. Henders (1992) suggests three categories of position, namely (1) the meaning of the present position, (2) the position as an idealized future state meaning the future position and (3) position as a process. A firm must develop new positions. Network positioning is about adjustment and adaptation (cf. Koon Huat Low, 1997) and most importantly the process by which the firm interprets the changing environment.

Johanson and Mattsson (1985, p. 188) further define network positions as "(a) the identity of the other firms with which the firm has direct relationships, (b) the role of the firm in the network, (c) the importance of the firm in the network and (d) the strength of the relationships with the other firms". Similarly, Mattsson (1984) presents network position as a role that the organization has for other organizations that it is related to, directly or indirectly. Håkansson and Johanson (1984) mention *strategic identity*, referring to the views about the firm's role and position in relation to other firms in the network. The definition by Mattsson implies that the firm is expected by other firms to behave according to the norms, which are associated with the position. Positions are furthermore balanced between the past and the future as history determines the current position and the future offers opportunities. Each position is unique and perceived differently by the various actors in the network (Gadde et al. 2003; Håkansson & Snehota 1989; Salmi 1996). A position has both stable and dynamic character and it is difficult to separate an actor's position and its role (Anderson et al. 1998).

Mattsson and Johanson (1992) continue that relationships are the factor that defines the position of the actor in a network. In 1985, the authors argued that network positions are the result of investments in exchange relationships. The network position strongly influences the basis for an actor's development of future exchange relationships, which eventually forms the basis for the actor's strategic actions (Mattsson, 1984). It should also be kept in mind that the position of an actor changes constantly due to the facts that (1) new relationships are developed, (2) old relationships are interrupted, (3) relationships change character, (4) the positions of counterparts' change and finally, (5) positions of third parties change.

4.4 Position in combination with role theory

The concept of role was brought in to the discussion on position in networks and linked to the dynamics of networks mainly during the 1990s (Henders, 1992; Anderson & Havila, 1993; Anderson et al. 1998). In social sciences the role concept and role theory as such have been widely used (see e.g. Linton, 1936; Biddle and Thomas, 1966; Zurcher, 1983; Broderick, 1999). According to Biddle (1986) role theory indicates that individuals behave in different and predictable ways depending on their social identities and respective situation. Stryker and Statham (1985) emphasize social interaction and individual behavior, saying that the individual social person is performing a role which is influenced by social structure. Role theory is "a cluster of social cues that guide and direct an individual's behavior in a given setting" (Solomon, Surprenant, Czepiel & Gutman, 1985, p. 102). Montgomery (1998) also

concluded that the role of an actor is socially constructed and actors should be perceived as collections of several roles. Ashforth (2000) comes to the same conclusion and states that roles are emergent and negotiable between individuals. Actors coordinate their behavior based on preferences, perceptions and interpretations, ending up in jointly defining what constitutes a certain role. Rizzo, House and Lirtzmann (1970) concluded that a role is composed of expectations and requirements about behavior. The basic idea behind role theory is to understand human behavior and for instance Biddle (1986) distinguishes between three categories of studying role. Firstly role refers to characteristic behaviors. Secondly, role is used for designating social parts to be played and thirdly, role indicates scripts for social conduct. The major generators of role are expectations, which Biddle summarizes as learned through experience and suggests moreover that individuals are aware of the expectations they hold. Role theory thus typically focuses on the behavior of the individual. Nevertheless, Mintzberg (1980) applied role theory on management and presented managerial roles. Katz and Kahn (1966) see role as a focal concept in their theory of organizations and propose that organizations are systems of role. The concept of role, according to the authors, contains elements that signify the static position of an individual among certain structures. Thus, the basic criterion for studying role is to identify the relevant surrounding structure (Katz & Kahn, 1966, quoted in Heikkinen, Mainela, Still & Tähtinen, 2006). According to Stryker and Statham (1985) roles emerge from the necessary division of labor in an organization and from the expectations of others.

According to Havila (1996) the explicit use of the concept of role can be traced back to the 1930s and has ever since been largely used especially in behavioral sciences, e.g. studying occupational roles such as teacher or nurse. Levinson (1959) defines role as something existing outside of the individual, indicating that some kind of structurally given demand is associated with a certain position, which then in turn guides the individual's actions. Levinson further suggests that if the individual leaves the position, the roles remain there and another individual can learn to perform this role, e.g. the role definition is made outside of the individual. This view is similar to Henders (1992), who argues that a position in a business network pre-exists the actor.

Drawing on behavioral and psychological sciences, Linton (1936) defines role in relationship to a position and proposes that role can be seen as the dynamic aspect of the position. Also, one position can be said to involve one role or many different roles (Havila, 1996). Depending on the situation a role is activated. Henders (1992) sees role as an activity in the way that many actors perform any one role at any one time and that each of these actors executes several roles at the same time. A role always involves other roles, such as the role of a teacher also involves the role of a pupil or a student. Bates (1955-56, p. 317) points out that "no role exists without a paired reciprocal role which is a part of a different position". On the characteristics of role, it has been noted that roles have a pre-history and are not created from scratch (Nadel, 1957).

4.4.1 Role mechanisms

Merton (1957) introduced the notion of the "role-set", indicating that X occupying a position has a set of roles which relate X to other parties with other roles. A role-set is a complex of positions in which an individual holds simultaneous membership. When one actor takes the role of another, it may or may not include adopting the standpoint of the other as one's own

(Turner, 1988). Role-taking is thus a process. Biddle and Thomas also ask questions how positions are filled and distinguish between ascribed status and achieved status. As Turner (1988) implies, actors' conceptions of themselves determine which roles they seek to play and how they will play them. The process of role-taking "involves interpreting the behavior of others as a syndrome of gestures that reveals a role" (ibid., p. 86). Role-taking begins with the use of shared role-conceptions as the basis for inputing a role and it is only when the gestures of others do not seem to correspond to these more shared and standardized conceptions that actors begin to construct a situationally unique role for others (ibid., p. 86). Role-making and role-taking are concepts that define role and define role as "the set of prescriptions defining what the behavior of a position member should be", according to Biddle and Thomas (1966, p. 29). Role-making, on the other hand assumes that individuals consciously and unconsciously orchestrate their emission of gestures in order to "make" or assert a role for themselves in situations.

When it comes to change in role, the process of changing from one role to another is referred to as *role transition*. For instance, Allen and van de Vliert (1984, p. 3) define role transition as "the process of changing from one set of expected positional behaviors in a social system to another". Role transition is believed to be an important type of change due to the fact that it strongly affects behavior and social identity of those who participate in the change process. Potential causes of role transition can be found in (1) chance events, (2) societal forces, (3) change in role senders and (4) capability or motives of the focal person or actor. Allen and van de Vliert also stress the fact that behavior is often determined less by characteristics of the person than by the part one is assigned to play. *Role distance* is seen as the efforts taken in order to differentiate the self from the role. *Role alteration*, on the other hand, indicates temporary changes in role relationships whereas a more permanent shift from one position to another is called role transition.

Role stress has emerged as a recent concept in studying e.g. entrepreneurship (Örtqvist, 2007) and assumes that not all expectations and demands are possible to meet or are very challenging for the focal person due to instances of conflict, ambiguities and overloads. Role stress consists of role conflict and role ambiguity (Kahn, Wolfe, Quinn, Snoek & Rosenthal, 1964) as well as role overload (Örtqvist, 2007). Role conflict is the degree to which expectations or demands are incongruous or incompatible (Rizzo et al., 1970) and can be caused by external and internal events (Kahn et al., 1964). Role ambiguity is a degree of unclarity or vagueness in the desired expectations which makes it difficult or impossible for a focal actor or person to respond and fulfill expectations and demands related to the role (Kahn et al., 1964). Role overload is a type of inter-sender role conflict and makes it impossible to meet all expectations and demands, e.g. due to time constraints (Örtqvist, 2007). Drawing on Levinson (1959) and Hall (1972) Örtqvist, Drnovsek and Wincent (2007) suggest role redefinition as a coping strategy to role expectations. Structural role redefinition includes altering the external conception of a focal person's role and personal role redefinition means altering the internal conception of a focal person's role.

In simple terms, role helps to describe how cooperating actors are expected to behave depending on their functions and tasks (cf. Jahnke, Ritterskamp & Herrmann, 2005). Jahnke et al. (2005) propose a number of role dimensions based on literature review, namely (1) position, which shows the relation to other positions or actors, (2) functions and tasks, (3) behavioral expectations and (4) societal interaction. The development of roles and their

patterns can, according to Herrmann, Jahnke and Loser (2004), metaphorically be described as role mechanisms. (1) Role-taking is related to expectations "which can be potentially enforced sanctions being imposed on the role actor". (2) Role-assignment occurs when one or more actors assign a concrete role to a certain actor. The actor can decide to take the role or not. (3) Role-change is taking a new role while giving up another. (4) Role-making characterizes how an actor transforms the expectations into concrete behavior. (5) Inter-role conflict indicates that a conflict between roles can occur, if an actor takes more than one role. (6) Role-definition means that tasks may be modified since existing roles are dynamic. A role always has a function of executing a certain task. There are two major approaches in role theory, which will be presented and discussed in the following section; (1) a structuralist approach and (2) a symbolic interactionist approach. "Role as a resource" is suggested as a third main approach to studying roles. Usually, role theory uses individuals as the primary unit of analysis, but in this research the unit of analysis is the organizational actors that are acting in the net through their representatives (cf. Heikkinen et al., 2006).

4.4.2 A structuralist approach

Role theory suggests that individuals behave in different and predictable ways depending on their social identities and respective situation (cf. Biddle, 1986). A basic assumption in classical role theory is that not all roles are the same. Distinctions have been made between e.g. ascribed and achieved status (Biddle, 1986), task roles and status roles (Bales, 1958), and expressive and instrumental roles (Parson and Shils, 1951). Callero (1994, p. 235) notes an important aspect, namely that these distinctions are based on structural definitions of role and "suggest a certain determinacy and stability in both roles and social structure". A structural perspective of role theory therefore assumes that roles are given in formal social structures. In terms of combining role theory with the perspectives on position in business networks, Baker and Faulkner (1991, p. 281) note that a role is, according to the structuralist view, thought to be "enacted *from* a position, meaning that a person first assumes a pre-established position and then behaves (or learns to behave) in a role-appropriate manner" (my highlight). The structuralist approach implies a certain determinacy and stability in both role and social structure and depicts that acted roles are based on position. Thus, position determines which roles an actor who holds a particular position is able to play. Also Havila (1996) notes this fact and highlights the importance of compliance with norms and expectations from other actors.

4.4.3 A symbolic interactionist approach

Montgomery (1998) argues that the role of an actor is socially constructed and actors should be perceived as collections of several roles. Roles are therefore emergent and negotiable between individuals. Actors coordinate their behavior based on preferences, perceptions and interpretations, ending up in jointly defining what constitutes a certain role. A role is thus composed of expectations and requirements about behavior. According to Biddle (1986), this view corresponds with the symbolic interactionist perspective of role theory, according to which roles evolve through social interaction and for instance, changing role also alters goals and self-conceptions of an actor/individual. A structural perspective of role theory, as already noted, assumes that roles are given in formal social structures.

According to a symbolic interactionist approach, roles are first claimed and then enacted into positions, i.e. roles are used in order to create positions and their relationships, or social structures. In other words, according to this approach a role does not exist without individuals; whereas a structural approach sees roles as given by a particular position (see e.g. Havila, 1996). Thus, roles are first claimed and then enacted into positions. Roles are used in order to create positions and their relationships, or social structures.

4.4.4 A "role as a resource" approach

Similarly to the symbolic interactionist approach, Callero (1994) notes that roles are not viewed as consequences of one's position in a social structure; roles must be claimed before they are enacted into positions. Roles can thus be used for e.g. granting access to other types of resources. Baker and Faulkner (1991) argue that a role actually is a resource in two senses, namely it is a means to claim, bargain for, and gain membership and acceptance in a social community. Secondly, it grants access to social, cultural, and material capital that actors exploit in order to pursue their interests. Baker and Faulkner use the concept of "role as a resource" as a tool to analyze the process by which roles are used as resources in order to create new positions and social structures in a specific context, such as a business network, for instance. This view suggests that a position does not necessarily pre-exist a role. Rather, roles are used in shaping positions, an approach similar to the symbolic interactionist approach. However, roles under the "role as resource" perspective, are regarded as tools, which are "used in a competitive struggle to control other resources and establish social structures" (Callero, 1994, p. 230). The resource perspective is therefore concerned with *how* roles are used in order to establish structure. Roles are viewed as making action possible, and without the role, certain types of actions may not be possible: "Most roles follow a similar pattern in that restrictions on social accessibility tend to be concentrated on claims of self-definition" (Callero, 1994, p. 237). Positions are unique to each actor, whereas roles are universals that are maintained independent of the actor. Callero (1994) furthermore notes that if role is viewed as a resource used in producing action and constructing social position, the idea of role being defined as a set of expectations, as is the case in the structuralist approach, may be misleading.

4.4.5 The link between network position and role theory

Network position is a concept that has emerged simultaneously with the industrial network approach, whereas the concept of role has gained research interest only during the last decade. Anderson *et al.* (1998) strongly point out that one cannot discuss position without referring to role (and vice versa). However, the link between position and role within the IMP tradition is not always clear. The difference between role and position is sometime vague, a problem not many researchers address. Attempts at this have foremost been made by Henders (1992) and Havila (1996).

Mattsson (1985) implies that the firm is expected by other firms to behave according to a set of norms, which are associated with the position. Thus, one can assume that the position pre-exists the role(s), since the expectations of behavior are linked to a position in a business network. This largely corresponds with the structuralist approach to roles and assumes that a firm may use its position in order to orientate in a business network. The position becomes a

resource, by which certain role(s) are accessed. On the other hand, Andersson *et al.* (1998) propose that role is a construct of the meanings of a situation and an actor can change the situation by acting in a role, therefore also changing its position in a process of e.g. role-taking. Role can thus be seen as the dynamic or processual aspect of position and describes what actors intend to do and how they construct meaning from their position. Research on role and position within the IMP tradition largely assumes a symbolic interactionist approach on role, arguing that positions can be influenced and shaped through acting in certain roles. Actors are viewed as active in constructing their business environment, i.e. their reality. Consequently, position is shaped by the role(s) an actor chooses to act. The symbolic interactionist approach implies that roles are created by individuals in interaction. In business and management studies a structuralist view of roles is largely adopted. A structuralist approach on role assumes that the position determines *which* roles an actor can act. Roles are therefore consequences of the position an actor has. The position concept locates an actor in a structure or system, but role is viewed as the dynamic aspect of position (Havila, 1996). For instance, Håkansson (1987, pp. 217-219) comes to the conclusion that a company has a position and acts in a role. Therefore, the structuralist view on role implies that the firm is restricted in its framework of action and merely enters a pre-existing social structure in order to fill a position and perform specific role(s). The question that rises out of this perspective on the different approaches to role is whether actors are actively shaping the environment they act in or whether they are restricted based on predetermined social structures such as business networks. Nevertheless, Havila (1996) points out that it is always individuals who act and build up relationships with counterparts. Building on the fact that a relationship is the result of an interaction process, the role(s) of a company is created and modified "through the interaction process between the individuals" (ibid, p. 35), thus saying that role and position in business networks indeed follow a symbolic interactionist approach rather than a structuralist approach. Analysing actors' roles from different perspectives (structuralis, symbolic interactionist and "role as a resource") may indeed explain firm behavior, establishment of relationships within business networks, entry into business networks and dynamics based on actors actively shaping and influencing their position in relation to other actors. Table 9 summarizes the approaches.

Approach	Implication
Structuralist	An actor's position determines role(s)
Symbolic interactionist	Position can be influenced by acting in role(s)
Role as a resource	Roles are enacted into positions

Table 9. The link between role and position

4.4.6 Role and position as indicators of business network dynamics

When it comes to the operalization of positions, Henders (1992, p. 102) suggests that a snapshot view of position allows for the "detection of opportunities for and constraints to action through consideration of the fit of resources in the network". First of all, one actor cannot by itself implement change and as already noted by Håkansson (1987) resources have value only in combination with other resources. This leads to constraints and opportunities for change. In the early research where position was included, Johanson and Mattsson (1985) pointed out that e.g. the lack of resources restrains change. Henders continues by stating that how actors are related to each other and the network impacts the process of change. Position is

thus proposed to contribute to the actor's capability to affect change processes. Positions are thus constantly altered through the process of change. Change, on the other hand, initiates a sequence of additional change, such as changes in activities would demand changes in resources, which eventually may result in changes in actors.

The discussion of using the role-concept in network theory has recently been associated with the question whether business networks can be managed (cf. Heikkinen et al., 2007). It is suggested that networks in their broadest sense cannot be managed by one single actor (Easton, 1992; Ford, Håkansson, Snehota & Gadde, 2002; Håkansson & Ford, 2002), whereas some researchers (Möller & Halinen, 1999; Möller & Svahn, 2003: Ritter, Wilkinson & Johnston, 2002) argue that managing *in nets* is possible. By managing in nets is mostly meant the capability to influence the net. Heikkinen *et al*. (2007) note that managing in a net is about managing interactions with others, not about managing others. Heikkinen *et al*. (2007) present a number of roles for actors involved in developing mobile services for a sports team, i.e. (1) webber who initiates net connections by deciding which potential actors should be contacted for executing the development process, (2) instigator, who causes change to the net by influencing other actors' decision making processes, (3) gatekeeper, who possesses significant resources and has a certain level of power in making decisions and influencing other actors, (4) advocate, who has a role in the background, distributing positive information about the service (may be e.g. a financier), (5) producer contributes to the development process, (6) planner participates in the development process by giving input in the form of intangible resources, (7) entrant and (8) auxiliary, which was not perceived to have any role in the operative process but at the end of the process took an active part. Network level roles identified were (1) facilitator, (2) compromiser, who balances the actions and relationships within the net through their willingness to step aside from the development process in order to avoid conflicts, (3) aspirant who aims at becoming a part of the net and (4) accessory provider, who finds opportunities to promote their own products, services and expertise in the development process. One of the interesting points that Heikkinen *et al.* (2007) make, is the fact that none of the actors acted only in a single role during the development process and that actions of actors determine their roles. Thus, management in a net occurs through the roles in which the individual, company, and network actors act. However, the study was highly context-specific and generalization of the roles identified is hardly possible.

Positions are nevertheless perceived in different ways depending on who is looking at the actor and why. According to a structuralist approach to role theory role "provides the pattern according to which the individual is to act in the particular situation" (Berger, 1963, p. 95). However, Henders (1992) points out that this definition does not allow for multiple roles and suggests that (1) many actors can perform any one role at any one time and (2) each of these actors execute several roles at the same time, which Henders refers to as "the multiplex idea". If role is defined as an activity of the firm in the network, Henders further argues that it then remains consistent with the activity/actor/resource frame: "A role thus becomes an aspect of the actor's contribution to the functioning of the existing network logic and more importantly its contribution to change in the network. This is opposed to the patterns or expectations attached to a position" (Henders, 1992, p. 90).

Network change is proposed by previous IMP-related research to foremost start at the relationship level, which in turn leads to changes on other levels, i.e. actor and network. These triggers of change sequences are thus mainly seen as internal to the business network.

Some researchers have proposed external triggers for change, but research on role and position have mainly focused on internal triggers of change so far. The network approach is in its simplest terms focused on describing how one or several focal actors fit into a network and, for instance, Håkansson (1987) has proposed the ARA-model as a basis for understanding the markets as networks approach. Henders (1992) notes that an actor can initiate change e.g. trough new product introduction, but also, the lack of resources may restrain change (Johanson & Mattsson, 1985). Håkansson (1987) points out, that resources have value only in combination with other resources. One actor cannot implement change single-handedly.

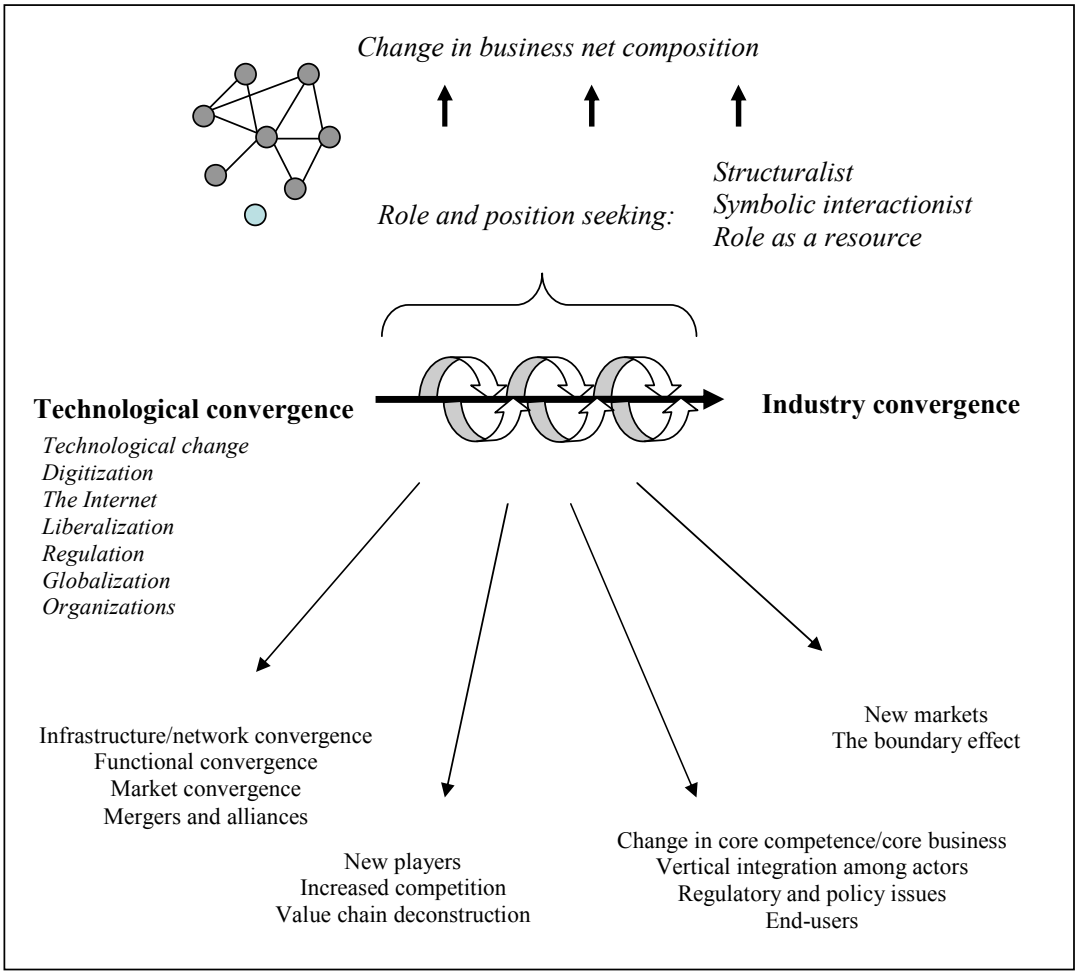

Figure 11. A model for studying change in business networks through role and position

Based on the theoretical review presented in this chapter a model (see figure 11) for studying change in business networks in a convergence setting through the concepts of role and position is proposed. The model combines position and role theory from a sociological perspective, drawing on the categorizations of role theory into the structuralist, the symbolic interactionist and the "role as a resource" perspectives. The model shows that an actor's position in a network determines the role(s) an actor has in the business network in terms of which

functions and tasks it executes in relation to other actors. The network position shows how the actor fits into the industrial system. The framework for action of the actor is dependent on the role(s) the actor possesses. Roles can be achieved or assigned. Roles are not static and a change in one actor's role may be that actor's input towards change rather than its importance in maintaining status quo in the network. Roles or the framework of action for an actor in turn affects other actors, resources and activities in the whole network, which per se leads to change. The model focuses on internally triggered change processes in its current form.

4.5 A critical view of the industrial network approach

The industrial network approach has been developed for several decades, but understanding change from various perspectives still remains on the "to do"-list. Most IMP contributions dealing with change in networks distinguish between different types of change, or different degrees of radicalism. Change in networks must basically be understood as being a process of practice that transform or reproduce network structures. However, even though there is quite extensive research on the dynamic dimension of networks, very few of these studies take the context into account. Of course, in the words of Aastrup (2000, p.12) "studying change at network levels as being modified by individual change episodes (actions and reactions) is analytically a very complex task (or perhaps impossible)". Håkansson and Lundgren (1995) acknowledge the existence of multiple centers of origin for change, which makes this kind of analysis very complex. However, since the INA suggests that an actor is embedded in the business network (cf. Halinen & Törnroos, 1998), and that networks can in themselves be viewed as a description of context (cf. Möller & Halinen, 1999), this would also mean that there is a link between the context and the actor, i.e. an actor is affected by the context in which it is acting. In the study convergence is considered to be a process that symbolizes change and characterizes the industry and thus also business networks and business nets. The INA and discussion on business net dynamics should focus more on contextual analysis of change processes. Furthermore, the nature of change is not dealt with to a large degree, at least not at the network level. Currently, we know a number of typologies of change on a relationship level, perhaps leading to change on a network level (depending on the actions and reactions of actors). We also know that change originates on a relationship level (micro-level) and the dyad is seen as both the transmitter and receiver of change (cf. Havila & Salmi, 1999). What we do not know much about can be summarized in the following questions:

1. What is the nature of change?
2. Is there interplay between industry-specific context and dynamics in business nets/networks?
3. Does the industry context affect the relationships?
4. Can change in business nets/networks originate in the external environment/context?
5. How does role seeking influence dynamics in emerging business nets?

In fact, our knowledge is not only limited concerning the nature of change, the importance of external factors as drivers of network change and the role of the context in business network dynamics. Our knowledge is also limited when it comes to information about emerging networks, short-term networks, and networks of project-based nature, to name a few examples. How do roles and position of actors in emerging networks contribute to business net dynamics, assuming that the role set is not yet determined and actors are still seeking their positions? How can we understand business net dynamics in a specific setting? For instance, telecommunications is a rapidly changing industry sector due to technological advancements, the influence of regulation, battles over technological standards, price wars, outsourcing etc.

How can we analyze this particular sector through a network perspective if we do not take the surrounding setting into consideration? The study claims that the context is too important to leave behind in such an analysis and therefore the INA is considered to leave much to be desired in its theories and models on change processes and business net dynamics and the use of role and position as analytical tools. Relationships in telecommunications do not necessarily have to be of long-term nature. If this is true, then how does it affect change originating on a relationship level? How does it affect change in general? Several questions arise when one attempts at analyzing telecommunications through the INA. The prime reason why the INA would be appropriate for analyzing telecommunications lies in the fact that it is recognized that actors are embedded in the context.

Furthermore, according to Kamp (2005) the INA implies that actors in a network are a fixed group of pieces on a chessboard that can change their positions and mutual strategies, but the basic line is that few or no new chess pieces enter the game. In telecommunications development runs fast and for several years, actors within the industry have struggled with increased competition and new entrants. The fact that there have been time periods when a large number of actors have tried their best to position themselves in the industry is something that the INA cannot explain and does not take into account. The INA implies that whenever a new entrant tries to enter a network it must be remembered that there already is a member in the network that performs that particular activity, which the new entrant wishes to perform. On the other hand, in telecommunications the technological development is rapid and there might not be a member in an existing network that has the know-how, resources, to perform a new type of activity. Thus, a new position and role is created within a network. Knowledge about network expansion is also quite scarcely presented in the main INA researches.

Concerning role and position, the distinction between the concepts is a matter of confusion. The theoretical review has established that an actor may either act in one or several roles, which are directly based on the position that actor holds. The other alternative is that an actor is able to influence and possibly change its position through acting in role(s). One approach states that the roles of an actor are fixed based on a particular position while the other give an actor opportunity to control positions through acting in roles. There are yet no distinctive research focusing on this aspect of role and position, i.e. how does business nets evolve and form taking into consideration that the actors which are net members are actively shaping their roles and positions in ways that fit their purposes. The roles and positions also align with convergence processes and challenges derived from the actors' external environment. The interaction between role and position has not been covered within the IMP literature to a large extent.

4.6 Summary

The network approach offers conceptual tools to study the dynamics in business markets (Halinen et al., 1999). One might ask the question whether networks really exist or are they merely analytical tools. Henders (1992, p. 17) argues that "the use of networks" could also be considered as a kind of working hypothesis which forces the analysis to consider the actors and their connections, which is essential for understanding a certain phenomenon that occurs in the industrial system. Based on the review of the INA the analysis will focus on change through the use of role and position as measures of change. Changes in networks can be traced back to actions and reactions in relationships, but few previous research link the discussion on

business net dynamics to role and position. Role and position are considered to be analytical tools in the discussion on change and dynamics. Roles may be adopted by a network actor in order to shape and form a position (the symbolic interactionist approach). According to the structuralist approach, the position of an actor determines the role(s) that actor may perform in the business network.

A model for studying business network dynamics has been suggested. The model builds on a theoretical review of the concepts of role and position, both from a sociological and an industrial network point of view. The actors' intents become important in the discussion as they drive the change, which takes place in a business network or net, by acting in roles and seeking positions. In the following chapters the setting of the study is examined closer, after which role and position as means of reaching change is lifted back into the discussion. The next chapter focuses on the methodological aspects of the study by discussing choices of studying dynamics in business networks, which are embedded in environments characterized by convergence.

5. HOW TO STUDY BUSINESS NETWORKS AND CONVERGENCE PROCESSES – METHODOLOGICAL ISSUES

In this chapter the research process is elaborated and presented. The research process has been challenging in many ways. After several years of pondering, discussing, reading, presenting research proposals at different doctoral tutorials, I finally landed in the current field of study – *change*. Basically, I wanted to learn what *change* meant for the telecommunications industry and its players. *Change* is the key word in this thesis, as convergence denotes change and business networks are dynamic by nature. In this chapter I will present the research process and which assumptions I base my analysis on. My analysis is highly dependent on the way I see the world and relate to society as a social construction. Research methods are usually divided into methods where the researcher is an observer to the phenomenon being studied and methods where the researcher is participating in that being studied (Holme & Solvang, 1997). This ultimately affects the choice of methods in the research design as well as the method of analysis.

When it comes to the purpose of the research process, Collis and Hussey (2003), among others, distinguish between exploratory, descriptive, analytical or explanatory and predictive research. In exploratory research, the central idea is to gain "insights and familiarity with the subject area" (ibid., p. 11). Typical techniques associated with explanatory research include case studies, observation and historical analysis. Descriptive research, on the other hand, describes phenomena as they exist. The approach is used to identify and obtain information on the characteristics of a specific problem or issue. Analytical or explanatory research is a continuation of descriptive research and here the researcher goes one step further from only describing the characteristics, i.e. to also analyzing and explaining why or how a particular phenomenon is happening. Predictive research aims to generalize from the analysis by predicting specific phenomena. In this research, an *explanatory research* type falls most natural, as the aim is to understand the change and convergence processes in business networks in a telecommunications setting.

5.1 Starting points for the research

The term research paradigm refers to how research should be conducted. In more sophisticated words, as written by Collis and Hussey (2003, p. 46), "the term research paradigm refers to the progress of scientific practice based on people's philosophies and assumptions about the world and the nature of knowledge". A researcher's basic beliefs about the world are thus reflected in the way the research is designed and how data is collected and analyzed. The term paradigm itself can be used in different ways, and for instance Morgan (1979) proposes three different levels for the term. (1) At the *philosophical level* the term reflects basic beliefs about the world. (2) At the *social level* it provides guidelines for the researcher's conduct of endeavours and (3) at the *technical level* the term specifies methods and techniques which should be adopted when conducting research. The two main research paradigms are labeled *positivist* and *phenomenological* (Collis & Hussey, 2003). These two paradigms present two main assumptions, namely the *ontological* assumption and the *epistemological* assumption.

5.1.1 Ontological assumptions

Ontology concerns the question whether social reality should be apprehended as something exterior in relation to social actors or as something these social actors create or shape (Bryman, 2002). One of the key questions, as stated by Snape and Spencer (2003), is whether there is a common and shared social reality. The authors further state that there are three distinct positions, namely realism, materialism and idealism. *Realism* claims that there is an external reality which exists independently of people's beliefs or understanding about it. *Materialism* also claims that there is a real world, but only material features such as economic relations hold reality. *Idealism*, then, indicates that reality is only knowable through the human mind and through socially constructed meanings. There are a number of different perspectives of these three positions, e.g. Hammersley (1997) believes social phenomena exist independently of people's representations of them but are only accessible through those representations. This is labeled *subtle realism*. Hatch (1997), on the other hand, presents the following ontological perspectives: classical, modernistic, symbolic-interpretative and post-modernistic. Bryman distinguishes ontologically between objectivism and constructionism. Objectivism means that social phenomena and their meaning exist independently of social actors, whereas constructionism states that social phenomena and their meaning is something that social actors continuously create. Therefore a researcher's description of a social reality becomes constructions. For instance, a category (such as convergence in this study) can be a social construction since the world is constructed when people talk about it, write and state arguments for their ideas (Potter, 1996). However, according to Schauman (2003) the different distinctions that the above mentioned authors use are mainly only a difference in vocabulary. Collis and Hussey (2003) present a figure (figure 12 below) where the difference between positivist and phenomenologist becomes clearer and the researcher can position his or her ontological stance.

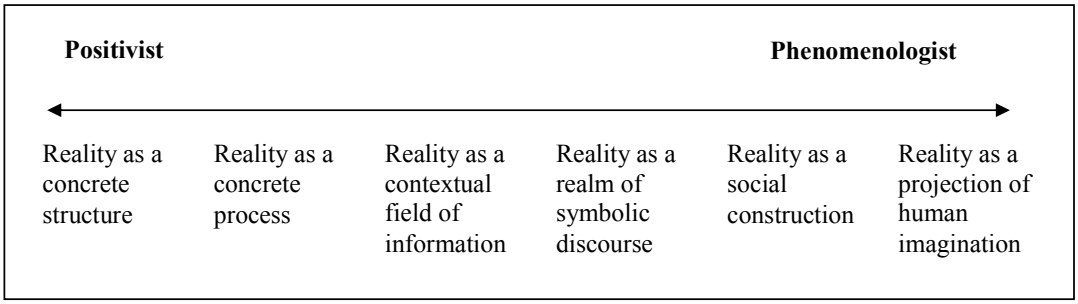

Figure 12. Continuum of core ontological assumptions (Collis & Hussey, 2003, p. 51)

In terms of an ontological stance or what is possible to know about the world, I believe that the social world does not exist independently of individual subjective understanding. I also believe, following on Hammerley's "subtle realism", that individual subjective understanding is accessible to us via informants' interpretations, which in turn are interpreted by the researcher. My ideas about ontological issues are also closely related to the constructionist ontological perspective according to Bryman. I believe the informants in this study create their own social reality and therefore they also create the context around them and try to make sense out of it in order to effectively make decisions, set up strategies and do business in general. Also, the data collection method chosen in this study allows for simultaneous construction of

meaning in the interviews. The interviewer and the interviewee concurrently construct meaning and paint reality during the process of the interview. I assume that reality is "subjective and multiple as seen by participants in the study" (Collis & Hussey, 2003, p. 49), rather than objective, singular, and apart from the researcher. I therefore land at the right side of the continuum in figure 12, e.g. at "reality as a social construction".

5.1.2 Epistemological assumptions

Epistemology concerns assumptions about how we obtain or create knowledge (Starring & Svensson, 1994). Collis and Hussey (2003) as well as Bryman (2002) explain epistemology as related to the study of knowledge and what we accept as being valid knowledge. The relationship between the researcher and what is being researched is therefore under examination. A positivist believes that only phenomena which are observable and measurable can be regarded as knowledge and position themselves as independent and objective to that being researched, whereas phenomenologists interact with that being researched, i.e. try to minimize the distance between the researcher and that being researched. According to Bryman (2002) phenomenologism is a philosophical stance that regards the question of *how* individuals create meaning in their world and how the philosopher (or researcher in this context) can put aside his or her own apprehensions when it comes to understanding that world. Using this approach, a researcher is often concerned with double interpretations as the researcher tries to interpret other individuals' interpretations. A phenomenologist is therefore concerned with interpreting individuals' actions and social world based on the individuals' own perspectives.

There are further different perspectives on these issues and for instance Bryman (2002) distinguishes epistemologically between positivism and an interpretive perspective. Hatch (1997), on the other hand, presents objectivism and subjectivism as the two main epistemological perspectives. When it comes to my own epistemological stance, I believe that the issues I am researching were there before I discovered them, but on the other hand I am studying the perceptions of various managers' view of the industry. Participants in a study view reality as subjective and multiple and the researcher thus focuses rather on the meaning than on the measurement of social phenomena. I am in this sense not completely detached from what I am researching. However, my epistemological stance falls most naturally under phenomenological research, believing that reality can be interpreted through the observation and experience of others. I am biased in my interpretations, even though I try my best to stay as objective as possible to that being researched. I interact with the informants and in a way we make sense of the structural changes in the telecommunications field together, even though the informant is the one indicating the direction of the interpretations during interview sessions.

5.1.3 Axiological assumptions

Axiological assumptions involve values. Positivists believe that the research process is value-free and unbiased. They see themselves as detached from that they are researching and "regard the phenomena which are the focus of their research as objects" (Collis & Hussey, 2003, p. 48). These objects were present before the positivist researcher even took interest in them and during the research process, the objects are unaffected by the researcher and his/her research

activities. Phenomenologists, on the other hand, view the research process as value-laden and biased. Researchers have values and believe to be involved with that which is being researched (Collis & Hussey, 2003). From my point of view as a researcher I am interacting with what I am researching, as opposed to being independent from it (epistemological perspective). I also realize and admit that I am value laden and biased, not value free and unbiased like a positivistic researcher considers him or herself (axiological perspective).

5.1.4 Towards a qualitative research design

Since a phenomenological approach is used, and the goal is to gain an understanding of a phenomenon, the choice of research approach falls rather natural under qualitative research. According to Bryman (2002) qualitative research encompasses an interpretative approach and aims at understanding the context from the perspective of the actors being studied (Hirsijärvi & Hurme, 2000). Furthermore, the research problem states which kind of research method is used, a qualitative or quantitative approach (ibid.). As mentioned above, qualitative approaches primarily take a perspective of understanding. The aim is to gain a deeper understanding of the problem being studied (Holme & Solvang, 1997). A researcher that uses a qualitative approach is furthermore, according to Holme and Solvang, interested in structures and links, description and understanding. The researcher tries to see the world according to that being studied, i.e. sees the phenomenon "from the inside". Therefore, due to my epistemological and ontological stance, I primarily base my research design on qualitative methods of data collection and analysis.

5.2 The research design

A research design is actually an action plan for getting from here to there (Yin, 1984). My overall research design is firstly guided by my research paradigm and reflects my research assumptions. The reality of the interviewees is shaped by the subjective experiences they have. This means that knowledge is constructed based on the actor's experiences. Conducting surveys does not seem to be a sufficient method in gathering rich and descriptive data. An experimental design is out of the question as I as a researcher have no control over that being researched. Therefore, as the focus is on one single setting and adapts a process view of reality, case studies, critical event analysis and process studies were chosen as methods for this particular research. These choices will be explained and motivated in the following section.

5.2.1 Systematic combining as a principle for the research design

Deductive research involves developing conceptual and theoretical structures which are then tested by empirical observations, whereas an inductive research approach develops theory from the observation of empirical reality (Collis & Hussey, 2004). Alvesson and Sköldberg (1994) and Kovács & Spens (2005), however, present an alternative approach, namely the *abductive approach*. According to Kovács and Spens (2005) the abductive approach originates in the insight that most great advances in science neither followed the pattern of pure deduction nor of pure induction (see also Kirkeby, 1990; Taylor, Firscher & Dufresne, 2002). The method is a kind of combination of deduction and induction bringing new elements into the method. Perry (1998) argues that it is unlikely that any researcher could genuinely separate the two processes of induction and deduction. During the research process the empirical

observation slowly reveals itself to the researcher, where after, for instance in my case, I return to the already prepared theoretical framework and refine or revise it. The authors point out that there is a specific understanding involved in the abductive approach, which cannot be derived from a deductive or inductive approach solely. Similarly, *systematic combining* as presented by Dubois and Gadde (2002) follows abduction rather than induction or deduction, allowing the theoretical framework, the empirical findings and the case analysis to evolve simultaneously. During this process, "the research issues and the analytical framework are successively reoriented when they are confronted with the empirical world" (ibid., p. 554). Accordingly, the preliminary analytical framework will be affected by what is discovered during the data generation and interpretation (Coffey & Atkinsson, 1996; Dubois & Gadde, 2002). On the other hand, predetermined conceptual frameworks may also restrict the researcher. In the study systematic combining has been used as a guide for performing abductive research. Abductive reasoning starts at the point at which an observation does not match existing theories and systematic combining starts in an attempt to create a framework that matches the phenomenon under study (Dubois & Gadde, 2002). Firstly, a theoretical framework was created, after which a pilot study revealed "unexpected observations" (cf. Alvesson & Sköldberg, 1994), which could not be explained by the existing theoretical framework. The theoretical framework was amended and the main study was conducted (interviews and content analysis of annual reports), after which the sub-cases were selected. Systematic combining allowed for new insights about convergence and business net dynamics by examining theses from a new perspective (cf. Kovács & Spens, 2005), which in the study involved role and position.

5.2.2 Processual research

Some studies take the approach of only studying the results of the process, not the process itself and thus describing how things change over time. However, processual research is capable of generating sound knowledge, not only of processes and outcomes but also of why and how outcomes are differentially shaped by processes (Van de Ven 1992; Pettigrew 1997). Therefore, the focus in processual research is on the temporal and interconnected nature of change, and the influence of subjective attitudes and perceptions and outcomes of change (Tikkanen & Tuominen, 2000). According to van de Ven (1992) a process is (1) a logic used to explain a causal relationship in a variance theory, (2) a category of concepts that refer to activities of individuals and organizations and (3) a sequence of events that describes how things change over time. Pettigrew (1997) defines a process as a sequence of individual and collective events, actions, and activities unfolding over time in context.

Sztompka (1991) (quoted by Tikkanen & Tuominen, 2000) argues that the ontological assumptions of social reality, which guide the processual research, include an explicit recognition that change is multifaceted and that social reality is a dynamic process. Social processes are thus constructed and created by human agents (individual or collective) through their actions. Action occurs in the context of encountered structures (Giddens 1979). The interchange of action and structure occurs in time and is cumulative. This means that the legacy of the past constantly shapes the emerging future (Pettigrew, 1997). Based on this logic, Pettigrew (1990) points out that any theoretically sound and practically useful processual research should explore the context, content and process of change and dynamics together with their interconnections through time. Cycles of deduction and induction best characterize the process research (Pettigrew, 1997). Pettigrew (1997) points out that the aim of

a processual analysis is not to produce a case history but a case study. In the study, convergence is perceived to constitute the context, in which actors are embedded. The context influences business net dynamics as well as industry change. Thus a processual approach is adopted, where the context (convergence) is investigated in detail and the content and process of change and dynamics is studied with reference to both the industry and the business net level during a certain period of time, namely 1985-2005.

5.2.3 Historical reconstruction and sensemaking

The research involved both a historical background reconstruction of the industry development and the process behind convergence thinking. Hence, the study involved retrospective, although first hand, accounts of relevant events. The research therefore reconstructs thought systems in the informants' own terms and language. Sensemaking, on the other hand, is something that exists and that can be examined (Weick, 1995). Sensemaking is not about interpretation. Rather, it is about "the process that culminates in interpretation" (Craig-Lees, 2001, p. 514). Geersbro (2004, p. 3) defines sensemaking as the process by which people "come to terms with the event we perceive in the world: how we establish or create some kind of meaning that allows us to cope with enormous complexities". Weick and Sutcliffe (2005, p. 409) define sensemaking as "turning circumstances into a situation that is comprehended explicitly in words and that serves as a springboard into action". Based on Mills (2003) the authors view sensemaking as the primary site where meanings materialize and inform and constrain identity and, specifically, action. Sensemaking is also about the interplay between interpretation and action. Action thus takes a central role in the sensemaking process. For instance, Weick (1995) points out that without action, there is no sensemaking. Czarniawska-Joerges (1992) continues that sensemaking depends less on e.g. shared goals, but more on shared actions.

Weick (1995) describes sensemaking in terms of a number of properties that stress its dynamic, social and retrospective nature. The making of sense is a process that has seven identifiable characteristics described in the following section. (1) Sensemaking is grounded in identity construction, indicating that "the sense maker" needs to establish and maintain an identity in order for the sensemaking process to begin. The sense maker undergoes continuous redefinition and the identity is, according to Weick, constituted out of the process of interaction with other human beings. (2) Retrospective means that people can know what they are doing only after they have done it. By this Weick (pp. 25–26) indicates that "it is only possible to direct attention to what exists, that is, what has already passed. […] whatever is occurring at the moment will influence what is discovered when people glance backward". The creation of meaning is thus an attentional process. Sensemaking also includes expectations about the future. (3) Enactive of sensible environments is a property by which Weick describes the fact that people shape and are shaped by the context in which all sensemaking takes place. (4) A social dimension indicates that sensemaking is a social process since meanings are intersubjectively shared (a collective mind). Sensemaking is thus "never solitary because what a person does internally is contingent on others" (p. 40). (5) Sensemaking is ongoing; it neither starts nor stops. It is a dynamic process. (6) Sensemaking is focused on and extracted by cues, indicating that people can make sense of anything and they tend to see the product rather than the process. Finally, (7) sensemaking is driven by plausibility rather than accuracy, meaning that sensemaking is an individual activity. The interpretation need not be accurate, merely plausible and acceptable. Accuracy is secondary to

plausibility due to e.g. the need to filter information (data, signals) or otherwise they would be overwhelmed by incoming information.

5.2.4 The theoretical framework

According to Yin (1984) a theoretical framework needs to state the conditions under which a particular phenomenon is likely to be found as well as the conditions when it is not likely to be found. In this study a theoretical framework was developed as a base for the empirical data collection. After stating the aim of the research as well as the research questions, the relevant theories were summarized in a literature review. This became the theoretical framework, consisting of specific parts of the industrial network approach and extensive material on convergence processes. The theoretical framework served as a basis for the choice of data collection method and guided the interview themes and questions in the interview guide.

5.3 Data collection

A researcher with a phenomenologist perspective has alternative ways of collecting data, such as observations, documents, content analysis, or etnomethodological interviews. My main source of data for studying the process of change was through interviews. Several researchers characterize in-depth interviews, or person-to-person interviews, as a "conversation with a purpose" (Merriam, 1998; Collis & Hussey, 2003). Interviews are conducted in order to obtain a special kind of information. Merriam points out that interviews are necessary when we cannot, for instance, observe behavior, feelings or, which is more relevant for this study, how people interpret the world around them. Interviews are also useful when we are interested in past events that are impossible to replicate. Furthermore, interviews combine structure with flexibility and are interactive in nature. The material is, in other words, generated by the interaction between the researcher and the interviewee (Ritchie & Lewis, 2004). The interviews allowed me to focus on my main methods of research, namely critical event analysis and case studies. The interviews were flexible and allowed the interviewees to recall which critical incidents had triggered an event or caused change in both the industry as well as business networks. The dynamics of the industry and between the actors was discussed through the interviewee getting an initial question and the researcher spinning forth on that particular topic without any beforehand prepared questions. The informants' opinions, interpretations and experience of convergence and convergence processes were also discussed freely due to the choice of using interviews as a primary data collection method.

Content analysis of secondary sources such as annual reports, research conducted by telecom companies and consultants were also included in the study. Concerning data collection for the mobile TV case, I also participated in seminars and events, during which presentations and discussions focusing solely on mobile TV took place. The events were organized by MobileMonday and Forum Virium.

5.3.1 The informants

In-depth interviews were conducted with key persons representing Finnish telecommunications operators and related companies. Related companies in this setting are handset manufacturers and for instance, content providers, content packagers, suppliers and

partners from the media and IT industry participating in existing business networks. A majority of the informants had been employed in the telecommunications sector for a longer period of time. Some had experience since the 1970s and were very much able to discuss the evolution of business networks as well as convergence related issues. The informants representing telecom/ICT/media companies were all employed on a middle or top management level. Furthermore, industry experts were also chosen as interviewees for the research in order to get an unbiased view of the industry and its evolution. Several of these informants had previously been employed within the industry or worked as telecommunications consultants or had switched to other industries. Representatives from the policy- and regulation side also participated in the study. According to Miles and Hubermann (1994, p. 34) it is also important to "work a bit at the peripheries" and talk with people who are not considered to be central to the studied phenomenon. They should, however, be neighbors to it, which means talking to people that no longer are actively involved, to dissidents and renegades as well as eccentrics. A majority of the informants were basically observers of the phenomenon convergence and it can be said that they were "outside" of the studied phenomena, whereas some of the informants were literally working with convergence issues and tasks, but on a technical level. They were, in other words, a part of the studied phenomenon (Holme & Solvang, 1997).

The informants were contacted via e-mail in the first round and via telephone if a response was not given within a week. More than 40 requests for interviews were sent via e-mail. Very few answered negatively but several of the contacted persons were hard to reach via telephone as well and were thus assumed not to be interested in participating in the study after several unsuccessful attempts to contact them. Some of the contacted industry players (mainly MVNOs) announced that they were laying down mobile telecommunications activities and therefore did not want to participate in the study. Anonymity was promised to all informants. Since the telecommunications industry in Finland has a very limited number of major firms, there would be a real risk that readers would be able to deduce who some of the informants are. A total of 38 interview sessions were held with 39 informants. The main interviews took place between February 2006 and April 2007. The following table summarizes which types of firms are represented in the study, including also informants from the pilot study conducted in late 2005.

Type of actor	Number of informants
Media sector	4
IT/ICT sector	1
Telecommunications handset manufacturer	5
Telecommunications incumbents	6
Mobile telecommunications sector	8
Regulatory authority	5
"Co-operation organizations"	3
Industry experts	5
Industry consultants	2
TOTAL	**39**

Table 10. Type and number of actors participating in the interviews

The background of the informants varied to a large extent. Around 70% of the informants were engineers specialized in telecommunications and engineering. Approximately 15% of the informants had studied business mainly, 10% were lawyers and 5% had other or no formal educational degree. Concerning their positions in the companies, 21% worked as technology managers, and 13% as managers in the mobile division of the company or as responsible for sales, products and services or research and development concerning mobile communications. 30% of the informants were CEOs or CFOs. 10% of the informants were classified as industry experts (retired, moved to another industry, worked as consultants) or employed at regulatory offices or organizations related to the telecommunications industry. The remaining group or informants (26%) were managers on a middle level of the organization, with various kinds of tasks related to mobile communications and technology development.

In terms of quoting informants, full anonymity was promised. The informants are labeled by number and a letter is used as a code for indicating which category an informant belongs to. The categories are (X) telecommunications (telecom), (Y) media, (R) regulatory authorities including the regulator (FICORA), MINTC and the Finnish Competition Authority (FCA), and (S) independent consultants and/or industry experts. For instance, if an informant is/was active within the telecommunications industry, this is indicated by the letter X. If the informant is/was active within the media sector, this is indicated by the letter Y, and so fort. Table 11 gives a complete account of the informants and their background as well as the date and duration of the interviews.

Informant ID	Industry	Company type	Position	Telecom focus		Interview	
				Fixed	Mobile	Date	Duration
S1	Telecom	-	Consultant/ industry expert			26.4.2005	2:41:11
X2	Telecom	Local operator	CEO	x		17.10.2005	1:57:23
R3	Telecom	Regulatory authority				18.10.2005	2:18:07
R4	Telecom	Regulatory authority				18.10.2005	1:31:41
X5	Telecom	Local operator	Sales manager	x		19.10.2005	1:19:46
X6	Telecom	National operator	Director, products & services	x		10.11.2005	1:57:43
X7	Telecom	National operator	Development manager	x		11.11.2005	1:59:19
X8	Telecom	Handset manufacturer	Director, multimedia		x	16.11.2005	2:27:00
X9	Telecom/ ICT	Cooperation organization	CEO		x	24.2.2006	1:39:20
X10	Telecom	Cooperation organization	CEO	x	x	27.2.2006	1:07:02
X11	Telecom/ ICT	Cooperation organization	CEO		x	28.2.2006	2:13:32
X12	Telecom	National operator	Director	x	x	1.3.2006	2:12:40
X13	Telecom	National operator	Director, products and services	x		2.3.2006	2:23:03
X14	Telecom	National operator	Vice president, R&D		x	10.3.2006	3:15:41
X15	Telecom	National operator	Director	x	x	15.3.2006	1:48:47

Informant ID	Industry	Company type	Position	Telecom focus		Interview	
				Fixed	Mobile	Date	Duration
X16	Telecom	Handset manufacturer	Vice president, operator sales	x	x	16.3.2006	1:56:28
X17	Telecom	Handset manufacturer	Senior vice president, technology advisor	x	x	17.3.2006	1:45:52
Y18	Media	Broadcaster	Director			20.3.2006	59:42
X19	Telecom	Handset manufacturer	Director, technology	x	x	20.3.2006	1:20:47
X20	Telecom	Local operator	Director	x	x	21.3.2006	1:49:23
X21	Telecom	National operator	CEO	x	x	22.3.2006	1:36:13
X22	Telecom	National operator	Senior vice president		x	23.3.2006 5.4.2006	2:11:10 2:41:30
R23	Telecom	Regulatory authority	Director			29.3.2006	1:17:02
S24	Telecom	-	Consultant/ industry expert	x	x	29.3.2006	2:18:40
Y25	Media	Broadcaster	Vice president			3.4.2006	1:04:58
S26	Telecom	-	Consultant/ industry expert	x	x	21.4.2006	1:28:53
X27	Telecom	National operator	CEO (former)	x	x	9.5.2006	53:37
X28	Telecom	Handset manufacturer	Developer (techn.)		x	10.5.2006	59:47
X29	Telecom	National operator	CEO		x	12.5.2006	1:11:01
Y30	Media	Broadcaster	Senior vice president (techn.)			12.5.2006	1:18:20
Y31	Media	Broadcaster	Director (techn.)			12.5.2006	1:18:20
X32	Telecom	National operator	Vice president (techn.)	x	x	15.5.2006	59:16
Y33	Media	Distributor	CEO			23.5.2006	1:00:31
X34	Telecom	National operator	CEO (former)	x	x	7.6.2006	1:05:45
X35	Telecom	National operator	CEO	x	x	7.8.2006	46:14
X36	Telecom	National operator	Manager (techn.)		x	13.9.2006	1:18:50
R37	Telecom	Regulatory authority				20.9.2006	1:19:10
X38	Telecom	National operator	Manager (techn.)		x	27.3.2007	1:57:28
S39	Telecom	-	Consultant/ industry expert		x	16.4.2007	1:14:19

Table 11. Informants and their background

5.3.2 Transcription of interviews

All interviews were tape recorded in order to be able to fully concentrate on the dialogue and to make notes during the interviews. Transcriptions of recorded interviews were done during October 2005 and April 2007. This was done simultaneously with the data collection process.

The transcription was done word-by-word in most parts. Parts where the interviewee would discuss a topic irrelevant to the study were not transcribed word-by-word. Notes on the topics were however made in the transcription. Preliminary analysis was done during the transcription and noted down for the coming data analysis. An assistant was hired to do the transcription of five interviews. These transcriptions were double checked in order to ensure quality of the transcription.

5.3.3 The interview guide

The interview guide (see appendix 1) was prepared in advance and based on the theoretical framework and research questions, as already noted. The interview guide was divided into three themes, namely (1) the mobile communications sector (change and evolution, critical events), (2) the actors in the industry (relationships, networks, role and position) and (3) convergence (definition, processes, and outcomes). The first theme aimed at furthermore opening the discussion and letting the interviewees openly reflect on the evolution of the industry and which, according to their opinion, were critical events that had affected the industry, the markets, the individual company and their environment (e.g. relationships to other actors, position in business networks etc.). In the beginning of the data collection process a large part of the interview was devoted to this theme. After a while a certain point of saturation was achieved as the same information was provided by the interviewees over and over again. Eisenhardt (1989) argues that one should stop collecting data when saturation occurs. At the end of the process I controlled the interviews more tightly and did not let the informants spend more than a third of the requested time on this topic, i.e. 15-30 minutes. This also meant that the questions related to this theme were more focused on the most critical events that the interviewee wished to shed light on.

The second theme was quite broad and encompassed discussions about the actors, their business environment, especially relationships to other actors. The concepts of role and position were introduced by the interviewer unless the interviewee him- or herself mentioned these concepts. The dynamics of the industry was the main issue and included both network and business relationship analysis from the interviewees side. A few interviewees drew pictures (e.g. of business networks) and provided me with information in forms of documents, statistics, printed presentations and speeches etc.

The third theme introduced convergence. If the interviewee had mentioned convergence earlier during the interview I would usually ask a few initial questions on that topic, i.e. change the order of questions and later return to those questions still to ask concerning other themes. The interviewees were asked what they think convergence is, how it affects the industry, the company and their business relationships, roles and positions. This topic was in general discussed wildly and passionately.

If the informant was a representative of a regulatory authority, I focused on the first and third themes and let the informants discuss the second theme only briefly, concentrating on role, position and market structure. The interview guide was sent prior to the interview only if the interviewee requested the questions beforehand. Approximately half of the informants wished to receive the questions beforehand. They were sent as a PDF-document via e-mail about one week prior to the scheduled interview.

5.3.4 The interviews

The selection criteria set for the informants were (1) long experience in (mobile) telecommunications; preferably employed in a Finnish telecommunications company since the early 1980s. (2) Interest in and perceptions/ideas/knowledge about convergence and a wish that (3) the informant would be a manager at middle- or top-level, who would thus be able to discuss partnerships with actors within and outside the telecommunications industry as well as comment on engagement in business networks. The interviews were semi-structured and open-ended. A semi-structured interview means that the features of the questions are the same to all interviewees but the interviewer might change the order of the questions. The interviewees responded to the questions in their own words. The order of the themes and questions were changed quite often in order to make the interviews run smoothly. The stimulus equivalence, or asking the same questions in the same way to all informants, was disturbed in the beginning of the interview process, as eight preliminary interviews (the pilot study) were conducted in order to test the interview guide. The questions were modified or reformulated a few times in the process of data collection. If the informant was a representative of a regulatory body, the interview guide was changed to fit with the background of the informant and the interviewer focused on certain questions. Such an informant would not be expected to be able to discuss company strategy or relationships between specific actors, even though such questions were asked briefly but they were not emphasized.

The first phase in the interviews was to remind the informants that the interview was fully confidential, and that I would ask the informants approval before publishing any results. The following phase was to ask the informants some general questions, such as their job experience and experience of telecommunications. The purpose with these questions was to make the informants relax and to create a certain amount of trust between the informants and me. This part of the interview typically lasted between five and ten minutes, but I felt it was quite necessary for the overall atmosphere of the interview situation.

The interviews lasted on average one and a half hours, the shortest being approximately 45 minutes and the longest three hours and 15 minutes. All interviews were tape recorded and transcribed. Most of the interviews were done at the offices of the informants, while two were carried out in a restaurant. Thus I was able to make sure that the interviews were done in a peaceful and uninterrupted environment (except for the ones conducted in restaurants), which improved the quality of the recordings. This arrangement also ensured that the informants did not have to worry about someone overhearing what was discussed during the interview.

The interview sessions were all characterized by interactivity. The material was generated by the interaction between the researcher and the interviewee. I asked an initial question based on the interview guide and encouraged the interviewees to talk freely when answering the questions. The following question was much dependent on what the interviewee responded, if there was a need for additional questions on that particular topic or if the next topic could be dealt with. Interviews were conducted mainly in Finnish. Swedish language was used in five interviews.

There are possible memory losses of the informants as the study concerns the past 20 years. However, distortion of information can be detected by checking the plausibility of the account and the reliability of the interviewee (Whyte, 1982; Merriam, 1998). Merriam continues that

one should compare an informant's account with accounts given by other informants, documentary material and observing the situation. Especially the information on the evolution and critical events in mobile telecommunications given by the interviewees has been compared to both other interviews and to existing documents, annual reports and other literature. If an interviewee remembered wrongly when an event took place, this was noted during the data analysis and compared to other data and information.

During the pilot study the method of snow ball sampling was used. The snow ball sampling strategy, also referred to as chain or network sampling (Merriam, 1998, p. 63), involves asking each participant or group of participants to refer the researcher to other participants. Basically the researcher finds a few key persons and asks them, in connection to the interview situation, to refer the researcher to other individuals (Hirsijärvi & Hurme, 2000; Bryman, 2002). The limitation that occurs when using this method is that the sample will not be representative of a population. However, according to Bryman (2002), the result of qualitative research should be generalized to theory, not to populations.

5.3.5 The pilot study

A preliminary study was conducted between October and December 2005. Eight managers active in telecommunications companies were chosen as informants. The informants were informed of the fact that the study was in its early stage and therefore the questions were quite broad. The interviews were tape recorded and transcribed. They were analyzed during November and December 2005, i.e. simultaneously with the data collection. After the pilot study I chose to deepen myself in the theoretical part of the study in order to make the interview guide more precise. The goal was to be able to make more accurate and useful interview questions for a next round of interviews, which then would encompass sub-cases within the main case study. The pilot study done in 2005 was merely a way of testing some initial ideas and interpretations of the changes going on in the industry. The interview guide was modified based on the findings from the pilot study. The themes in the interview guide remained the same, whereas questions in each theme were specified and modified. For instance, the approach of studying business network change through role and position was added after the pilot study, as the data showed that the industry actors are, and have been for a longer period of time, searching for a role and a position on the constantly changing market and in relation to the other actors. Due to the fact that every informant mentioned "role-seeking" and "position on the market", I chose to integrate this issue in the theoretical framework, as it also a major part of the industrial network theory (thus following the principle of systematic combining, see section 5.2.1).

The pilot study also gave access and pre-understanding of the evolution of the telecommunications sector and which critical incidents had shaped the market(s). Convergence was discussed wildly and also implied some initial opinions on the topic and several angles were brought into the light, which later was included in the final interview guide. Also, the pilot study helped me focus on a few questions from the initial interview guide and forced me to narrow down the themes and to find the very most important questions; those that were relevant in order to find answers to my research questions.

5.4 Data analysis

Ritchie and Lewis (2004, pp. 56-57) distinguish between naturally occurring data and generated data. The former involves, among others, observation and documentary analysis and relies on the researcher's interpretation. The latter, on the other hand, involves interviews and therefore means that "the participants have a direct and explicit opportunity to convey their own meanings and interpretations through the explanations they provide", i.e. dealing with double interpretations. According to Hirsijärvi and Hurme (2000) the actual analysis means summarizing, classifying and interpreting. Merriam (1998) points out that data analysis is the process of making meaning.

5.4.1 Case studies

Easton (1995), Eisenhardt (1989) and Yin (1989) all propose that case studies are beneficial in situations where only little is known about the issue at hand and in situations where current theories seem inadequate. Case studies allow the study of a contemporary phenomenon, which is difficult to separate from its context, "but necessary to study within it to understand the dynamics involved in the setting" (Halinen & Törnroos, 2004). Case studies are therefore optimal for studying convergence processes and business networks, as the context is complex, but the issues cannot be separated from it. Business networks must, in this case, be analyzed in their current setting and context, which in telecommunications is characterized by convergence processes, implying change on several levels of the economy and society in general.

According to Yin (1984), case studies can be exploratory (what?), descriptive or explanatory (how? why?). The types of research questions, the extent of control over actual behavioral events and the degree of focus in contemporary or historical events will determine which strategy to use. Stake (2000), on the other hand, distinguishes between three types of case studies. (1) An instrumental case, in which the case is of secondary interest and plays a supportive role. The case more or less facilitates the understanding of something else, contrary to the (2) intrinsic case, where the case itself is of interest. (3) A collective case study indicates studying several cases in the same study. Both the instrumental and collective case studies require the researcher to choose the case(s). When it comes to case selection criteria, Stake (2000) argues that one should examine the case from which we feel we can learn most and that the primary criterion for case selection should be the *opportunity to learn*. In qualitative case studies, it should be remembered that the researcher is the primary instrument of data collection (cf. Merriam, 1998). Jensen and Rogers (2001) divide case studies into three categories, namely (1) longitudinal (analysis of events over a certain period of time), (2) pre-post study (assessment before the studied phenomenon as well as a follow-up after e.g. implementation) and (3) a snapshot study (a description of an entity at a single point in time). The case in this study has been performed as a longitudinal study, whereas the industry evolution description offers both a longitudinal as well as a snapshot perspective. The main case in the study is the Finnish telecommunications sector and its context, i.e. convergence processes and interaction between mobile operators or business network dynamics. Three sub-cases were chosen due to their ability to offer insight into these issues.

Halinen and Törnroos (2004) point out that there are four major challenges of case research when it comes to analyzing business networks. These are (1) problem of network boundaries,

(2) problem of complexity, (3) problem of time and (4) problem of case comparison. In this research these factors are of importance, as the pure notion of convergence implies blurring industry and network borders and the issue at hand is characterized by a high degree of complexity. Halinen (1998) proposed that business relationships are perceived to emerge, evolve and dissolve in a continuous and interactive process between companies (processual case study approach). In analyzing my case study (the Finnish telecommunications sector) and sub-cases (mobile TV, Aina Group and MTV Handy) I have found the processual case study approach to be useful. Pettigrew (1990) also noted that processual research requires interpretation of patterns in events, which makes processual case study approach applicable with critical event analysis. The idea is therefore to study cases as a process and implement critical event analysis on the processes identified in the case studies. Ontological assumptions of social reality guiding the processual research include recognition that change is multifaceted and that social reality is a dynamic process (Sztompka, 1991). The unit of analysis is change occurring in relationships and nets in the telecommunications industry. According to Hertz (1998) industrial networks can be analyzed on four different levels, namely (1) the single organization, (2) the relationship, (3) the net, meaning a sub-network in the total network (Easton, 1997) or (4) the total network.

5.4.2 Critical event analysis

Critical event analysis is used during in-depth interviews to generate qualitative data. The informants are asked to identify specific incidents or events which they may have experienced personally and which had an important effect on the final outcome. The emphasis is on incidents rather than vague opinions. Critical event analysis is a way of identifying events that may have a positive or a negative influence on the system under review. Critical incident technique, as labeled by Flanagan (1954, p. 335) is a "procedure for gathering certain important facts concerning behavior in defined situations". Initially, Flanagan developed this technique within the field of psychology. Flanagan concentrated on an observable activity (the incident). The intended purpose of this activity seems to be clear and its effects seem to be logical. This means that the incident is critical. It is important to remember that critical incidents are not things that happen and exist independently of an observer and await discovery. Critical incidents are rather created (Angelides, 2001). The basic point is that incidents happen, but critical incidents are produced by the way we look at a situation. Edvardsson and Luukkonen (1996) define a critical event as an element in a process which a person, e.g. client or an actor, initially experiences as abnormal.

This technique is especially useful when (1) the topic researched has been scarcely researched or documented (Grove & Fisk, 1997) or (2) as an exploratory method to increase knowledge about a little-known phenomenon (Gremler, 2004). (3) Critical event analysis can also be used when a thorough understanding is needed for describing and/or explaining a phenomenon (ibid.). (4) The technique is effective when studying a phenomenon for which it is hard to specify all variables a priori (de Ruyter, Kasper & Wetzels, 1995), i.e. it is an inductive method that needs no hypotheses as patterns are formed as they emerge from the responses. This, according to Olsen and Thomasson (1992) allows the researcher to generate concepts and theories.

There is no reason why this technique could not be used in business studies as well – in fact it is being widely used – in order to establish which critical events occurred for change to take

place. Angelides (2001, p. 429) argues that "an analysis of critical incidents can be used by researchers interested in collecting qualitative data quickly as a method for doing a case study". According to Gremler (2004) critical event analysis allows informants to choose and determine which incidents are the most relevant to them for the phenomenon being investigated. This is in other words the informants' perspective in own words (Edvardsson, 1992) and the content is developed entirely from the informants' perspective. Friman (2000) continues that categorizing critical events consists of (1) developing knowledge on the area to be investigated, (2) developing guiding principles for distinguishing critical incidents from other incidents, (3) developing categories as well as rules defining inclusion and (4) actually categorizing the critical events.

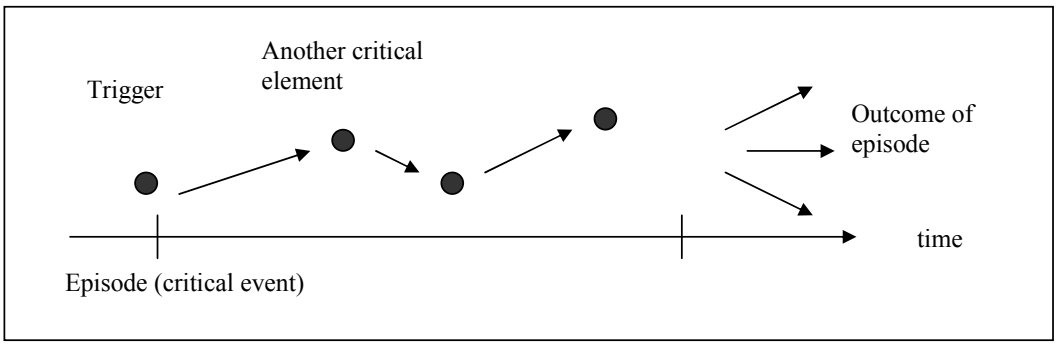

Figure 13. Illustration of critical event (Olsen, 1992, p. 147)

There are, however, a number of disadvantages with the method, such as informants being asked to remember a particular event and the reasons for their choice is not evident (Collis & Hussey, 2003; Edvardssson & Luukkonen, 1996). The informants may also be unable to remember important facts or "rationalize events to impose a certain logic and coherence which did not exist at the time" (Edvardsson & Luukkonen, 1996, p. 165). Memory lapses are also noted as a drawback of the critical incident technique. Furthermore, informants may be misunderstood or misinterpreted (Gremler, 2004). Since the technique relies on events being remembered by informants and requires the accurate and truthful reporting an informant might also misinterpret the event. An informant might not want to or have time to tell the whole story as well (Edvardsson & Roos, 1992).

A critical incident or an event can also be studied using the event structure analysis (ESA) (see e.g. Griffin, 1993, 1994; Heise, 1989) which is used to "analyse history as a sequence of events" (Stevenson, Zinzow & Sridharan, 2003, p. 2). Events are here seen as happenings that are significant in understanding the history of a process. Events may be causally linked to each other and parallel series of events may occur simultaneously. Some events can be seen as critical turning points in a process and some events lead to multiple streams of events. Events may also merge on one significant event. ESA is a rule, driven and formal technique of narrative analysis and its aim is to clarify causal linkages between events. For instance, a "non-event" may prove to be significant in the sequence of events or the event structure. This technique is rather special and its focus is on the event structure. In this study, the purpose is not to analyse the structure of critical events that have occurred in Finnish telecommunications related to convergence, but rather to identify the critical events. Whether they are linked to

each other will be discussed if there is a need for it and certainly some kind of structure of the identified critical events may be detected. However, the predominant aim is not to analyse a structure of the events but to point out which the events are that are/were critical for the process of convergence and/or change in business net to take place.

Using critical event analysis in studying business networks

A critical event is an incident that triggers radical change in a business dyad and/or network. It is the impulse that allows tension to be realized and the network to reconfigure (Halinen et al., 1999). Critical event is the concept for occurrences that trigger changes and which are decisive for relationship evolution (Halinen, 1997). Critical events should not be interpreted as negative events, simply as "decisive" events which can open up "windows of change" (Kamp, 2005). Holmlund and Strandvik (1999) conclude that critical incidents represent potential instances of change in business relationships. They also represent instances of turbulence in an otherwise steady flowing stream of interactions in a business relationship. The authors do not consider a critical incident to be an objective issue; it is rather regarded in terms of how it is perceived by involved individuals. Furthermore, Roos and Strandvik (1996) suggest that a study of critical incidents should include four elements: (1) the initial state of the relationship, (2) the trigger invoking the critical incident, (3) the process, and (4) the outcome of the incident. The sources of the trigger may lie in changes in the buyer, seller, interaction, competitor influence or general environment. It is interesting to note, that most authors studying phenomena using critical incident techniques (cf. Elsässer, 1984; Liljegren, 1988; Halinen 1994) all refer to events and happenings related to change processes and specific interaction episodes and use the concept "critical event" to refer to events that affect the relationships. According to Holmlund and Strandvik this concept differs from the definition of critical incident. Holmlund and Strandvik (p. 12) argue that "what makes an incident critical is that it derivates from what is expected and, as a result of this, catches attention and thus triggers different perceptual reactions". What may be perceived as a critical incident for one might be a routine for another and therefore Holmlund (1997) suggests a division of incidents into routine and critical based. Edvardsson and Roos (2001) argue that an incident is critical when the observed consequences of it are clear (cf. Roos, 1998, 1999). Triggers of critical incidents may be (1) the selling firm, (2) the buying firm, (3) interaction in the relationship, (4) the network or (5) in the environment (Holmlund & Strandvik, 1999).

In categorizing critical events Hedaa and Törnroos (1997) suggest to look at events from two perspectives, namely (1) internal forces (intra-net related forces) and (2) external forces (extra-net related forces: political changes, natural forces, regional and global changes, competitors, new inventions). There are, according to the authors, two sources of events, namely man and nature. The distinction is that the actions of man can be intended or unintended, whereas nature has no intentions (e.g. hurricanes, tsunamis). The event is seen as the core for understanding change in business networks. Critical event analysis in this study where applied, has the goal of identifying critical events and categorizing them. This process is more deductive than inductive. For instance, Medlin (2004) points out that interaction in business networks takes place between three analytical levels, which are (1) firms, (2) relationships and (3) network. Since social and economic exchange occurs in time, is executed by human beings, it is also influenced by human perceptions of time. Medlin (2004) thus argues that any understanding of the interaction process can only be reached from a human perspective. Past time holds the memories and interpretations of selected events. Medlin cites Mead (1932) and suggests that this selection of past events is likely to be based on what is required to

understand the present and its attendant future possibilities. This view is quite similar to the ideas of Weick (1979). The view of the past and future can only be given meaning in the present.

5.4.3 Data reduction

Miles and Huberman (1994) propose a system for data analysis encompassing (1) data reduction, (2) data display and (3) conclusion drawing and verification. Data reduction refers to organizing the mass of data and somehow meaningfully reducing or reconfiguring it. Data reduction is the process of "selecting, focusing, simplifying, abstracting and transforming the data that appears in written-up field notes or transcriptions" (Miles & Huberman, 1994, p. 10). Even before the data is collected anticipatory data reduction occurs in the form of decisions made by the researcher on conceptual frameworks (often without full awareness), selecting cases, research questions and data collection approaches. The data reduction process continues until a final report is completed.

Data analysis can take place in different ways. Purposeful for this research would be classification and coding, or category construction. Coding is simply the process of categorizing and sorting data. Codes serve as devices to label, separate, compile, and organize data (Charmaz, 1994). Merriam (1998) mentions category construction as an intuitive process, which is systematic and informed by the study's purpose. There is a continuous comparison of incidents and informants' remarks with each other. Categories should furthermore reflect the purpose of the research and categories can be thought of as answers to the research questions. The data analysis was assisted by computerized software, Nvivo, which was chosen due to the program's ability to form categories and handle large amounts of data and documents. Computer-assisted data analysis is questioned by many researchers, who are skeptical towards whether the researcher looses parts of the rigor in analyzing or relies too much on the "computer's analysis". However, Coffey and Atkinson (1996, p. 208) state that computer software is but an "analytic support", whereas Merriam (1998) notes using computer software programs in the data analysis is a form of managing the data.

In this research data reduction has taken place continuously throughout the project. The cases were selected after an initial data analysis during the end of 2006. Even though I used a computer-assisted data analysis method, I was reading and re-reading the data. While reading the transcripts I was looking for patterns within the data, and also things of surprise, contradictions and similarity. I was also using different colors in the word processor to highlight certain issues, thus using them as codes. I prepared the data by sorting it according to different codes, being guided by the theoretical framework throughout the process.

5.5 Reliability and validity?

In order to produce research with high quality, phenomenological research should provide the reader with detailed descriptions allowing the reader to decide whether the conclusions drawn are logical or not (Merriam, 1998). To measure quality of research, the terms validity and reliability are often used (Yin, 1994). Validity and reliability are based on the researchers' ability to plan the study, the analytical skills and the conclusions that are drawn. According to

Merriam (1998, p. 198) ensuring reliability and validity in qualitative research "involves conducting the investigation in an ethical manner". Miles and Huberman (1994, p. 266), among many other scholars, mention triangulation as a method of supporting findings "by showing that independent measures of it agree with it or, at least, do not contradict it". In the research, triangulation can be made between the three pillars of the research, namely (1) industrial network theory, (2) role and position as means of measuring and studying change and (3) dynamics (change). From a methodological point of view triangulation is possible between (1) abductive approach/systematic combining, (2) case studies (the context) and (3) critical event analysis (dynamics) (see figure 14).

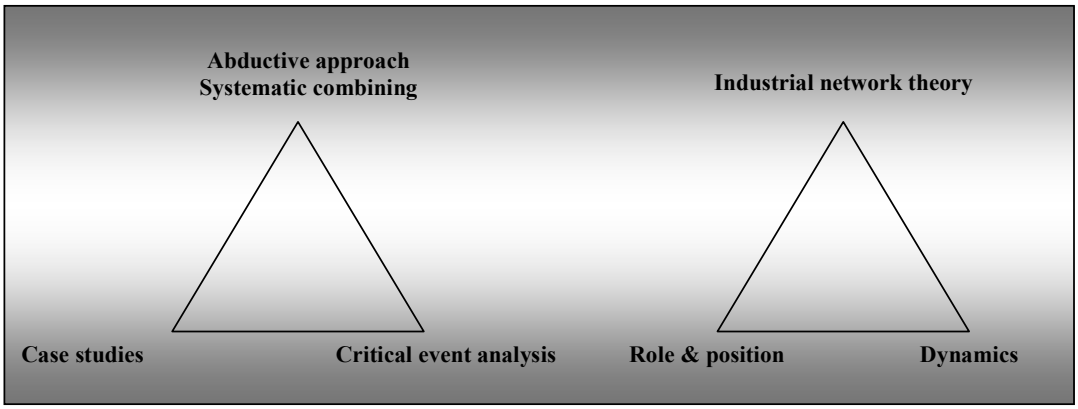

Figure 14. Triangulation of methodological and theoretical approaches

Internal validity deals with the question of how research findings match reality, whereas external validity indicates the extent to which the findings of one study can be applied to other situations. Reliability refers to the extent to which research can be replicated (Merriam, 1998). Ritchie and Lewis (2002) point out that the "constructivist school" argue that there is no single reality to be captured in the first place, which basically means that reliability or replication is an artificial goal to pursue. Bryman (2002) defines reliability as the question whether the results of one study will be the same if the study is conducted again. Validity, on the other hand, is the assessment of results. However, Bryman also presents alternative concepts of discussing reliability and validity in qualitative research. Yin's and Merriam's concepts are rather case study specific. Bryman uses *credibility*, which corresponds to Yin's internal validity, *transferability*, which is equivalent to external validity, *dependability*, which can be compared to reliability and finally *confirmability*, which corresponds to objectivity. These concepts are partially based on Lincoln and Guba (1985) and Guba and Lincoln (1994), who originally suggested two basic criteria for assessing qualitative data, namely trustworthiness and authenticity.

5.5.1 Credibility

In order to guarantee a high degree of agreement between concepts and observations, and to improve credibility I have used multiple sources when available. By interviewing 39 informants I believe I have attained a high degree of agreement between the concepts I have used and my findings. After the interviews I often stayed for some time to discuss interesting

aspects of my preliminary findings with informants. I have also discussed my findings with other academic researchers. After I concluded my analysis I sent the findings to the informants and asked them whether they find the result plausible. Since the informants were allowed to confirm or deny findings I believe that it has increased credibility. According to Bryman (2002) informant or respondent validation involves the researcher conveying the results from the data analysis to the people who acted as respondents or interviewees in the study. This ensures higher validity. Furthermore, another recommended technique is triangulation, which involves the use of multiple investigators, multiple sources of data or multiple sources of methods to confirm findings (Merriam, 1998). Lewis (2002) also mention the use of multiple theories as a method of triangulation.

5.5.2 Transferability

It would be rather difficult in my study to transfer the findings as such of the study beyond the immediate study, because the study was set in a specific context. Parts of the study are, however, transferable. I believe it is unlikely that I would receive identical answers if the research would be conducted one more time, because the in-depth interviews were highly context specific and influenced by the situation in which they occurred. Also, the telecommunications sector develops in a rapid pace and the reality of the informants is constantly changing. Furthermore, as convergence affects not only the immediate business environment, business relationships and networks, convergence processes also affect an organizations' structure. It is evident that some companies, e.g. Sonera and Elisa, are going through extensive re-organizations in order to cope with the external changes and market demands. Therefore, depending on which stage an organization is in "internal" convergence processes, the views and the "reality" of the informants will vary among companies. I am not at any point attempting statistical generalization. Instead I have focused on theoretical generalization, developing models and frameworks that can be used in other contexts. However, convergence theory and the development of theory concerning role and position in business networks can separately be applied in other settings than telecommunications.

When I contacted the informants for the first time, I included an introductory letter that explained the reason, purpose and content of the study. I emphasized that they would remain anonymous at all times, and that I would be the only person to analyse and handle the data. The informants would not be required to present any sensitive or strategic information. The credibility of the informants' knowledge is high, due to the facts that a majority of the informants have more than ten years of experience of mobile telecommunications and telecommunications in general. Concerning their willingness to give information, I felt that many of the informants were rather enthusiastic about my interest in their experiences, whereas others expressed their worries that I was concentrating on "old" issues or "unimportant ones like convergence". When I asked various questions, the answers were elaborative and descriptive. Despite the fact that there is a high level of consistency between the various informants' answers, some contradictory answers did appear during the interviews. In the case I felt that there was a contradictory answer, I asked the informant to further elaborate his or her answer, thus attempting to highlight the issue at hand in order to clarify the contradiction.

5.5.3 Dependability

Lincoln and Guba (1985) suggest dependability as an equivalent to reliability. This requires that the researcher explains in detail the various phases of the research process. However, according to Collis and Hussey (2003) there are no exact rules for analyzing qualitative data. I followed some basic principles when managing and analyzing my data. I critically examined all findings, and systematically processed the data, ensuring that I provided thorough account of the way I have proceded throughout the analysis process. The findings and ideas presented have been related to the theoretical framework, and I have also attempted to reason logically when drawing conclusions.

5.5.4 Conformability

Conformability indicates that the researcher tries to confirm that he or she has acted in good will, based on the insight that it is impossible to reach total objectivity in social research (Bryman, 2002). While doing the research I have tried to remain as open-minded and objective as possible, always trying to find alterative points of view to different issues. I do, however, acknowledge that interpretation and analysis to some extent involved a degree of subjectivity, but this is characteristic of phenomenological research. The questions that lead to this study were in the first hand based on my own interpretations of the telecommunications sector and mobile telecommunications in particular. Many of the versions of my research questions were based on lack of knowledge of "how it works" and which mechanisms lay behind certain processes and phenomena. During the process of research I have started to understand these processes and mechanisms, and those that I yet do not understand (especially when it comes to technical issues) I am at least aware of. This learning process has become evident also in my reformulation of research questions again and again during the research process. The final research questions are as laden free and subjective as possible. I also aim at giving as comprehensive answers as possible, in order to reduce the risk of being influenced by own pre-understandings.

5.6 Thoughts on the research design

The approach of systematic combining is useful as it allows the researcher to go back and forth "from one type of research activity to another and between empirical observations and theory" (Dubois & Gadde, 2002, p. 555). The researcher is thus able to get a wider understanding of both theory and empirical phenomena. This study has adopted systematic combining and it has enabled me to first concentrate on the theoretical framework in order to get a pre-understanding of the phenomenon being studied. After a thorough literature view, the interview guide was developed and empirical data collected in the form of interviews. The interview guide was also modified during the data collection process. Since I modified and improved the theoretical framework several times and interview guide I also ended up with more than one perspective on the same issue.

A far as time has allowed, the data has simultaneously been collected and analyzed, but much time has been spent on the transcription of the interviews, thus reducing the time to spend on analysis. Data was analyzed and during this process I often returned to the theoretical framework, modifying or adding, improving as well as analyzing and interpreting once again what I had written and what the theoretical framework really was implying. Again, I returned

to the empirical data and would go on like this, back and forth between theory and empirical data in order to come to my final conclusions and compare them against the theoretical framework. But, would I arrive to the same conclusions had I done this in a different way? A phenomenological study is not only limited to qualitative data. It can also have a combination of quantitative data input in the data generation process (Collis & Hussey, 2003). I could have enriched the empirical finding by developing a questionnaire that would have targeted issues such as convergence processes in the individual organization, degree of technological convergence on product and service levels inside the company and between partners, convergence affecting the firm's strategies or organizational structure etc. However, I feel I have gotten rich and descriptive data already through the interviews. This study offers a partial understanding of convergence and gives a preliminary picture of business network dynamics in the light of convergence processes, but the limitations in the study lie in the fact that it is impossible to cover the whole issue of convergence and its influences on business network change. More research is needed in this area. Suggestions for further research are given in chapter 9.

Using interviews as the source for empirical data was not without problems. There was a risk that the informants began to construct their reality during the interview, i.e. that they created a specific reality based on the questions and themes that I asked and addressed. There is unfortunately no direct method of eliminating such risks in doing research. I, however, tried to overcome this problem by asking interviewees to comment on various themes that I had chosen for the interview, for instance how important a certain theme is for the overall understanding of the dynamics of the industry and the business network. If an informant claimed that some theme I addressed was unimportant then I refrained from asking further. The risk was that the informant would feel he or she was required to answer and hence, would have created reality rather than reflected on it.

Another potential problem connected to using interviews as data collection method was that the actual interview was situation specific. The informants might have answered differently if another person had asked the same questions. The chemistry between the one doing the interview and the one being interviewed is an important factor. Informants might also have answered differently if the context of the interview had been different, or if the interview had taken place at another point in time. Interpreting another person's reality is no easy task. In essence I have tried to describe with words what another person experiences with all his or her senses. A number of errors could therefore have occurred during the analysis process – bias being one of them. Sources of bias were of course my own experiences of telecommunications, and how various issues have been presented in literature. Bias may also occur due to poorly constructed interview questions. My strategy for eliminating bias was (1) to ask informants to comment my findings, and (2) to ask colleagues and other researchers to comment on my methods, assumptions, proposition etc.

Concerning the text itself, one might ask why I did not look more specifically on the media and IT sectors and their interaction with telecommunications in order to address convergence processes. The EC (1997) defined convergence as these three sectors merging. However, it quickly became clear when I was conducting the pilot study, that there is no such thing as industries merging at this point in time in Finland. The development has not reached such levels yet, and the industry is practically still interpreting what convergence means for various processes and mechanisms driving the industry and technology development. Therefore, my

initial plans to focus on industry convergence proved to be without reason, as such a phenomenon does not exist in practice – at least according to the informants. Of course, later analysis shows that there are indications of such a process slowly taking place.

6. CRITICAL EVENTS IN THE EVOLUTION OF THE TELECOMMUNICATIONS SECTOR IN FINLAND

This chapter presents the development and evolution of the Finnish telecommunications sector (1985-2005), both from a fixed telephony and a mobile telephony point of view. Even though the focus is on events which have taken place between 1985 and 2005, events prior to this time period will be presented as background information. Critical event analysis is applied to the sector's development, contributing to the understanding of the current structure of the industry as well as the convergence discussion in the following chapter. The Finnish market for mobile telecommunications has shifted from a state of active growth to maturity. The players' focus has thus far been mainly on aggressive price competition rather than on offering value added services and developing the mobile service industry. The driving forces behind the current structure of the market are, according to Nordic Adviser Group (2005) (1) industrial consolidation and (2) fragmentation and development among foreign and domestic operators. This is influenced by technological discontinuities and unique economic characteristics of different market structures. The total value of the Finnish mobile market in 2005 was 2.1 billion euro. As of 31 December 2006 the total number of mobile subscriptions was 5.7 million (Statistics Finland, 10.10.2007). Eight percent of mobile subscriptions are pre-paid and 22 percent are held by corporate customers. Approximately 47% of all persons aged 15-74 use a mobile phone exclusively (PTS, 2006). Firstly, the development of fixed and mobile communications is elaborated, followed by a discussion of the role of regulation. Thereafter the actor landscape is presented as well as interaction in business nets and networks. A discussion of perceptions of role and position concludes the discussion. These two sections open up the industry for applying critical event analysis with the aim of answering research question theme A, i.e. which critical events can be identified in the industry change process in Finnish telecommunications during 1985-2005.

6.1. Fixed telecommunications

The Finnish cluster for telecommunications has a long history, starting during the time period when Finland was under Russian authority. Telecom competition in Finland originates from the pre-independence era.[3] The history of Finnish telecommunications started from the independent telecommunications companies. These were created for the purpose of offering local telephone services in towns at the end of the 19th and in the beginning of the 20th century. The state had the task of linking the local telephone companies together and to operate the long distance and international telephony (Steinbock, 2001a). Thus, there were two camps – a number of local telephone companies and a state owned one (Post and Telegraph - PTT).

The first fixed telephone call took place in December 1877 in Helsinki and the first telecommunications company was established during 1882. Long distance calls between different cities were established at the end of the 1880s. By the end of the 19th century all cities in Finland had a local telecommunications provider. There were several hundreds of telephone companies in Finland before World War I and all of them were granted a license by the senate. The largest company was Helsingin Puhelinyhdistys (HPY) who covered 29% of

[3] For a thorough description of the historical development of the Finnish telecom sector see e.g. Turpeinen (1997), Steinbock (2001a) or, in Finnish, Taivala (1989).

the country's phones in 1910. Finland became independent in 1917 and the legislation concerning telecommunications (Telephone Statute established in 1886) still remained valid. In 1919 the rights for allocating licenses and general license terms were defined. A committee appointed by the senate suggested establishing an Administration of Telegraphs, which would be in charge of both state telephone and telegraph activities. This led to Finland's Council of State proposing a telegraph monopoly and a year later telegraph legislation gave the Finnish government the sole right to build and use telegraph equipment and lines (Taivala, 1989; Steinbock, 2001a). In 1927 Finland's Post and Telegraph Office (PTT) began its operations. Due to the fact that there were many local telephone companies it was left to the state to link the local telephone companies together and to operate the long distance as well as international telephony services. Thus, the PTT (later a state owned telecommunications company Telecom Finland and privatized Sonera) took that role. Local telecommunications was left to private telephone companies, who enjoyed local monopolies whereas the PTT acquired monopoly in long distance phone calls by acquiring the equipment of some 170 telephone companies between 1920 and 1949. Thus, the emerging market for telecommunications in Finland was characterized by a duopoly situation due to the division of two camps – the PTT and the private telephone companies.

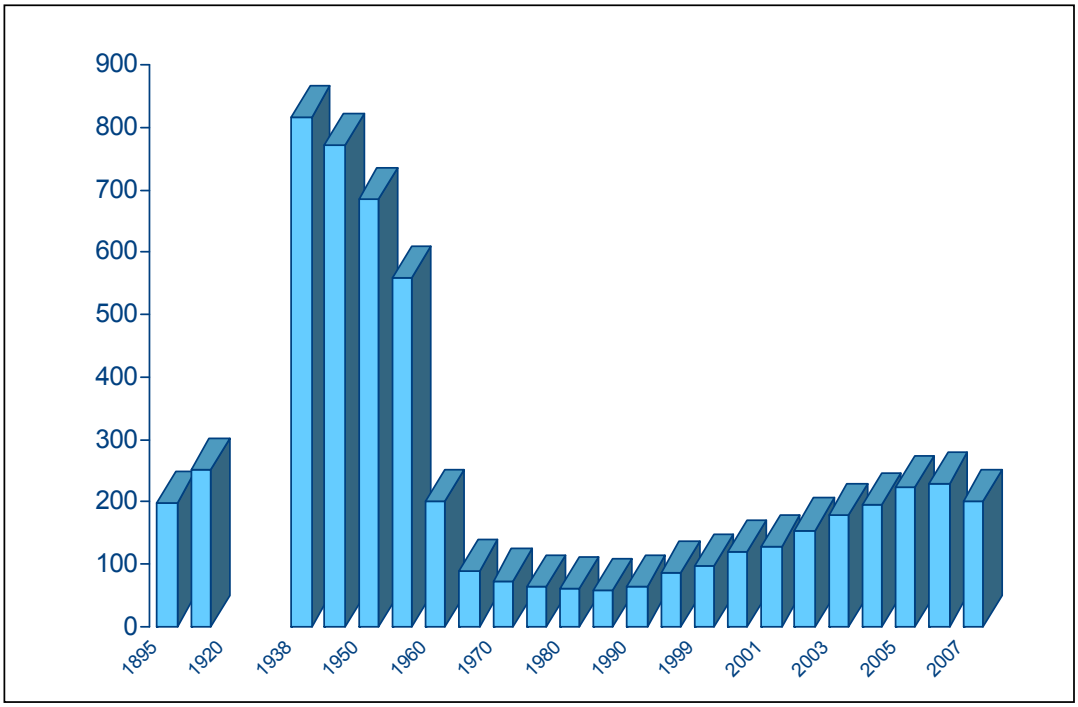

Figure 15. Development of number of telecommunications operators in Finland 1895-2007 (Finnet, 2007b, internal material)

6.1.1 The dispute of data transmission and establishment of Datatie

From roughly 1950 to the 1970s automation of long-distance traffic commenced and technical requirements affected the local networks, which eventually led to a consolidation period.

During this process the PTT and the local telephone companies acquired smaller telephone companies (as can be seen in figure 15 above). After the automation was completed the need for consolidation diminished (Taivala, 1989). From 1969 to 1974 the tension between the PTT and the local telephone companies began to increase. New telecommunications services were introduced; data transmission during the 1960s and teletex, videotext and telefax during the 1970s. Digitization had started during the late 1960s, with the foremost goal of reducing the costs of the telephone network. One of the most important eras in Finnish telecommunications history concerns the dispute over data transmission between the PTT and the local telephone companies. The Telephone Statute of 1886 was too old to take technical development into consideration and interpretation of the law was difficult. In 1964 the first data transmission connections were established but only in 1969 was a public debate arisen concerning the classification of data transmission, whether it was such a telephone service that local telephone companies were allowed to sell or if it was a service closer to the telegraph and thus falling under the framework of telegraph legislation. PTT would in the latter case consider data transmission belonging to its monopoly. Because data was transmitted over telephone networks, the local telephone companies considered it telephone traffic, whereas the PTT was of the opinion that a decision had to be made on the classification of data transmission services, as technology was developing and computers were increasingly being used. In 1970 a compromise in the dispute was reached, where both the PTT and the local telephone companies were allowed to operate in data transmission. However, in 1978 the next dispute arose when the PTT considered the at that time new services teletex, videotext and telefax falling into the framework of telegraph legislation and thus the PTT was the only one with a sole right to offer those services. The dispute could not be settled as the services were difficult to define as either telephone or telegraph communications.

The local telephone companies felt that they were trapped in a corner since there was a risk that the PTT would have sole right to exploiting technical developments. The PTT was at the time acting in a dual role as both regulator and operator. It is often argued that the birth of real competition in Finnish telecommunications is due to the local telephone companies' establishment of Datatie. Datatie was actually established in corporation with users of telecommunications services, i.e. Kansallis-Osake-pankki, Tampereen Puhelinosuuskunta, Hämeen Puhelin and Päijät-Hämeen Puhelinyhdistys. Later on more companies joined, e.g. banks, insurance companies, media companies and IT companies. The local telephone companies owned 60% of Datatie and the users 40%. The main idea in establishing Datatie was that each telephone company remained independent on its (geographical) territory. The burden of investment was thus shared. The cooperative pattern created new services and made existing companies stronger, according to Häikiö (1998). Datatie dropped prices to half of the PTT's prices for data transmission. Competition was thus initiated in order for Datatie to receive a license to operate. Häikiö (1998, p. 49) argues that the establishment of Datatie was also an open challenge to the PTT's monopoly in long distance calls, even though this was not "mentioned loudly". Automatization of the telephone network, which was completed in 1980 (Riihimäki, 1989) and technological advancements gave birth to new innovative services. The fact that the new services did not fit into current legislation, contributed to the preparation of a new legislation in telecommunications, which was brought to a conclusion in December 1986 and implemented in May 1987. The new legislation implied that there was one general telecommunications network, which had to be maintained and developed in order to satisfy needs of communication throughout the country. For instance, Datatie started operating in

February 1985 and the PTT responded by establishing Oy Yritysverkot AB in November 1988.

Since Datatie was operating without a license for some yeas it had to engage in a political fight in order to create a position for itself. Häikiö (1998) notes that the PTT regarded Datatie as a competitor based on a loophole found in the Telephone Statute from the tsarist era. Changes in the political context did however lead to a more liberal approach towards deregulating the Finnish telecommunications sector. Informants X12 and X21 note that the regulator encouraged the local telephone companies to apply for a license together, as a network of actors cooperating. Principally this kind of horizontal cooperation was forbidden, but exception permits were granted by the Finnish Competition Authority (FCA). In 1988 the Government granted Datatie and Kaukoverkko Ysi licenses and through that action it also opened up the market for competition. Later on, in December 1990, both operating licenses were expanded to include local and long-distance connections all over Finland. Part of the reason why the regulator issued a license to Datatie in the first place has to do with the fact that during the mid-1980s the service capacity was almost insufficient (e.g. Informant X22). The capacity of one provider to deliver services to all interested customers was limited and societal forces got moving in order to establish a second player on the market. It was reckoned that besides competition, delivery capacity would be improved. Thus, the end-users and market forces played significant roles in the deregulation of Finnish telecoms. Also, during the mid 1980s the industry started to experience the initial stage of computerization (e.g. Informant X6). The industry suddenly required people specialized in computers and employed many IT-experts, who were later "raised into the industry" (Informant X6), i.e. educated in order to perform telecom activities. Informant X6, for instance, has a background and education in computer technology and did not know much about telecommunications before becoming employed in the telecommunications sector. Informant X6 views this process as an important part of the evolution of the industry but points out that there exist no such events or time periods where one can say accurately that a change in direction or change in general occurred in the industry. Know-how was imported from the IT sector and trained for telecommunications specific tasks and activities. The development of the industry has taken place in a continuum, with smaller events and changes that have lead to new events and changes. Informant X6 also notes that the telecommunications industry employees' work competence has changed, which does not always show outside the companies. The difference is large between what an employee does today compared to 20 years ago or even ten years ago.

6.1.2 The PTT's makeover

The PTT lost its role as a regulatory authority alongside the implementation of the new law. A reform was initiated in 1986 with the aim of simplifying external control of PTT (Turpeinen, 1997). Previously the PTT received money which was allocated via the state budget. The regulatory authority was moved to the government, who issued licenses for acting as a telecommunications provider and licenses for other networks were to be applied from the Ministry of Communication. In 1992 the government accepted a change in legislation, which allowed the liberalization of data transmission. The new legislation also brought with it a number of license applications and due to the increased competition, the PTT decided to invest in the Helsinki metropolitan area local networks; in the beginning of 1992 the PTT applied for a license to operate in the local telephone companies' area. Correspondingly, the local

telephone companies applied for licenses to operate in PTT's traditional area (Pursiainen, 1992). In 1993 along with the discussion on incorporating PTT into a limited company, the company's name was changed into Telecom Finland. In 1998 Telecom Finland was listed on the stock exchange and changed name into Sonera. The next step was a merger with Swedish Telia, which was first announced on March 26, 2002 and was carried out through an exchange offer in which Sonera shareholders received shares in Telia. The aim of the merger was the opportunity to reach economies of scale regarding cost and capital expenditure (CAPEX), product development, IT systems, networks and technical platforms and administration (TeliaSonera, AR 2004).

The company went through several stages in its transition from PTT to TeliaSonera. Informant X22 labels the stages (1) the institution stage, (2) the limited company stage, (3) the stock exchange stage and (4) the stage where fusion with Telia takes place and argues that this transition has had large impacts on the industry in general. In general it is regarded that Telia "let Sonera off the hook" when the merger was announced, as Informant R3 expresses it. Sonera had made large investments in UMTS licenses and related business internationally, with little success.

6.1.3 Deregulation continues

During 1992 a decision to open competition in long-distance and local telephony in early 1994 was taken. Actors such as Kaukoverkko Ysi Oy and Telivo[4] started operations in long-distance calls. Telivo was owned by the Finnish energy company Imatran Voima (IVO) and Swedish incumbent Telia. Telia thus entered the Finnish telecom market through acquisition. Telivo operated in co-operation with the local telephone companies since spring 1993. In 1994 full competition in telecommunications started and three independent providers of long-distance calls existed on the market; Telecom Finland Oy (formerly the PTT), Kaukoverkko Ysi and Telivo. Kaukoverkko Ysi was created by the Finnet telephone companies as a common tool for long distance telephony in very much the same way as Datatie was earlier created as a common tool for data business.

Data transmission networks were developing rapidly and ISDN, which is considered to be a first convergence product (e.g. Informant X15), generally contributed to the development of the telecommunications infrastructure. In 1995 Finland joined the EU and during summer 1995 the first licenses to service operators (actors who do not own a network) were granted. In May 1995, the MINTC prepared a draft concerning changing the current legislation for telecommunications. The aim was to open up the market for competition, i.e. making entry barriers lower for new entrants, caring for the positions of service operators and making payment regulation run more smoothly (Pursiainen, 1995). The draft was said to mirror new perspectives in telecommunications: the aim was set for developing telecommunications into a "normal industry, which is regulated by common competition and consumer protection laws"

[4] The third national player in fixed telecommunications, Telivo, had a 4.5% share in long-distance calls and 7.7% share of international calls in 1996 (Tossavainen, 1996). Telivo announced plans to build a mobile communications network based on the DCS 1800/GSM standard in urban areas. Larger areas would be reached by leasing capacity from other operators, i.e. Telecom Finland and the local telephone companies. In connection to the Telecommunications Market Act 1997, Telivo was allowed to offer local telephony services. The same year IVO sold Telivo to Telia and Telivo changed its name to Telia Finland Oy.

(ibid., p. 7, own translation). The draft was accepted and implemented in August 1996 as an amendment of the Telecommunications Act of 1987. The major change that this amendment brought with it was the abolishment of license applications; only such telephony networks that make use of radio frequencies became obliged to apply for an operating license. The change of law was meant to mitigate entry to the industry markets and thus override the duopoly, which was prevalent at the time (Pursiainen, 1996). Discussions on the next law amendment was initiated in early 1996 (ibid.) and a new telecommunications market law was suggested to replace the Telecommunications Act of 1987. In June 1997, the new law was implemented and implied, for instance, that some actors were assigned significant market power (SMP) status, which obliges them to lease network capacity to competitors. Mobile operators (i.e. those who own and operate mobile networks) still need a license. At this time (1997) three operators still dominated the scene; Telecom Finland, the local telephone companies (the Finnet Group) and Telivo. Other players on the market were Global One Communications Oy, Nordnet Oy and RSL COM Finland Oy (Televistintätilasto 1997). In the statistics overview "Televeistintätilasto 1997", for the first time, the structure of the Finnish telecommunications market is analyzed. Telecommunications companies are divided into (1) telecommunications network companies and (2) telecommunications service companies. The former offers telecommunications networks for use of telecommunications service provision and the latter offers telecommunications services to end-users. In other words, a distinction between network operator and service operator was presented, a direct implication of the new telecommunications law and telecommunications legislation on an EU level. Service operators thus have no role in maintaining and operating the network. The roles of the actors in the marketplace had thus become clearer.

6.1.4 Digitization

Planning for digitization had begun in the early 1970s. Digitization meant that analogue telephone exchanges were replaced by digital exchanges, "in which calls are transmitted as PCM-coded pulse strings" (Turpeinen, 1997, p. 80). The digital exchange consists of subscriber line and junction line devices, a switching field and a computer. The exchange transmits the call. By the end of 1993 62.1% of phone connections were digitalized in Finland (Televiestintätilasto 1994). Local networks were digitalized in the early 1980s. In 1996 digitization of telecommunications reached 100% in Finland (Televiestintätilasto 2002).

In terms of digitization of broadcasting (TV), it has also been argued (e.g. Informant Y18) that the reason why digitization took place quickly in Finland was due to a mistake made by Sonera. Digita, the distribution unit of YLE, the national public service broadcasting company, was sold to Sonera in 1999 (YLE, 1999) but since the FCA would not grant Sonera a license to operate digital TV (YLE, 2000) Sonera refrained from the deal. YLE then sold their distribution unit to French TDF in December 2000. Initially the plan was to sell Digita to a domestic actor, but there were no media actors of the size that would be able to acquire Digita. Sonera was the only one in that position. The payment that YLE received from TDF in the deal is argued to be the event that enabled lower license fees for digitalization (e.g. Informant Y18).

6.2 Mobile communications

The very first activities in this area originate in the semi-automatic network ARP (Autoradiopuhelin, car radio phone in English). ARP was the first commercially operated public mobile phone network in Finland. It was launched in 1970, and reached 100% geographic coverage in 1978 with 140 base stations. The technology is that of zeroth generation (0G), since although it had base stations (cells) moving between them it was not seamless and the call could not be transferred between base stations. A caller thus had to stay within the range of one and the same base station for the entire duration of the call in order for the call not to break. At its most, the technology had more than 35 000 users in 1986 (Nordic Adviser Group, 2005, p. 6). The ARP network was operated by the PTT and was closed at the end of the year 2000. The PTT enjoyed a monopoly situation concerning the ARP network.

Due to the success of ARP, the Nordic countries Sweden, Finland, Denmark and Norway started developing mobile communications further, resulting in the first generation of mobile telecommunications technology referred to as NMT (Nordiska Mobiltelefongruppen, Eng. Nordic mobile telephony group). The service was not geared toward profitability, but rather dictated by the public-sector service values of the Nordic PTTs (state owned incumbents). The difference to the ARP network was that a user could seamlessly change between base stations and thus really be "mobile" while making a phone call. The Finnish PTT built an NMT network in 1977, while the other Nordic countries started building NMT networks in 1981. In Finland the network was commercially opened in 1982 and 100% network coverage was reached in 1990. NMT based on the 450 MHz bandwidth was such a success that a working group for investigating the opening of the NMT based on 900 MHz bandwidth was established already in 1983, one year after opening of the 450 MHz network. The NMT-450 network reached its full capacity quickly. NMT-450 had close to 200 000 users in 1988 (Nordic Advisor Group, 2005, p. 7) and was closed in late 2002. The NMT-900 network was opened for commercial use in the Helsinki-region in 1987. This technology allowed for real mobile terminals, opposed to NMT-450. PTT even forbid the production of handheld devices for NMT-450 in order to promote the use of NMT-900. NMT-900 enhanced the use of mobile telephony and at its most popular period in 1991, the technology had 444 000 users. The network was closed at the end of year 2000. Thus, the earliest analogue networks were ARP (1972), NMT-450 (1982) and NMT-900 (1987). No special licenses were required for the PTT at the time due to the fact that the PTT had a de facto long-distance and NMT monopoly and served as the regulator of the telecom industry at the same time. When the Finnish telecom market was liberalized new actors did not emerge within the analogue mobile services. This was partly due to the dual role of the PTT, as new entrants had few opportunities to establish themselves as e.g. NMT service providers. The PTT would not grant other operator a license to operate networks.

At the end of the 1980s, the European Conference of Postal and Telecommunications Administration (CEPT) decided to develop a common standard for digital mobile telephony. This was a result of the fact that the European markets were gradually integrating. This standard became known as GSM, which originally stands for Group Spéciale Mobile, and was the standards group formed for developing the technology. In 1987 the at that time 13 countries in the EU committed to the GSM standard in a contract, which also required international roaming and interconnection between those offering mobile telephony in various European countries, something which the Nordic countries already were familiar with from

the cooperation around NMT. Finland also committed to the GSM standard and it was in fact along with GSM that the Finnish incumbent got its first competitor, Radiolinja. Radiolinja was awarded a GSM licence in October 1990, after several years of lobbying and paving the way for the market to open up. At this time there were two competitive mobile operators, Telecom Finland and Radiolinja. In the NMT-era Telecom Finland enjoyed full monopoly. Between the years 1991 and 2000 Telecom Finland (Sonera in 1999) and Radiolinja built a complete GSM network in Finland. Table 12 shows the development of mobile communications in Finland in terms of number of subscriptions.

Year	Mobile phone subscriptions			Change, %	Subscriptions/ 100 inhabitants
	Digital	Analog	Total		
1980	-	23 482	23 482		0.5
1985	-	67 639	67 639		1.4
1990	-	257 872	257 872		5.2
1991	-	319 137	319 137	23.8	6.4
1992	3 308	382 713	386 021	21.0	7.6
1993	19 111	470 063	489 174	26.7	9.6
1994	110 155	565 410	675 565	38.1	13.2
1995	380 703	658 423	1 039 126	53.8	20.4
1996	830 585	646 391	1 476 976	42.1	28.8
1997	1 523 356	568 435	2 091 791	41.6	40.6
1998	2 498 793	347 192	2 845 985	36.1	55.2
1999	3 073 943	199 490	3 273 433	15.0	63.4
2000	3 672 762	55 863	3 728 625	13.9	72.0
2001	4 137 337	38 250	4 175 587	12.0	80.4
2002	4 516 772	-	4 516 772	8.2	86.8
2003	4 747 126	-	4 747 126	5.1	90.9
2004	4 999 060	-	4 999 060	5.3	95.5
2005	5 384 572	-	5 384 572	7.7	102.5
2006	5 679 010	-	5 679 010	5.5	107.6

Table 12. Number of mobile phone subscriptions and subscription per 100 inhabitants 1980, 1985 and 1990-2006 (Statistics Finland)

Helsingin Puhelinyhdistys (HPY) was established in 1994 when Helsinki Telephone Association became a limited company. In 1992 former HPY became a member of the Association of Telephone Companies, which at this time consisted of 44 local telecom companies. In 1995 this group changed name to the Finnet Association. Therefore, HPY was a part of the old Finnet Group, but broke free from the group in 2000. At this time HPY also formed Elisa when the fusion between HPY Oyj and HPY Holding Oyj occurred. Radiolinja was founded by the local telephone companies at the end of the 1980s. HPY bought the majority of the network Radiolinja used. Elisa later on built the network to cover the whole of Finland. Radiolinja applied for a GSM license, which the PTT of course strongly opposed since it would then become a competitor to Telecom Finland in the area of mobile communications and specifically in the NMT technology. However, the license was granted but this required an amendment of the Telecommunications Act from 1987. The major change in this law implied that even Telecom Finland had to apply for an operating license, just like the local telephone companies. The developments of Datatie, Yritysverkot and Kaukoverkko

Ysi have their own history (mainly leading to deregulation in the fields of data transmission and local fixed calls, long distance calls and international calls), but they were vital for the opening up of the mobile communications market in Finland. Radiolinja did not choose decreased prices as a strategy in competing with Telecom Finland. The focus of the strategy was on speed, value added services and technology at that time. The price aimed at being barely below the price level of Telecom Finland (Häikiö, 1998). Radiolinja also formed a close relationship to Nokia in product development. Nokia delivered Radiolinja's first GSM-network in 1988. While Radiolinja was investing in GSM-networks Telecom Finland was still investing in its NMT-network. One of Radiolinja's assets was, according to Häikiö (1998), the fact that Radiolinja did not have the same heavy structure as Telecom Finland, which had acted in a double role as both an operator and as a regulatory body. Telecom Finland was used to this role and had some difficulties in making the organization flexible and adjusting to changes, both internal and external.

6.2.1 Competition over distribution channels

During the 1990s competition between Telecom Finland and Radiolinja was fierce. GSM had brought with it competition (e.g. Informant X22). The value chain was simpler in the sense that business was operator focused. Both operators built their own mobile networks. The industry basically consisted of operators and equipment providers as the main actors, supported by distributors in the form of mobile phone dealers. However, it has been noted that the competition was based on innovative services and the quality of the mobile networks rather than price.

> *"[...] back then we knew how to compete in order not to destroy business, not to price below the others. Price was not the only means of competition. We competed on services and the quality of the network. [...] Another means of competition was distribution channels [...]. This third actor, when it did not have anything new compared to the others, price became the only means. The consequences were quite dramatic for the industry."* (Informant X22)

The competition was thus based on (1) mobile network quality, (2) mobile services and (3) distribution channels. Several informants note that during the duopoly situation (Telecom Finland and Radiolinja) in mobile telephony, one of the major issues was distribution channels. Telecom Finland had established several chains of stores, e.g. Telering, for selling NMT subscriptions. Informant X22 explains how Telecom Finland built relationships to mobile phone dealers at the end of the 1980s and early 1990s, which turned out to be a competitive advantage for Telecom Finland. The relationships and cooperation partnerships were based on formal contracts but Informant X22 mentions that a mutual trust existed between the parties and Telecom Finland. Radiolinja thus initially experienced problems in finding distribution channels for their mobile subscriptions, as Telecom Finland had developed relationships with most mobile phone dealers in the country, which only wanted to sell Telecom Finland's mobile subscriptions. The dealers thus had two domestic clients, i.e. a mobile terminal supplier (Nokia) and a network access supplier (Telecom Finland). The dealer acted as an integrator, since the subscription and mobile terminal could be bought by the end-user in the same place. A natural development concerning this issue was that customers started demanding Radiolinja's subscriptions, which forced the mobile phone dealers to rethink their strategies and start offering both subscription alternatives. Radiolinja also sought external

dealers as cooperation partners and used them as distribution channels when competition in GSM started. The main channel used by Radiolinja was the local telephone companies, who also owned shares in Radiolinja. The local telephone companies sold Radiolinja's subscriptions to their customers, which increased the pressure for independent dealers to include Radiolinja's subscriptions in their service range. Independent dealers were furthermore attractive partners for mobile operators as well as handset manufacturers due to the fact that they carried out marketing activities, such as advertising their products and services, which also benefited operators and manufacturers. Heavy investments were made in distribution channels by Radiolinja, who thus acquired, among others, the Mäkitorppa chain, which was the strongest of the NMT dealers, Setele and Kama. Radiolinja established ownership of a few distribution channels in order to compete with Telecom Finland and to position itself on the retail market (Informant X15). Later on, after Radiolinja had become part of Elisa, a convergence of distribution channels took place, as Elisa sought synergy effects in distribution. This meant that the distributors would not only sell mobile subscriptions and handsets, but also other of Elisa's products and services, such as Internet subscriptions or broadband access.

Today all mobile operators own their distribution channels, which mean that the number of private or independent dealers has decreased drastically since the 1990s. They have more or less been vertically integrated with the operators in the value chain, according to Informant X34. Current dealers are Päämies, Sonera Piste and Elisa Shopit, among others. Some independent dealers are part of the distribution system, such as Musta Pörssi and Gigantti, which *per se* are newcomers in the distribution system, since their core products are electronic hardware and white ware. The distribution channels turned out to be a question of (1) reaching markets and thus encouraging the use of mobile phones and (2) paving the way for competition among mobile telephony providers.

6.2.2 The third mobile operator

The Finnet Group consists of customer-owned private telephone companies which provide telecommunications services in their own areas. The Finnet Group was also the original owner of Radiolinja until HPY acquired full ownership of Radiolinja. The Finnet group is organized as a business network, where all actors are independent but share certain investments, infrastructure etc, i.e. the interdependency between its network members is evident. Later, the Finnet Group took the role as an underdog when it established a mobile operator in 2001, much to the harm of both Elisa and Sonera, but blessed by the regulator and the MINTC. The mobile business was, however, organized differently than with the other operators: the service and network operations were separated into two different companies. Suomen 2G Oy operated the network and owned the license and was at the end of 2003 fused together with Kaukoverkko Ysi to form Finnet Verkot Oy. DNA Finland was the mobile service operator. Theoretically DNA Finland was a virtual mobile operator but based on its owner structure it was a traditional operator. DNA functioned as the mobile service operator, responsible for customer service, distribution, pricing, marketing and billing; building the products which were visible to end-users; and developing customer relations. Suomen 2G functioned as the mobile network operator, building and operating a nation-wide GSM/GPRS network and service; connecting traffic with other networks; and responsible for both national and international roaming agreements. However, in 2005 these two companies were fused together, making DNA Finland a mobile network operator. At the end of 2005, DNA's mobile

communication network incorporated around 850 000 customers (DNA Finland, Year 2006). Informant X12 points out that even DNA Finland was surprised after it had positioned itself on the market, that other service operators followed their example, such as Saunalahti and ACN. This led to overheating of the market, according to Informant X12. However, DNA Finland is distinguished from service operators in the sense that it owns its mobile network, which gives DNA Finland room to play. Since DNA Finland was the third mobile operator to be established, it ran into problems concerning radio frequencies and bandwidth, of which the best quality had been allocated to Sonera and Elisa. Furthermore, the mobile network only covered the largest cities in Finland in the beginning, which restricted DNA Finland from growth. For instance, Informant X22 mentions that DNA Finland's network coverage area was much smaller than Sonera's or Elisa's. DNA Finland did not have the same competitive advantages, which *per se* initiated increased competition. DNA chose to build their competitive strategy on price, since they could not compete on mobile network quality, coverage or innovative mobile services. There exists diverging views of what or who triggered the price war, e.g. DNA Finland does not view itself as triggering the price war and e.g. Informant X36 expresses that ACN, which entered the market after DNA Finland contributed more to the decrease in prices than DNA Finland.

6.2.3 The rise and fall of service operators

In the late 1990s regulation forced fixed telephone operators to open up their infrastructure network to alternative and competing providers. Concerning mobile networks, this did not become an obligation but was allowed. DNA Finland was very keen on attracting service operators for its newly built mobile network in the early 2000s. DNA Finland needed service operators since it was small and aimed at increasing volume in its mobile network. However, Sonera benefited from this opportunity the most, since it had the largest and most covering mobile network (customers were e.g. Saunalahti, ACN). Informant X12 argues that without the threat of DNA Finland, Sonera would not necessarily have opened up its mobile network to other service providers.

By the year 2003, three national GSM networks were built in Finland, Sonera, Elisa and Finnet (DNA Finland). Moreover, a number of service operators have acted, and still do, as players on the market, leasing capacity from either one of the three network operators. The first one of these service operators was RSL Com in 1998. RSL Com offered mobile subscriptions to corporate customers mainly. RSL Com leased capacity from Sonera and had around 7 000 subscriptions in 2002 when it was sold to Finnet. The next service operator to appear on the market was Saunalahti under the brand name Jippii in 2000. Saunalahti grew fast into a competing operator and was acquired by Elisa in 2005. Some players entered and exited the market rapidly, such as ACN and Tele2. Most players in the field did not survive the heavy price war that was started already when DNA Finland entered the market as a third alternative. When number portability was allowed in 2003 the mobile minute prices dropped significantly, which eventually forced some operators out of business (e.g. ACN, Tele2).

The first international player on the Finnish mobile communications market was, as already mentioned, Telia, followed by RSL Com. Several new types of players emerged on the market in 2000. For instance, a number of brand extension strategies were to be identified as restaurants, department stores etc. extended their service range to include mobile subscriptions. Examples of these are the fast food chain Hesburger and the department store

Stockmann who offered mobile subscriptions to its regular customers. Tele2 entered the market in 2000 signing an MVNO agreement with Elisa. ACN entered at the same time and based its marketing on personal networks, i.e. people recommending subscriptions to each other and attracted customers by offering free calls among ACN subscribers. Eventually, ACN could not deliver customer satisfaction nor survive the tough price war and exited the market. When post rationalizing the strategy of ACN, one can come to the conclusion that ACN was merely out for skimming the market and making a profit in the short-run rather than playing for the long-run. ACN has been accused on not being a real telecom operator, since ACN never made any profit on offering mobile subscriptions. The price war also forced Tele2 to give up its operations in Finland. Saunalahti was actually the only one that grew its customer base through innovative service offerings. Saunalahti eventually transformed its business into a virtual operator in 2005.

In early 2004 the two "incumbent" players Sonera and Elisa both launched cheap brand service operators, Tele Finland and Kolumbus respectively. This was a strategy to cope with the heavy price war. Both brands were active in their parent companies' networks. Tele Finland announced in 2005 an interruption in signing new customers, but returned as a subscription seller in mid-2007. Almost all service operators on the Finnish market have chosen an aggressive price war as their strategy. This has led to a decrease in end-user minute prices, whereas the investments in and development of mobile services has remained on a low level. These service operators normally target end-users who focus on cheap prices rather than value added services.

Operator	Type	Established	Status (as of 2007)
Sonera	Mobile operator	1970	Active
Elisa	Mobile operator	1988	Active
RSLCom	Service operator	1996	Consolidated into Finnet 2002
Telia Mobile	Mobile operator	1998	Consolidated into DNA Finland 2004
Saunalahti	MVNO	1999	Consolidated into Elisa 2005
Tele2	Service operator	1999	Liquidated 2005
DNA Finland	Mobile operator	2000	Active
Stockmann Dial	Brand operator	2001	Active
Aina Group	Service operator	2001	Active
ACN	Service operator	2003	Consolidated into Sonera 2004
Choice (Markantalo)	Service operator	2003	Liquidated 2004
Fujitsu Services	Service operator	2003	Active
Hesburger	Brand operator	2003	Liquidated 2006
Kolumbus	Service operator	2003	Active
MTV3	Service operator	2003	Liquidated 2004
Pgfree	Service operator	2003	Liquidated 2005
Cubio Communications	Service operator	2004	Active
Passeli	Brand operator	2004	Liquidated 2004
SK Mobile	Brand operator	2004	Active
Spinbox/Go Mobile	Service operator	2004	Active
Tele Finland	Service operator	2004	Active (non-active between 2005 and October 2007)

Table 13. Players in Finnish mobile communications until 2005

When it comes to the relation between mobile network operators and service operators or MVNOs it is important to remember that none of the three mobile network operators in Finland (i.e. Sonera, Elisa and Finnet) has SMP status in access to the mobile network market. The mobile network operators are not obliged to open up their network; it is up to them to decide whether they sell network capacity to possibly competing players or not. However, it is a fact that all three network operators have excess capacity and thus try to attract service operators into their networks. They are interested in wholesale business. In fact, the mobile network operators are nowadays competing against each other concerning service operators, virtual operators, MVNOs and other types of resellers as the network charges bring in money to the company.

In terms of content providers, the informants state that since the introduction of short message services (SMS) not many independent content providers have emerged. When SMS became popular some providers emerged, providing logos, ring tones and similar services for SMS. The most important content providers in Finnish telecommunications are the TV broadcasters MTV, YLE and Nelonen, i.e. "the traditional content providers" (e.g. Informant X22). They are not the pioneers of mobile services, and have entered the market for mobile services later than most other content providers, which emerged during the late 1990s (e.g. Informant X29). The main mobile service operators active before 2005 are presented and summarized in table 13 and are described in appendix 2.

6.3 The role of regulation

Steinbock (2001a) notes that the earliest predecessor of MINTC was the Transport Execute created in the Department of Economic Affairs of the Grand Duchy of Finland in 1892. Finland was at that time still a part of the Russian Empire. After the independence in 1917, the transport Executive transformed into the Ministry of Transport and Public Works, which was divided into the Ministry of Transport and Communications (MINTC) and the Ministry of Labor in 1970. Many have thought that the MINTC developed, formulated, and executed the public policies of the 1970s, but in reality, according to Steinbock (2001a) the MINTC opted for monopoly power, not for free markets. Political debates characterize the decade and during the 1980s liberalization, privatization and deregulation became evident in Finland. The liberalization of the Finnish telecommunications market had been in preparation since 1983 and the new Act was enacted in 1987. After the new Act was introduced, deregulation has been a systematic process where fixed networks, mobile networks, radio and television networks have gradually been opened up for competition. It is also believed that since technology advancements no longer fit the duopoly structure of Finnish telecommunications, MINTC had the opportunity to rise as a major actor in the telecom sector.

6.3.1 Regulatory bodies

After the PTT was stripped of its dual role as an operator and a regulator, the regulatory rights were transferred to the MINTC. However, it was considered that this arrangement created a conflict due to the fact that the main owner of Telecom Finland was the government, under which the MINTC acted. When competition started in telecommunications, the need to separate official responsibilities from business operations was acknowledged. The *Telecommunications Administration Centre* (TAC) was founded in October 1988. The aim of

TAC was to deal with radio frequency and license matters and technical inspections related to telecommunications. The Television License Centre was also organized under TAC. TAC laid down the technical basis for the phased liberalization of the Finnish telecom market during the 1980s and 1990s (Steinbock, 2001b).

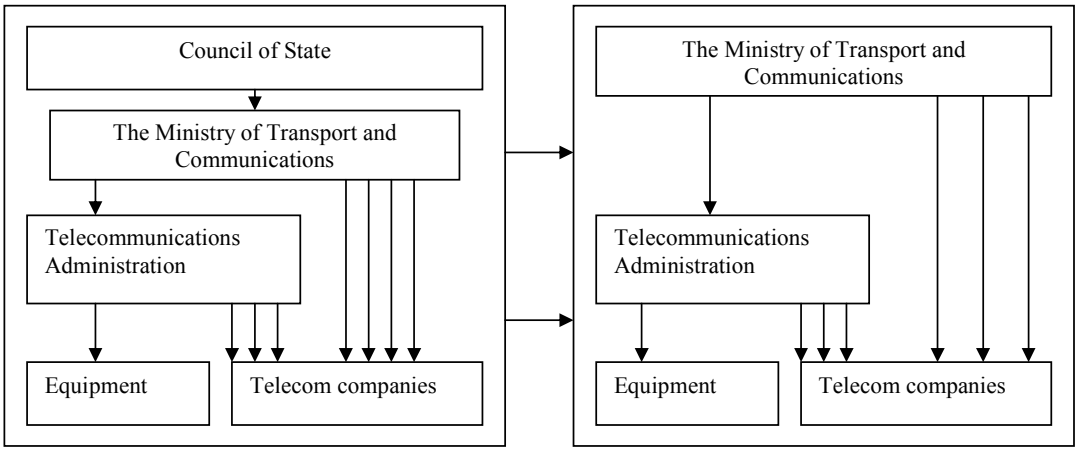

Figure 16. Restructuring the regulation of the Finnish telecommunications market (modified from Televiestintätilasto 1998, p. 10 and Televiestintätilasto 1999, p. 9)

In 2001, the TAC was renamed *Finnish Communications Regulatory Authority* (FICORA). The handling of information security infringements and responsibility for communications security became the responsibility of FICORA. The 2002 amendment to the Communications Market Act extended regulation concerning telecommunications networks to cover digital television and radio networks. FICORA issues technical regulations and coordinates standardization work at a national level. It belongs to the same administrative sector as the MINTC. The aim is to encourage a healthy competition on the market. FICORA is also responsible for preparing, approving and enforcing international agreements and recommendations. The Finnish regulator has an important role to play on the market as a supervisor. FICORA decides on regulation concerning e.g. services and products. For instance, voice over Internet Protocol (VoIP) has been strictly regulated in order to ensure quality of service for its users, interconnection charges in telephony have been looked over and changed in order to enhance competition and so forth. The role of regulation is to secure issues concerning quality and pricing, which services are available, technical functionality and similar issues (Informant R23).

The *Finnish Competition Authority* (FCA) is another institution, which affects and may restrict business activities in telecommunications. FCA was founded in 1988 and functions under the Ministry of Trade and Industry. Its objective is to protect sound and effective economic competition and to increase economic efficiency in both private and public-sector activity. The FCA intervenes with competition restraints which violate the Act on Competition Restrictions and the EU competition rules, and generally contributes to the functioning of competition. The FCA may, for instance, intervene if cooperation among actors resembles cartels. Horizontal cooperation is especially monitored by the FCA. The FCA also monitors vertical cooperation

and specifically defining one brand, restricting distribution, specifying retail prices and sharing markets.

6.3.2 The EU and regulation

In most European countries telecommunications reforms were designed to introduce GSM as the pan-European standard and to transform the monopoly telecommunications environments into internationally competitive (Steinbock, 2001a). In Finland liberalization took place before most other European countries and in order to participate in the development of the EU, Finland more or less had to take one step backwards. According to Steinbock (2001a) this worked against the pioneer strategies that have generated first-mover advantages for Finnish companies. When Finland joined the EU in 1995, liberalization of the telecommunications market was already under way. Within the EU the full liberalization of telecommunications was set to take place in 1998. In 1996 it was noted (Pursiainen, 1996) that due to the fact that the Finnish market for telecommunications was far ahead in deregulation and liberalization, it may cause adaptation problems for Finland, as many of the other European markets needed expansion of regulation in order to open up monopoly markets to competition. MINTC was of the opinion that when telecommunications markets are liberalized, regulation should be revoked step by step. Except for Sweden, this view did not in 1996 receive much attention in the other EU member countries (ibid.).

6.4 The actor landscape of Finnish telecommunications - snapshots

Palmberg and Martikainen (2003, p. 20) point out that a network of actors in telecommunications "make up the organizational and institutional context of […] competence development". In their research on technological discontinuities in the Finnish telecommunications sector, they conclude that the active role of the PTT in disseminating business opportunities throughout the industry was very important during the NMT era. The PTT did not want to become dependent on pricing policies of Ericsson and Siemens. The PTT is furthermore regarded as a driver for Nokia's success, since it forced Nokia to enter mobile telephony through producing technology for the NMT era (cf. Palmberg, 2002). Collaborative networks started to take form between the actors during this time. Based on the description of the fixed and mobile communications market areas in terms of competition and actors presented in sections 6.1 and 6.2, some snapshot pictures of the actors are illustrated in this section. In 1985, there were two camps in Finnish telecommunications, namely the state-owned PTT on one side and the local telephone companies on the other side. The interviews conducted for this study suggest that the telephone companies at this point in time were independent entities, which protected their own territories in a strict way. The local telephone companies started cooperating when it became clear that it was required in order to change the monopoly status that the PTT enjoyed in long-distance and international telephony. Deregulation was initiated when technological advancements did not fit into current legislation and own interpretations was made, mainly by the local telephone companies, who established Datatie and therefore triggered change in the actor landscape.

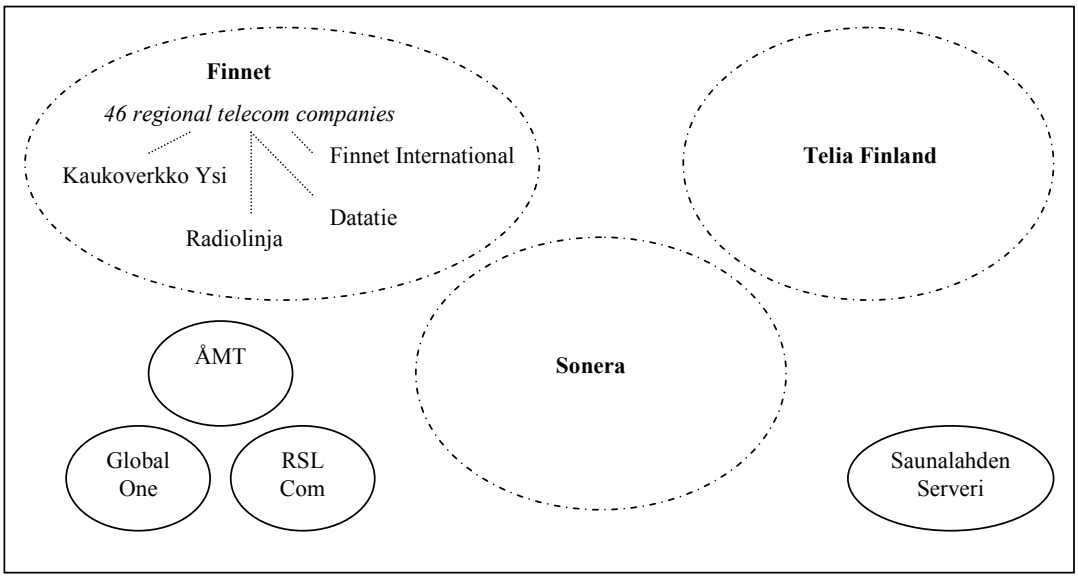

Figure 17. Actor landscape 1998 (modified from Finnet, 2007a, internal material)

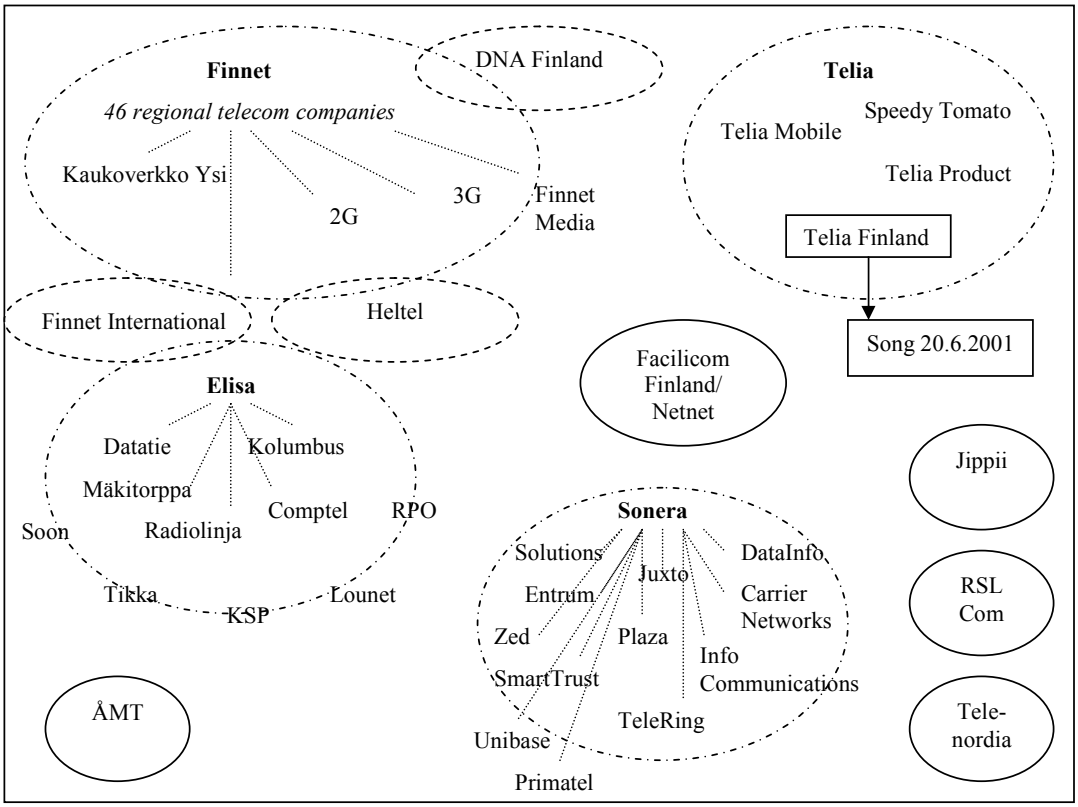

Figure 18. Actor landscape 2001 (modified from Finnet, 2007a, internal material)

The establishment of Datatie paved the way for Radiolinja to be established at the end of the 1980s, i.e. competition was opened up also in the mobile communications field. For the most part of the 1990s a duopoly situation existed between Telecom Finland and Radiolinja. Radiolinja was not granted a license to operate a NMT network, but after some regulatory changes, a GSM license was awarded Radiolinja (and Telecom Finland too). Telia became the third actor who was seeking a position on the Finnish telecommunications market, and became active in mobile communications in 1998 alongside service operators RSL Com and Saunalahti. The third national mobile operator was established by the Finnet Group in 2001, after the majority of Radiolinja's operations had been acquired by HPY, who had exited the business network surrounding the local telephone companies. DNA Finland changed the duopoly situation for good and influenced the way of doing business in mobile communications by offering cheaper mobile subscriptions and letting competitors lease capacity from Finnet's network operator. Figure 17 shows the actor landscape at the end of the 1990s in Finnish telecommunications and figure 18 shows the change that has occurred between 1998 and 2001.

Network operator	2004	2005	2006	2007
Finnet Verkot	DNA Finland Wireless Maingate Fujitsu Invia PG Free (Ventilo) Spinbox	DNA Finland Maingate Fujitsu Services PG Free Spinbox (GoMobile)	DNA Finland Maingate Fujitsu Services Go Communications Aina Group Setera	DNA Finland Fujitsu Services Go Mobile Aina Group Setera
TeliaSonera	Zeroforty Tele Finland Saunalahti Hesburger Aquasource Passeli Paperiliitto Hiihtoliitto Palloliitto Finnet Com ACN Net Fonet SK Mobile	Tele Finland Aina Group Finnet Com Globetel Net Fonet SK Mobile	Aina Group Globetel Net Fonet SK Mobile	Globetel Net Fonet SK Mobile
Elisa	Elisa Kolumbus Stockmann Dial Cubio Tele2 MTV3 Song	Saunalahti Kolumbus Cubio TDC-Song Tele2	Saunalahti Cubio TDC-Song	Saunalahti Cubio TDC-Song

Table 14. Service operators in mobile networks (Finnet, 2007b, internal material)

At the beginning of the 21st century, the actor landscape had changed dramatically. Elisa had been formed by HPY, who consolidated all subsidiaries into one organization, including Radiolinja. Service operators had entered the Finnish mobile communications market. At the

end of 2005 in terms of mobile communications actors, the landscape had not changed much when it comes to mobile network operators. Three mobile networks existed in Finland, i.e. TeliaSonera, Elisa and Finnet Verkot, who all sold network capacity to service operators through buyer-seller relationships. Table 14 summarizes the service operators from 2004 to 2007.

6.5 Types of interaction and relationships in Finnish telecommunications

From a historical perspective the informants mention that relationships between telecom operators and equipment manufacturers were close. However, it is recognized that cooperative nets have been formed, which are more or less forced by regulation and legislation concerning interconnection, roaming, network access etc. Such issues lead to buyer-seller relationships where the actors are mutually dependent on each other in order to provide functioning services to end-customers. These are however cooperative nets formed around the network infrastructure and are crucial for providing services. Another issue where the informants' views are similar concerns the belief in no actor being able to succeed on the market by itself. Rather, networking is obligatory for today's actors on the market. For instance, Informants X34 and X28 note that actors must "play together" in order for a market to be created and once it is established the actors find other means of competing on the market. Informant X28, however, states that after the market is functioning the partnerships are ended. Informant X32 compliments the cooperation between Finnish mobile operators, which is one of the reasons why mobile telephony became such a success in Finland. In the U.S., for instance, SMS has only recently (around 2003) become popular due to the fact that there were no interconnection agreements between American mobile operators. A user could only SMS others with the same subscription provider. However, many informants (e.g. Informant X12) argue that actors' cooperation in the mobile communications market leaves much to be desired. Informant X12 also points out that since the introduction of DNA Finland as the third mobile operator and the entrance of ACN and other service providers, the willingness to cooperate has been extremely low since all actors were forced to cut costs due to low prices in mobile telephony. Informant X10 mentions that it has been an old tradition to standardize (cooperate) to a certain degree, after which competition between actors was initiated.

It is generally pointed out that the FCA restricts actors' cooperative patterns (e.g. Informants X27, X34), which leaves the industry with only competitive relationships. This is however a one-sided interpretation of the situation, as the FCA argues that it only intervenes when it suspects cartels (Informant R37). Horizontal cooperation is allowed since it promotes all kinds of product and technology development projects. Some product or technology development cooperation may have elements of forbidden actions, but from a principal point of view this kind of cooperation is allowed. A grey area exists, however, where for instance industry organizing occur. If market data is collected in such a form that price and market share information is shared, the FCA will intervene. Some informants argue that actors, especially such actors which enjoyed monopoly power until the mid 1980s, possess thinking towards institutions rather than cooperation. They are better at preventing cooperation rather than cooperating, by slowing down processes and defending market shares. The FCA used to deploy a system where exception permissions were granted for cooperation between competing companies. This system was ended in 2004, but some agreements are still valid. Informant R37 mentions that the Finnet group possesses a number of special permissions. By obtaining these permissions the Finnet group escaped cartel accusations. Today companies

must themselves assess whether their cooperation has elements of cartels or not. The FCA thus considers that it does not in any way restrict cooperative patterns between telecom actors; it merely monitors that no cartels are formed. If a telecom actor cooperates with an actor from outside the industry, it is referred to as vertical cooperation, which may lead to closed markets. The FCA intervenes in such cases.

It is also noted that mobile operators and content providers have different cooperative patterns (e.g. Informant X34). The Finnish market for telecommunications is also criticized for having "millions of projects competing with each other", by which Informant X34 indicates that the market is fragmented and each actor has only concentrated on its own role and service production. The actors should cooperate more. Mental barriers and opinions restrict cooperative agreements; the attitudes are said to be locked and old-fashioned, which leads to opportunities being lost. None of the operators, however, have such a perfect infrastructure network or service set that they would not need cooperation partners. In general cooperation relationships in Finnish telecommunications are considered to be based on technology (Informants X13, X16, X17, X21, R23, X27), whereas cooperation on the commercial side is regarded as more complicated and does not exist to the same degree.

Informant X16 mentions that there were always cooperative relationships in the industry, but many were of the "good brother" –type, where no formal agreements were established. The amount of formal organizations with member fees, where actors jointly develop technology or aim at influencing regulation or the industry have, however, increased (Informant X16). Revenue sharing is generally mentioned as a strategy in relationships which cannot purely be labeled as buyer-seller relationships. Informant X13 argues for the importance of recognizing revenue sharing as a viable model if one aims at succeeding in the telecommunications field. Informant X13 also believes that partnering occurs mainly within the industry and especially with the aim of future consolidations. Also, Informant R23 mentions cooperative relationships initiated by regulation. Also, such actors which have SMP status are restricted by law in their cooperative patterns. Infrastructure networks must be interconnected and this is done through formal agreements (contracts), of which the regulator requires copies. The fact that the network operations were separated from service operations more or less forced mobile operators to open up their networks to competing actors, which *per se* is a buyer-seller relationship initiated by force. Negotiations are thus initiated due to the regulatory environment. The regulator has in general taken a role as a supporter of service providers and MVNOs. Some informants are of the opinion that cooperative patterns between actors in the Finnish telecommunications industry are all based on regulation rather than free will. It is more about duties rather than "real" partnering (e.g. Informant X29) and has influences from politics (Informant X35). Table 15 summarizes cooperative patterns.

Type of interaction	Regulatory obligation	National	International
Standardization	x	x	x
Interconnection	x	x	x
Roaming	x	x	x
Revenue sharing	x	x	x

Table 15. Interaction among actors in the telecommunications industry

6.5.1 Standardization

Standardization indicates that a majority of actors have agreed upon a set of guidelines for interoperability amongst actors in order to promote usage of a certain technology. For instance, in Europe it was agreed that GSM would be the common standard for mobile telephony. Cooperation around standardization takes place both on a national and international level. Examples from an international level are Open Mobile Alliance (OMA), which is the forum for standardizing the layers above the transport; the GSM Association, and various associations focusing on next generation mobile technologies etc. The most important standardization organs are the International Telecommunication Union (ITU) in Geneva and the European Telecommunications Standards Institute (ETSI) in Nice. ETSI is recognized as an official European Standards Organization by the European Commission and produces "globally applicable standards for Information & Communications Technologies including fixed, mobile, radio, broadcast, internet and several other areas" (ETSI, 25.10.2007). Finnish member organizations at the end of 2006 were Digita, Elcoteq, Electrobit Ltd, Elisa, Finnet, Flextronics, Helsinki University of Technology (HUT), NetHawk, Nokia, Satel Oy, Tecnomen Oy, Trio Network Solutions Oy, Vaisala Oyj and FICORA. There are furthermore more than 400 forums for telecommunications and information technology actors globally, focusing on e.g. electronic commerce, Internet-IP, mobile communications and multimedia. On a national level, FICORA coordinates telecommunications standardization in Finland. The coordination of standardization on a national level takes place through a standardization board, to which belongs FICORA, Sonera, Finnet, Elisa, HUT, FiCom and Nokia. National standardization groups, under the direction of FICORA, cover each of the main areas in telecommunications standardization. The groups have members from the most important cooperation partners: operators, industry and users. The groups coordinate national views in international standardization in their specific technical areas and draw up national standards and guidelines as necessary. There are currently eleven standardization groups, such as DVB/iTV, human factors, IPv6, equipment engineering, NGN architecture and protocols, terminology, etc.

6.5.2 Interconnection

Interconnection is defined as the physical and functional connecting of different communications networks and communications services. Interconnection is executed in order to ensure that users can access communications networks and services of other telecommunications operators. According to Melody (1997), telecommunications networks are unique because they require a high degree of cooperation from all parties involved and because of the interdependency of network components. Technical standards, service definitions, and pricing arrangements all must be well understood by the various users of the network in order to ensure efficient provision of the network's services. Interconnection arrangements in the telecommunications industry have a long history; they first became a contractual issue in 1894 when Alexander Graham Bell's initial patents expired. Beginning in 1894, the Bell System had to enter into interconnecting contracts with independent telephone companies, and the independents similarly signed contracts with each other that governed the terms of interconnection (Gabel, 2002). For most of the history of telecommunications worldwide, operators negotiated with each other to set the terms and price on interconnection. However, the emergence of competition has led to regulators being forced to intervene, since incumbents have little or no incentives to make things easy for their new competitors (McCarthy & Tétrault, 2000).

Obligations regarding provision of services are posed especially on operators with SMP. A telecom operator is obliged to negotiate on interconnection with another telecom operator. If the parties are not able to reach an agreement, FICORA must intervene in order to solve the dispute through conciliation. Interconnection requires cooperation among competitors, who must agree on its mode and especially its price (cf. Laffont, Rey & Tirole, 1998). National interconnection is handled through a non-profit organization, Finnish Communication and Internet Exchange association (FICIX Ry). FICIX was founded in 1993 by Eunet Finland Oy, HPY and the PTT, who made an agreement on interconnecting Finnish IP networks. FICIX currently has 23 members.

6.5.3 Roaming

In mobile communications roaming refers to the ability to use a mobile terminal outside the home network, i.e. a user may automatically make and receive voice calls, send and receive data, or access other services when outside the geographical coverage area of the home network, by means of using a visited network. In order to do so, service providers must sign roaming agreements, which stipulate billing of the services obtained. The GSM Association broadly outlines the content of such roaming agreements in standardized form for its members. For instance, TeliaSonera has signed GSM roaming agreements with operators in over 100 countries and GPRS roaming agreements in over 50 countries. WLAN roaming agreements have been signed in over 16 countries.

There are different types of roaming, i.e. (1) regional, in which a user may move from one region to another region inside national coverage of the mobile operator. The U.S., Russia and India are examples where there are a number of regional service operators. (2) National roaming indicates moving from one service operator to another within national borders. (3) International roaming refers to the ability of moving to foreign service provider's network. (4) Inter-standards roaming allows a user to move seamlessly between mobile networks of different technologies, such as between UMTS and GSM, for instance. The Regulation on roaming charges within the EU came into force June 30, 2007.

6.5.4 Revenue sharing

Revenue sharing encompasses splitting of profits and losses between two parties. For instance, revenue sharing takes place between media companies and telecom companies during popular shows like "Idol" or "Dances with stars", where viewers may vote for their favorite contestants via SMS or phone calls. The operator then receives a certain percentage of the fee for making the call or sending an SMS, while the media company or broadcaster receives the rest. Pelkonen and Dholakia (2003) argue that revenue sharing models hamper the development of e.g. mobile services. Finnish content and application developers have faced 80/20 revenue sharing demands, with operators retaining 80% of the revenue. For instance, in Japan the revenue sharing model is 10/90, i.e. the mobile operator holds 10% and 90% of the revenues flow back to the content and/or application developer.

6.5.5 Joint ownerships

The Finnish mobile communications operators have set up a special company by the name of Suomen Numerot Numpac Oy (Numpac) to assume responsibility for the management of the system required for number portability. Numpac was founded on 23 May 2003. The shareholders in Numpac are Finnet, Elisa and Sonera with each company holding 33% of the capital stock.

6.5.6 Organizations as cooperative initiatives

FiCom

The Finnish Federation for Communications and Teleinformatics, FiCom, is a co-operation organization for the ICT industry in Finland and was established in 2000. FiCom is regarded as a societal network and involves strong cooperative and developmental relationships (Informant R23). A prerequisite for the establishment of FiCom was the demolishment of the state ownership of Sonera. The main aim of the organization is to look after the industry's interests as well as to promote business opportunities for its members and to enhance their competitiveness. FiCom's member companies include telecom operators and internet operators; message transfer agents; data network equipment and system manufacturers, installers and administrators; software and ICT houses; companies providing on-site ICT equipment support; as well as e-commerce and e-consulting enterprises. FiCom cooperates to a certain degree with universities and research institutes, which also has elements of commercial cooperation (Informant X10). Some informants however state their mistrust in FiCom by saying that FiCom only drives the interests of the largest operator or one specific member rather than the whole industry's interest (e.g. Informant X6).

Radio- ja televisiotekniikan tutkimus RTT Oy

RTT is a non-profit organization, established in 2002 in order to contribute to the research and development of new radio and television technologies in Finland. The participants are Digita, Elisa, MTV Media, Nokia, TeliaSonera, Swelcom, Teleste and YLE (RTT, 22.3.2007). In relation to mobile TV, RTT has a "subjective mobile audio-visual quality testing" -project in the DVB-H environment, which started in 2004.

Dimes

Dimes collects Finnish ICT players by calling for joint effort to utilize the results of R&D work for the deployment of new services benefiting the national economy. Companies can become members in the association by paying a membership fee. Dimes Association cooperates with the Finnish innovation organizations forming an effectively operating network which can represent the Finnish national actors in activities towards EU technology opportunities. The association was established in 2004. The first members attending were e.g. Nokia, TeliaSonera, Teleste, Yle, Finnet and Elisa. In 2006 the association had already over 40 member companies and several ongoing projects. One of them is "Rich Media Services" including for instance a project that experiments mobile distribution systems with DVB-H channel and content billing support (Dimes, 22.3.2007).

Forum Virium

Forum Virium is a cooperation cluster, established by Digita, Elisa, Nokia, TeliaSonera, Finnish Road Enterprise Destia, TietoEnator, Veikkaus, WM-data, YIT-Group and Finnish

Broadcasting Company YLE. Forum Virium focuses on the development of new customer-driven digital services and contents. Its partners on the public sector are the City of Helsinki, SITRA (The Finnish National Fund for Research and Development), TEKES (National Technology Agency of Finland) and VTT (Technical Research Centre of Finland). Forum Virium's role is to act as the neutral matchmaker between the partners and to organize development activities in order to promote innovation and create new business through interaction between enterprises. Forum Virium was established in 2005 and views itself as a business network.

6.5.7 Examples of business nets and networks

Business networks mentioned are distribution networks and supplier networks (Informant X19). If an actor cannot provide a solution e.g. for a large client, partnering is a prerequisite for completing the task. Informant X6 argues that since actors are focusing on their core competencies the field becomes more fragmented and actors are forced to act in networks and nets. Informant X12 argues that only actors on the same level of the value chain can cooperate. Evidence of vertical cooperation patterns and "walled gardens" within the industry are scarce, according to Informant X12. The only way cooperation between actors on the same level of the value chain can take place is if a larger actor such as Nokia initiates the cooperation. Mobile TV is here given as an example. Informant X29 argues that the industry is characterized by competition rather than cooperation at the moment. Informant S26 notes that cooperation occurs in "non-critical areas", such as number portability and base stations.

> *"And at the moment if you consider the convergence market it is in that sense a nice situation; the big media companies and telcos and even a few independent service producers are participating in these common, Dimes or mobile TV or what ever, they are all participating."* (Informant X19)

Informant X11 believes that networking is crucial for the industry and mentions ad hoc networks and mesh networks as possible partnerships. Ad hoc networks are established quickly and only when a need arises whereas mesh networks include several different elements, such as broadband, mobile technology, broadcasting etc. Informant X11 argues that cooperative patterns will in the future be based on specific needs and wants. Networking will thus become faster in the sense that business networks are built and destroyed faster. Some networks will be purely based on projects. During the NMT era cooperation was initiated without problems. Informant R4 notes that the Nordic incumbents did not see each other as competitors. Rather, standardization was seen as the prime target and cooperation was regarded as a prerequisite in order to reach it.

6.6 Signs of industry changes in telecommunications

The informants mention the low level of investments as one of the major challenges in the Finnish mobile communications sector at the moment. Informant X34 distinguishes between innovation in service development on one hand and investments on the other hand. Large infrastructure network investments mean large financial outcomes, whereas particular mobile services can be created on a small budget. Informant R4 argues that earlier, when telephone companies were owned by customers and Sonera was a state-owned company, the gained revenues were invested in the infrastructure network. The situation has changed since in the

sense that "the market owns" or is more market-oriented. The companies cannot thus rely on the same kind of revenues as before. The transition from state-owned to limited company meant that revenues had to be earned from the market rather than through a post in the state's yearly budget. Profitability has changed into a relatively "normal" business as within any company specializing in technology services (Informant X14). Informant X19 establishes that in practice a part of the revenues are intended as investments in various areas of the business environment but since the revenues have decreased investments have diminished. This is, however, a natural result of binding investments to business activity. Informant X21 argues that telecom companies can no longer gain a competitive advantage out of investing in infrastructure networks, since legislation requires that the network must be open to other actors. Informant R23 notes that the issue of SMP restricts e.g. Sonera to act on the Finnish market and points out that in central Europe an operator with SMP status might have 12-15 million customers whereas Sonera has only two million. However, this concerns mainly the fixed telephony area. Informant R23 poses questions on how Sonera can compete against large multinational operators such as Vodafone, on a basis like this.

In terms of service development, Informant X19 is concerned about the division of service production and network distribution. According to current legislation, an operator with SMP status is obliged to separate between service production and network distribution, thus allowing competitors to lease network capacity. The idea in a horizontal market is that all actors have the same basic prerequisites before they can freely compete with each other (Informant X19). A vertical market model based on bundling leads to operators being able to combine access with own services. For instance, if a customer buys access the services which that particular operator produces are included in the same price. Informant X19 argues that this hampers the opportunities for independent service producers and providers and continues that service production and network distribution should therefore be separated from each other. Another frequently occurring topic concerns horizontal and vertical market structures, which is connected to the discussion on service creators and providers. Informant R23 speculates whether the cooperation between the telecommunications sector and the media sector will be based on a vertical market structure and which the motives for such a strategy would be. Informant X12 argues that the actors have succeeded poorly in managing the interests of the whole industry. For instance, the ability to cooperate is weak and the image of the industry is low due to the heavy price war. Informant X19 argues that each operator must be able to change if it aims at staying in position and acknowledges the fact that a lack of service and content production among independent providers is a problem in Finnish telecommunications.

The Finnish telecommunications industry is furthermore characterized by extensive personal networks. Informants R3, X5 and X17 note that the industry is quite close in the sense that the people involved with decision making and managers at lower levels are familiar with each other. These people, i.e. representatives from the media sector, TV companies and telecom companies, are invited to the same events. Through these common events, people have become acquainted with each other, which facilitate cooperation and relationship building.

Informant X16 shares opinions about the changing roles of operators and handset manufacturers. Operators have diminished the amount of providers and experience that they through this action have access to less information about the business environment. Thus, the equipment and handset provider's role increases and functions such as advisors and consults

are added to the role of the equipment manufacturer. In this sense the operators are more dependent on manufacturers. Informant X12 also notes that the relationship between operators and manufacturers was tight "during the old days", i.e. the 1960s and 1970s:

> *"When Ericsson said that you probably need to buy a new type of telephone exchange then it was bought. The prices were what they were, and were not bargained. From Ericsson's perspective monopoly companies were kind of like money collecting machines at the end-customer interface. It was the same with all the manufacturers."* (Informant X12)

Informants S24 and S26 brings forth the issue of patents and points out that a large part of Nokia's revenues come from GSM patents (about 20%). Current GSM patents expire in 2008. Informant S26 believes that the patents are the reason why no new actors have emerged on the manufacturer side of telecommunications; the patents are too expensive and have been divided (cross-licensed) among the existing manufacturers Nokia, Motorola, Ericsson etc., which are the largest patent owners. They have in other words blocked entry to the manufacturing side of telecommunications. In 3G Qualcomm is a major player, with which Nokia is currently in dispute concerning patent rights and payments.

Informants also agree on the fact that telecom companies have become more customer-oriented during the past 20 years. However, Informant S26 argues that operators possess a vertical relation with customers in the sense that a mobile terminal cannot be used without a SIM-card. The subscription, use of mobile terminal and services are linked to each other and cannot be separated since they are combined on the SIM-card. In this sense operators have blocked the entry for e.g. content providers. This also leads to there being no "free" convergence. Rather, convergence occurs on the terms of essential patents (GSM) and SIM-card relations.

The fact that the owner structure has changed is also an issue raised by several informants. Sonera is backed up by Telia and Elisa is cooperating with and reselling Vodafone's services. Finnet was until recently the only Finnish-owned telecom actor. In June 2007 25% of mobile operator DNA Finland was sold to 3i[5], giving 3i a total share of 13% in the new DNA, where fixed network operations of six telephone companies have been merged with the DNA's earlier mobile operations. Finnet comments this by saying that instead of three large actors in the Finnish telecommunications sector, there is now four since Finnet has been divided into Finnet and DNA Finland. DNA Finland is the service operator and DNA Verkot provides network access.

6.7 Perceptions of role and position of industry actors

The positions of operators have not lost their meanings, according to Informant X8. Rather, new actors and influencing players have emerged alongside the operators. An operator offers connectivity and access and bills the end-customers. The end-customers are thus in connection with the brand of the mobile operators rather than with e.g. media companies that act as content providers. It has been argued that media companies seek to position themselves so that they would have direct contact with end-customers, which would mean that they overtake the

[5] 3i is a global actor in the private equity and venture capital market.

operator's role as the end-customer contact. Informant X12 names this scenario industry convergence, when a media player succeeds to overtake the operator's role. The following section discusses change in relation to types of actors in the industry.

6.7.1 Focal mobile telephony actors 1985-2005

In 1985 the roles of the focal actors were locked. The PTT acted in a dual role as regulator and operator, whereas the local telephone companies had joined their forces in a cooperative organization in order to challenge the monopoly situation that the PTT enjoyed. Its dual role allowed it to minimize threat from competitors. The equipment manufacturers are also raised by many informants as important actors, mostly Ericsson, Siemens and the newcomer Nokia. It is also argued that the equipment providers possessed stronger positions during the 1980s, and early 1990s. Furthermore, Informant X22 argues that the organization consisting of mobile phone dealers, Matkaviestintoimittajat Ry, should be considered as a major player of the 1980s and the 1990s. The organization had a position as a focal actor in the sense that it was crucial for the development of the industry, exercised lobbying and looked after the interests of the industry. The organization was established by Nokia together with importers of mobile terminals. The mobile phone dealers were independent actors, but had formal contracts with the PTT. In the mid-1980s, when a customer bought a mobile terminal a license application had to be sent to the PTT in order to receive a permit to use NMT-phones. The quality of the NMT network was not considered to be satisfactory. Also, customers generally had to wait several weeks before they got a license to use their NMT-phone. When they finally got the license, the network was constantly jammed due to its low capacity. The PTT's organization was inflexible, and customers were dissatisfied with the level of service. Matkaviestintoimittajat Ry was later on merged with a larger organization that looks after the interests of white ware and electronics. Informant X22 mentions that the position of the organization as an influencing actor in Finnish telecommunications was lost when it merged into a larger organization. During the 1980s operators had much more power in relation to the end-users and other actors. After the century shift, the position and power have weakened (Informants X8 and X34). Only large operators on a global level, such as Vodafone, are today powerful enough for orchestrating the industry. For instance, Informant X8 states that equipment and handset manufacturers have to cooperate with such large powerful operators. Operator's relation to equipment manufacturers has traditionally been based on the equipment provider giving a few alternatives and the operator purchasing systems and technologies based on a small range. The operator's position has become stronger in this area as well, since operators are in the position to demand certain solutions etc. rather than "taking whatever they get". This has, according to Informant X8 marked a large change for e.g. Nokia. Informant X11 expresses similar thoughts by saying that equipment providers could direct operators, since the equipment providers possessed superior technical knowledge. However, operators have today realized that they are not buying technology, they are selling services. The positions of operators have thus, according to Informant X11, improved. They have become equally customer-oriented compared to previously being technology-oriented.

At the end of 2005, most of the service operators had been acquired by one of the three focal actors, e.g. Sonera acquired ACN, DNA Finland acquired Telia, Elisa had initiated an acquisition of Saunalahti. The focal actors were Sonera, Elisa and DNA. One informant mentions that already the names of the actors signal that many changes has taken place during the years.

6.7.2 Handset and equipment manufacturers

It is often believed that Nokia and Ericsson are engaged in a bloody competition with each other. A closer examination of their relationships reveals that they are indeed competitors, but have over time established a functioning cooperation (cf. co-opetition by Bengtsson and Kock, 2000). They do not only engage in cross licensing arrangements (Informants X8 and X16), but for instance Ericsson in Finland is responsible for testing the compatibility between Nokia's and Ericsson's technologies. Both Nokia and Ericsson state that their cooperation occurs on a technological level rather than a commercial. Informant X16 believes cooperation within the industry is initiated around technology and standardization issues as well as regulation, but not that much concerning commercial issues. Convergence is, nevertheless, viewed as a driving force of cooperation patterns and relationships. Informants X15 and X27 also consider convergence as an important factor which requires cooperation between actors in order to provide solutions to clients. It is namely the clients or end-users who demand converged solutions, which puts pressure on the providers of these solutions.

Nokia also states that it is engaged in a number of value networks, where it has had to learn new kinds of behavior. For instance, Nokia has had a principle of not sharing its brand or diluting it in any way. On this point, Nokia has had to change its position when it became clear that Nokia does not possess all the relevant resources and competences in order to e.g. include a pulse meter in the mobile terminal. Polar thus became a natural partner and their brand also shows in the terminal, since Nokia believes that it gives the mobile terminal higher credibility. Nokia has come to a conclusion that partners perform a certain part of the value chain or value network. Nokia is not independent in the sense that it is able to produce almost everything by itself anymore. The management of value networks has furthermore become more complex and Nokia's role as a major influencer on informal cooperative organizations such as OMA and 3GPP is perceived to have become smaller.

The outsourcing trend that has prevailed in the telecommunications sector during the past decade also affects the role of handset manufacturers/equipment providers in the sense that operators have begun to outsource certain functions, such as maintaining and operating infrastructure networks, to e.g. Nokia and Ericsson. This provides the latter companies with new business opportunities and new roles. For instance, since 2001 Ericsson has invested heavily in providing services of various kinds, which also indicates a shift in their core competence area. One third of Ericsson's income originates from services. For instance, Ericsson's business network partners are Accenture, to which Ericsson has outsourced functions in early 2000s. Digita performs installations for Ericsson as does Primatel (YIT). TietoEnator is considered Ericsson's partner but also competitor in some business areas. Informant X16 states that cooperation partners act independently and that the amount of "symbiotic actions" has decreased in the sense that Ericsson chooses partners according to situation. This means that Ericsson commits to other actors less than previously. The amount of customers has decreased as well and those who are left, e.g. operators, see Ericsson in a different light; they rely on Ericsson for information and as an advisor and consultant. Operators' too have less relationships with manufacturers.

Informant X8 states that actors from other areas than mobile telephony have entered the business environment and formed value networks. One actor cannot perform everything by itself, especially if the company lacks competences in a specific area, and needs cooperative

partners to form a business net with. Nokia has grown from a self-fulfilling and self-sufficient company to a networked company. Nokia struggles with its role, whether its core competence is in technology or understanding end-customers. At the moment Nokia's core competence is technology, but the future might bring new directions. For instance, Apple is an attractive partner for Nokia, but sees Nokia as a competitor and Informant X8 states that it takes time to find a win-win concept. Sometimes it is not found at all. Nokia has acknowledged the fact that the more they enter other industries, the more they must accept the fact that they do so as equals or even as an underdog.

6.7.3 Media companies as actors in telecommunications

Before Digita became a limited company its main target was to serve TV and radio. Digita's role changed in the beginning of the 2000s. Digita views itself in the role of a pure network operator and its focus lies in the 450-network designed for wireless broadband, media networks, i.e. television and radio networks and the DVB-H network. In relation to telecommunications actors, Digita acts as a supplier, offering site and building services, maintenance services and other network services. Digita belives telecom actors perceive Digita as an infrastructure provider since telecom actors use Digita's base stations and station sites. Digita is also one of Finland's largest companies specialized in 3G installation. Digita is thus engaged in buyer-seller relationships with telecom operators, acting both in the role of supplier as well as the role of competitor. Digita also regards itself as a catalyst of bringing things together and has deliberately chosen a role in the background and acts as a pure B2B actor. "Without such a role real convergence will not occur" says Informant Y33.

Media companies have during the past decades pursued opportunities in the telecommunications industry. For instance, in 1999 Swelcom decided to enter the mobile business area by establishing a mobile portal, 2ndhead, which was operator independent. When Swelcom announced its plans, their stock worth rose with half a million Finnish marks, which Informants Y30 and Y31 regard as a sign of the prevailing hype period. 2ndhead was stopped in 2002 since it became too expensive to maintain and develop. Swelcom underestimated the competence and investments needed in order to produce content for a mobile terminal with a small screen. Thus, a role transfer was attempted also by Swelcom before the century shift, which did not prove to be a successful strategy.

6.7.4 Perceptions of role and position in business nets

Informant X19 points out that the relation between service operators and mobile operators depend on how these actors wish to position themselves. Many speculations during the interviews show that due to changing business environments the operators are considering becoming (1) the bit pipe or (2) integrate vertically in order to take on a role as content providers. One of the strong sides of mobile operators in general are the fact that they control and manage the relations to end-users. They also have more experience and insights into what end-users' needs are compared to e.g. service providers or content providers. Therefore, most informants state that mobile operators will not disappear from the market in the future, even though operators feel threatened by technological advancements such as IP technology. The discussion on which role operators take in the future often evolve around at which stage the operator wants to be in the value chain:

> "*This is quite a dilemma for operators [...] how far up or down they will go in the value chain*" (Informant X16)

Some innovative ideas on the future roles of mobile operators are presented by e.g. Informant X32 which builds on operators being responsible for the basic technology platform, upon which service providers build their content or services. Also, the operators can act in a role where security becomes a core competence. As e.g. the Internet becomes free and customers seek the cheapest and best alternatives, the operators can offer security services.

The gatekeeper role has occurred frequently during the interviews and e.g. mobile operators are said to be gate keepers, since they have access to the infrastructure network. For instance, Informant X9 argues that instead of acting in the role of a gatekeeper, mobile operators should be "super novas" which are more or less the most important part of a business network (focal actor) and deserves its position due to the added value it creates. Content providers in Finland are not many. For instance, YLE, MTV and Nelonen are aggregators rather than content creators, according to the informants (e.g. Informant X28). The challenger role has been ascribed to many operators throughout the years, e.g. Radiolinja, Saunalahti, and DNA. The role of the regulator has also changed from 1985 to 2005. It is not anymore considered to be a proactive actor, who shows the direction of the industry by its actions.

Informant X12 argues that role is related to core competence. An operator might not be able to take on the role that it wishes. Rather, the role is something that has been ascribed to the operator. Core competence is thus a better concept to describe the operator. Also, Informant S26 argues that there exist no separate roles in telecommunications. Informant X38 believes the role of an operator is to focus on social media and community, since one of the core services an operator offers is communication, or the possibility to communicate. Shared experiences in a secure network are potential area for operators to focus on. Informant X32 believes that customers are willing to pay for complete solutions which are perceived to be secure and reliable. The only opportunity Informant X32 sees for operators is to be an active provider of different kinds of services and believes information security services will be part of the operators' roles in the future.

6.7.5 Actors' core competence and outsourcing activities

Core competence of actors has become narrower in the sense that concerning infrastructure, the focus is on planning and controlling the networks. On the other hand, from an end-user perspective the brand and brand management becomes more important as well as being able to control and manage multiple channels (Informant X29). The role of business networks have however grown rather than diminished. Doing everything by yourself is not possible anymore and new roles have become important in the industry, e.g. due to outsourcing.

In 1985 core competence was considered to be building and maintaining infrastructure network and its quality, i.e. technological competence. In 2005 core competence has shifted from technology to understanding the end-user, marketing and serving clients (Informant X34). However, Nokia, for instance, considers its core competence to be technology at the moment, but Informant X8 questions whether technology should be the core competence in the future, or if e.g. understanding the customers would be a more appropriate core competence, since technology A can easily be replaced by technology B. The positions of

mobile operators are generally considered to be strong since they are linked to end-users and have a long history of managing customers. Mobile operators also understand network distribution. Informant X16 on the other hand argues that competition has moved from residential customers to corporate customers.

In terms of a historical development of core competence focus, telecom operators included e.g. mobile telephony and the Internet in their core competence palette during the late 1990s. Informant X27 argues that granting Datatie a license affected the core competence of the entire industry: "you had to manage in the industry, not only provide products and services". Operators are in general considered to possess the core competence of billing customers and distributing content. Narrowing down core competence means that an actor must seek resources from other actors. One reason for outsourcing is the goal of cost efficiency. Informant X29 mentions that even though products and services differ from operator to operator, the production models are becoming increasingly similar and mobile and fixed telephony networks are being integrated with each other. A result of this is that operators have specialized themselves and chosen which functions it carries out by itself and which ones are outsourced and carried out "by partners". For instance, installation and network building functions were outsourced already in the early 2000s. Maintenance of mobile networks has been outsourced to Ericsson and Nokia in many cases, which see new business opportunities in this area. Core competence has also moved increasingly to managing solutions.

In the interviews it became clear that role is connected to core competence in the sense that what ever an actor chooses as core competence will be reflected in the role it plays in the industry as well as in business nets and business networks. However, core competence focus is more or less a result from cost efficiency requirements and managing processes in the company. The fixed and mobile networks are converging and constitute a common technology platform. The convergence of networks has, according to Informant X29 led to a certain kind of specialization which functions an actor performs by itself and which ones are outsourced: "Core competence has increasingly moved towards own core functions". Informant X35 states that Sonera's core competence is billing, which also reflects its perceived role. Due to this role, Sonera is an attractive partner for media companies as Sonera is in the position to bill customers and return investment via revenue sharing relationships. The role of Sonera is thus to transmit content in its access network and bill customers for used services. Informant X14 points out that all functions and processes which are not a part of stated core competence must be outsourced

6.8 Critical events in Finnish telecommunications

A critical event is created when an incident happens, but the criticality concerning the incident or event is always related to the way we look at a situation. According to Tripp (1993, 1994) the majority of critical incidents are not dramatic or obvious. They can be regarded as straightforward accounts of commonplace events, which occur in routine professional practice. However, these events are indicative of underlying trends, motives and structures. Thus, saying that an event is critical always includes an interpretation of the significance of the event, or in the words of Angelides (2001, p. 431) "[…] their criticality is based on the justification, the significance, and the meaning given to them". Basically everything that happens is a potential critical event, but its criticality depends on our interpretation. Roos (1998, 1999) argues that an event is critical when the observed consequences of it are clear.

The notion of critical events thus contains a process view, as criticality is assessed based on the identifiable outcomes of that particular event. Olsen (1992) structured critical events in terms of (1) triggering factor, (2) further critical steps and (3) final outcome. Similarly, Voima (2001) studies critical events based on (1) source, (2) process and (3) outcome. The following analysis is based on a categorization encompassing a description of the critical events and the process of it, including triggering factors as well as outcomes. An event is thus categorized as critical if it has affected the development of the telecommunications industry. A process view is adapted and combined with critical event analysis. The aim of the analysis and combining two approaches is to show the change and development of the industry on different levels has contributed to the industry's current structure and context. The categorizations below are based on interview coding results. The categories have been created by cross-comparisons of informants' responses and are the most frequently occurring critical events (categories, codes) mentioned during the interviews. Thus, the criticality of an event has been determined jointly by the researcher and the informants, even though the final decision on which events to include in the analysis has been taken by the researcher.

In the analysis of critical events in the Finnish telecommunications sector, the events have been divided into three main categories. (1) Critical events in the competitive landscape focus on highlighting the most critical events among actors. (2) Critical events in technology aim at presenting the role of technological advancements and especially mobile technology in shaping the structure of the industry. (3) Critical events in the regulatory environment further support the analysis of the industry development by pointing out how regulation and legislation has influenced the industry and more or less forced change upon it. In terms of the development of Finnish telecommunications (both fixed and mobile) a summary is provided table 16. The events listed can in a certain way be regarded as critical events, but are here merely meant to summarize the development of the industry.

Year	Event
1971	ARP
1982	NMT-400 Group Spécial Mobile established
1985	Datatie Oy established Business operations of the PTT are transferred to PT Finland Ltd
1986	NMT-900
1988	The Telecommunications Administration Centre (the regulator) is established Radiolinja is established
1990	Radiolinja is awarded a GSM license
1994	Full competition in telecommunications starts: long distance and international calling operations are deregulated Business and supervisory activities are separated: PT Finland changes into a limited company; the telecom segment of the PT is named Telecom Finland Ltd HPY is founded when Helsinki Telephone Association's operations are privatized
1995	Finland joins the EU FiCom is established
1996	The telecommunications Act is modified: liberalization continues towards free industry activity. Actors are obliged to cooperate concerning telecom connections Digitization of telecommunications is completed (mobile)
1997	Telecom Finland is broken out of the PT and changes name to Sonera Kolumbus Internet service is launched by HPY

Year	Event
1997	The Telecommunications Act of 1987 is replaced by the Telecommunications Market Act The Telecommunications Market Act assigned some operators as companies with significant market power. All actors become obliged to separate between network and service operations. Telia enters the market via acquisition of Telivo's telephony business The sector becomes a line of business
1998	Telecom Finland lists on the stock-market and changes name into Sonera Telia Mobile enters the market First service operators on the market: RSL Com and Saunalahti Radiolinja becomes a subsidiary of HPY
1999	Tele2 enters the market via acquisition of Suomen 3G Oy Fujitsu Services becomes a service operator
2000	HPY breaks free from the Finnet-Group and changes to Elisa Communications Oyj Suomen 2G is awarded a GSM license
2001	DNA Finland is established Stockmann becomes a brand operator by offering Stockmann Dial to its customers Aina Group starts to shape its operations
2002	The fusion between Telia and Sonera takes place Telia Mobile is bought by Finnet A new telecommunications law is introduced (EU-level)
2003	Mobile number portability is introduced ACN enters the market DNA Finland takes over customers of Telia Mobile Sonera and Telia merge RSL Com is acquired by Finnet Pgfree is established Hesburger starts offering mobile subscriptions Markantalo offers the Choice mobile subscription in cooperation with Elisa
2004	Tele2 launches mobile telephony services Tele Finland is established by Sonera MTV becomes a service operator (mobile and broadband subscriptions) Spinbox starts mobile telephony operations in Finland Passeli was launched as a mobile subscription and stopped the same year Markantalo stops its mobile telephony operations
2005	ACN and Tele2 withdraws from the market Pgfree is acquired by DNA Finland Hesburger stops operations in the mobile telephony field Dimes and Forum Virium is established as cooperative organizations
2006	3G subscription and handset bundling is allowed
2007	Aina Group acquires Spinbox/GoMobile subscribers DNA is established (four actors left the Finnet Group, acquired DNA Finland)

Table 16. Events in the development of Finnish telecommunications

6.8.1 Critical events in the competitive landscape

Four main critical events have been identified concerning the actor or competitive landscape, namely the establishment of (1) Datatie, (2) Radiolinja, (3) DNA Finland and (4) the hype period 1998-2002.

Establishment of Datatie

The fact that the local telephone companies together with telecommunications service users (banks, insurance companies etc.) established Datatie in order to circumvent the PTT's monopoly is the first major critical event in Finnish telecommunications during the time period 1985-2005. Datatie opened up the market for competition, but the establishment of Datatie also had other consequences; PTT responded by establishing Oy Yritysverkot Ab and after this the competition moved to the field of mobile phones. Two years after establishing Datatie the local telephone companies jointly acquired Mäkitorpan Autoradio Oy, a company specializing in installing car radiophones. Since the private telephone companies had succeeded in getting an operating license for Datatie and opening up competition in the data transmission area, the step to attempting the same trick in mobile communications was not far away. Licenses for operating in the NMT-900 network had been applied by HPY (Informant R4; Häikiö, 1998). PTT refused the application in 1986 based on its dual role as an operator and regulator. The PTT basically enjoyed a monopoly position in the NMT network. For instance, Informant X22 stated that the PTT would have preferred to focus on its NMT network instead of investing in GSM, but the competition by Radiolinja and pressure to move ahead forced Telecom Finland to shift focus. The PTT opposed granting a license to Radiolinja referring to "a senseless duplication of investment from a national economic perspective" (Turpeinen, 1997, p. 76). Granting the license to Radiolinja required an amendment in the Telecommunications Act. The amendment was approved in June 1990 and implied that also the PTT, transformed into Telecom Finland by this time, had to apply for an operating license. In September 1990 both Radiolinja and Telecom Finland were granted operating licenses for the GSM technology. Häikiö (1998, p. 196) argues that since Radiolinja was set up with customers as joint owners, this added political weight "in a situation where an operating license had to be secured from the government, and […] important expertise when new services had to be marketed to users". Thus, the establishment of Datatie gave an insight into market transformation and a view that the local telephone companies were capable of changing the market conditions through cooperating and acting in a business network form. The success of Datatie fueled an aggressive strategy for opening up the markets, which paved the way for competition in mobile communications as well.

Establishment of Radiolinja

Informant X27, among others, argues that Datatie paved the way for Radiolinja to be established. The local telephone companies had lobbied for Datatie years before it was granted a license, which Informant X27 sees as a critical fact in the development of Finnish telecommunications. Without Datatie Radiolinja would never have had a chance to establish a position in the mobile communications market. Informant R4, however, argues that Datatie and the whole idea behind the company were initiated by HPY, which at the time belonged to the association which the local telephone companies had formed. Häikiö (1998, p. 195) notes that for the local telephone companies "getting involved [in mobile telephony] was a matter of life and death, and so they were prepared to take on the risks required for building up the network". Since they were not allowed to operate in the NMT network, their only option was to make use of the, at the time, new digital GSM technology. Häikiö mentions that the GSM technology had become the tool of new operators to enter markets in other countries too (however, without referring to any particular examples). As already mentioned the PTT refused Radiolinja's application for operating in the NMT-900 network in the mid-1980s. At the same time discussions were introduced whether an operator can have a double role as a regulator. The GSM licenses that were issued in 1990 (to Radiolinja and Telecom Finland)

changed the position of Telecom Finland as the regulatory authority considerably. Finland was the first country where a GSM network was opened, and thus Finland never followed any kind of examples. Rather, Finland has paved the way for the establishment of competitive mobile communications markets.

Slowly, the monopoly which Telecom Finland enjoyed in e.g. data transmission and long distance began to dissolve. In December 1990 Datatie and Yritysverkot were allowed local and long distance connections all over Finland. This event meant that the companies were competing for customers in earnest. Long distance traffic, traditionally Telecom Finland's key area both operationally and financially, was opened up for competition as was international traffic in 1994. Thus a sequence of events occurred after Datatie was established and granted a license. A majority of the informants refer to Datatie when asked to mention critical events in the Finnish telecommunications history. Informant R4 argues that competition started when telefax was introduced, indicating that technological development would be the trigger of opening up competition. However, the process which led to a competitive market for telecommunications was initiated through the dispute over data transmission, which *per se* depended on the introduction of new technology. However, the outcome of that particular critical event (i.e. the introduction of telefax) was that Datatie was granted an operating license, which led to an atmosphere more favorable towards competition. Datatie in itself in not just an outcome of a previous critical event, but also a critical event *per se*, which has led to several different end results, e.g. opening up the market for competition, paving the way for Radiolinja, and changing the context to such a degree that the PTT had to undergo an internal reform. Informant X14 states that when Radiolinja was awarded a license to operate a GSM network, the situation was perceived as very threatening by Sonera.

Establishment of DNA Finland

The Finnet Group was established in 1921 and referred to as the local telephone companies' "central organization and cooperation body" (Artte, 1995, p. 7) or the Association of Telephone Companies. The local telephone companies had to cooperate in order to form a mobile operator as well. Informant X21 confesses that the whole structure of Finnet is "one messy business network". The next critical event in terms of the competitive landscape occurred when HPY broke free from the Finnet business network. Some informants refer to this as a divergence between interests, on one hand a capitalistic wing in Helsinki and a local focus by the other telephone companies on the other hand. After HPY broke free Radiolinja was driven into the hands of HPY and later consolidated into Elisa. This gave the Finnet group an opportunity to establish a mobile operator of its own, since it also received a sum of money when HPY acquired Radiolinja at the time when the IT-hype was at its peak and company valuations were nearly astronomical. DNA Finland was established as a third operator on the mobile communications market in Finland. On the other hand, disputes and arguments in the form of diverging opinions on strategic issues had already been noted among the members of Finnet, even before HPY's decision to exit the network of local telephone companies was taken. The establishment of DNA Finland broke a duopoly situation which had emerged also in the mobile communications market. The third mobile operator and the strategies it deployed affected Sonera and Elisa as well; DNA Finland competed on price rather than quality and was actively seeking for service operators who would lease capacity from Finnet's network operator. A few informants argue that this forced Sonera and Elisa to open up their mobile networks to competitors, an action which both operators strongly opposed until DNA Finland

became active in this line of business. The competition and related strategies had changed once again due to DNA Finland as well as Finnet's actions on the market.

Hype period 1998-2002

Informant X32 mentions that the deregulation of markets in Europe occurred around the same time as the revolution in mobile technology, i.e. when GSM reached a mass market. This was followed by a growth period. Furthermore, the dot.com-bubble occurred roughly 1995–2001 during which stock markets in Western nations saw their value increase rapidly from growth in the new Internet sector and related fields. A recession was experienced in most East-European countries during the early 2000s. The "normal business" period begun after the hype period and the GSM boom, around 2002-2003. Informant X32 mentions that cycles of investments and competition have settled, i.e. a base for action has become clear only recently. Informant X22 describes Sonera's point of view of the unlimited growth that was experienced when GSM and mobile phone penetration rose to the skies during the late 1990s. Sonera became listed on the stock market in 1998 and the growth was believed to continue, which led to questions why Sonera would limit itself to growth only on the Finnish market. Sonera made large investments in UMTS licenses and other activities in e.g. Germany and Spain – investments which proved to be too expensive. Due to the fact that Sonera failed in its UMTS license acquirement endeavors in Germany and Italy, the company was "rescued" through a fusion with Swedish former incumbent Telia. The fusion also meant that Telia Mobile which was present as an actor on the Finnish mobile communications market had to sell its mobile operations. DNA Finland took over this part of Telia's business and customers and Finland had three mobile networks again.

Summary of critical events in the competitive landscape

Summarizing the critical events concerning the competitive landscape shows that the establishment of Datatie was extremely important in terms of setting the ground for future competition between a state-owned side and a privately owned side. Many informants argue that without Datatie, Radiolinja would never have gotten a license to operate in the GSM network and therefore Finland would not have gained a top position among the most developed countries in terms of mobile communications. The labeling as critical events of the establishments of Datatie and Radiolinja are thus justified; Datatie opened up the way for Radiolinja to position itself on the market. The establishment of DNA Finland may be seen as another critical event, as it started to compete on price rather than service offerings, thus leading to a shift of focus among mobile operators – from services to prices. The fact that DNA Finland was established may be a result of the hype period, during which many mobile operators acquired licenses and rights to mobile services for extreme amounts of money, leaving them in a period of recession when the hype was over. The operators were recovering still in 2005. Table 17 summarizes the main critical evens in the actor landscape, their triggers, process and outcomes as well as examples of informants expressing these points of view.

Event	Trigger	Process	Outcome	Informants
Datatie	Telefax, telecopying (data transmission)	1. Establishment of Datatie, which operated without a license 2. Datatie was established in cooperation with users forced regulation to adapt and license to be issued	1. Deregulation of markets 2. Competition opened up in long-distance and international telephony	X15, X20, S24, X27, X32
Radiolinja	1. The introduction of mobile technology 2. Datatie paving the way for opening up markets	1. Implementing GSM technology 2. Cooperation with Nokia 3. Establishing functioning distribution channels	Competition in mobile telephony	X20, X22, X27, X32
DNA Finland	1. Dispute between HPY and private telephone companies 2. HPY acquired Radiolinja	1. HPY broke free from the Finnet-group 2. HPY acquired Radiolinja, which gave the Finnet-group an opportunity to invest sales income 3. Mobile telephony growth was high and Finnet did not want to be left outside	1. Third national mobile operator 2. Price war commences 3. Change in competitive strategies	R3, X12, X22, X29, S26
Hype period	Exponential growth in mobile telephony	1. Investments are made in various projects. 2. The markets are hyped.	1. Loss of money on investments 2. Crisis in the industry	X6, X11, X13, X16, X17, X28, Y30

Table 17. Summary of critical events in the competitive landscape

6.8.2 Critical events in technology

From a technological perspective, critical events have been identified as (1) digitization, (2) mobile technology and terminal development, and (3) the Internet.

Digitization

Digitization is mentioned by practically all informants as a critical event in the evolution of Finnish telecommunications, but the outcomes of digitization in terms of influences on an industry level are quite vague. Digitization is more or less an upgrade of technological functions, allowing for faster and more flexible transmissions. However, digitization can be seen as a critical event in the development process in the sense that it allowed for improvements in technology concerning telecommunications systems in general. Digitization served as a boost for the technological advancements within the industry. Through digitization ISDN-technology was introduced, which was the first convergence service according to Informant X15. Optical cables were introduced during the early 1980s, which led to plans for digitizing the entire network of the PTT by the end of the 1980s. Eventually broadband connections were developed as an outcome of the digitization process. Basically, digitization

meant faster, better and better quality connections in all types of networks. Digitization also led to actors becoming more customer-focused (cf. Turpeinen, 1997; Häikiö, 1998).

Mobile technology and terminal development

In terms of mobile technology, the ARP network had proven to be a good experience for both the PTT and telecommunications equipment providers testing technology. NMT was, however, a success, which according to Informant X11 offered early interpretations of what kind of business could be built around mobile technology. The NMT cooperation between Nordic incumbents is a critical event in the sense that many lessons were learned during the building and maintenance of the network. Factors such as cooperation around base stations, interconnection were valuable for the future building of GSM networks. It was furthermore only when the GSM standard was being developed that telecommunications equipment manufacturers were invited to participate in the development process. The equipment manufacturers only received orders during the NMT planning and implementation. Cooperation took place on a European level in GSM, whereas in NMT the cooperation was purely done among Nordic actors. GSM technology, on the other hand, is the most critical event in terms of technology development, as it laid the ground for reaching a mass market of mobile phone users. GSM alongside the advancements in making the terminal itself smaller and more convenient to use, gave birth to a new industry. In 1994 cheap mobile terminals began to appear on the market (cf. Häikiö, 1998). Informant X17 argues that a critical event process which has taken place is the decrease in prices of mobile terminal related technology. This process is supported by small events that have occurred during the years, such as improved voice quality, mobile terminals reaching a critical mass, components for mobile terminals becoming smaller and cheaper, etc. In terms of one particular critical event in mobile technology development, it is hard to estimate which would be the most important one. Rather, technology has advanced steadily and, for instance, color display, smaller handsets and the availability of Internet were mentioned as critical advancements during the interviews. Mobile Internet was, perhaps, hyped during the late 1990s when GPRS was introduced and UMTS licenses were allocated. Different types of mobile handsets by different equipment manufacturers with different features exist on the market, but for instance Carlsson, Hyvönen, Repo and Walden (2005) note that even though technologically advanced handsets are available and *per se* should encourage users to try out new mobile services, the adoption rate of mobile services in Finland has not progressed as expected. Reasons for the Finnish consumers' unwillingness to use mobile services are the start-up costs and the costs of using the services, which are regarded too high (Carlsson, Carlsson, Puhakainen & Walden, 2006).

The Internet

The Internet is mentioned as a critical event by informants, but in terms of how its emergence has affected the industry, it becomes less clear as to why the Internet can be regarded as a critical event in the evolution of telecommunications. Nevertheless, if one adopts a convergence perspective to the Internet and telecommunications, the link becomes rather clear. The Internet plays a large role in the telecommunications sector of today, both from a fixed and a mobile telephony perspective. The spread of the Internet, from being an army invention to becoming an every-day commodity offers opportunities for telecom providers. Even though revenues from fixed telephony are decreasing, revenues from broadband access is increasing. Telecommunications operators possess a valuable core competence in their infrastructure networks, since they will always be needed. In January 2007, 53% of households in Finland subscribed to broadband services (Laajakaistainfo, 22.11.2007). The

xDSL technology, which is the main access type used for providing broadband, is *per se* an important step in the technological development, as it allows for high bandwidth broadband services.

Summary of the critical events in technology
Digitization is mentioned both in the theoretical review and by informants as the main event that has shaped the industry during the past 20 years. Digitization opened up the way for several technological breakthroughs and allowed for new and innovative services, decreased costs for deploying technology and invites technologies to converge. This inevitably affected the emergence of mobile communications technology as well. The emergence of the Internet is another critical event, which is frequently mentioned as a main driver of the industry development and restructuring since it allows for new ways of processing and reaching information. Table 18 summarizes the main critical events concerning technology.

Event	Trigger	Process	Outcome	Informants
Digitization	Technological advancement	From analog to digital	1. New services and products 2. Decreased costs 3. New data transmission systems 4. Convergence of technologies	X5, X10, X12, X13, Y25, Y30
Mobile technology/ handsets	1. Technological advancement 2. Cheaper components for mobile terminals	1. From ARP to GSM 2. From car radio phones to multimedia handsets	1. Mass market of users reached 2. Billion dollar industry 3. Related industries formed, incl. new types of actors 4. Convergence of technologies	X8, X11, X14, X17, S24
The Internet	Advancement in technology	From army invention to mass market	1. Information access 2. Convergence of technologies	X13, X14, X15

Table 18. Summary of critical events in technology

6.8.3 Critical events in the regulatory environment

The regulatory environment has played a large role in shaping the industry and the actions and activities actors are able to perform. The critical events in the regulatory environment have been identified as (1) liberalization, (2) EU legislation, (3) the service operator model, and (4) number portability.

Liberalization
The development of the Finnish telecommunications sector can be summarized in figure 19. Finland never had one single incumbent and therefore the telecommunications market is today multi-operator structured (cf. Wirzenius, 2003). The history of the Finnish telecommunications sector thus differs from most European telecommunications markets, due to the large number of local actors (local telephone companies) that have been present on the

market ever since the late 19th century. These small local actors have later on formed large communication companies and this structure of the market has had an important impact on the development of the market. Other European countries have foremost had one single incumbent, who has dominated the scene and the development has centered on the state-owned incumbent.

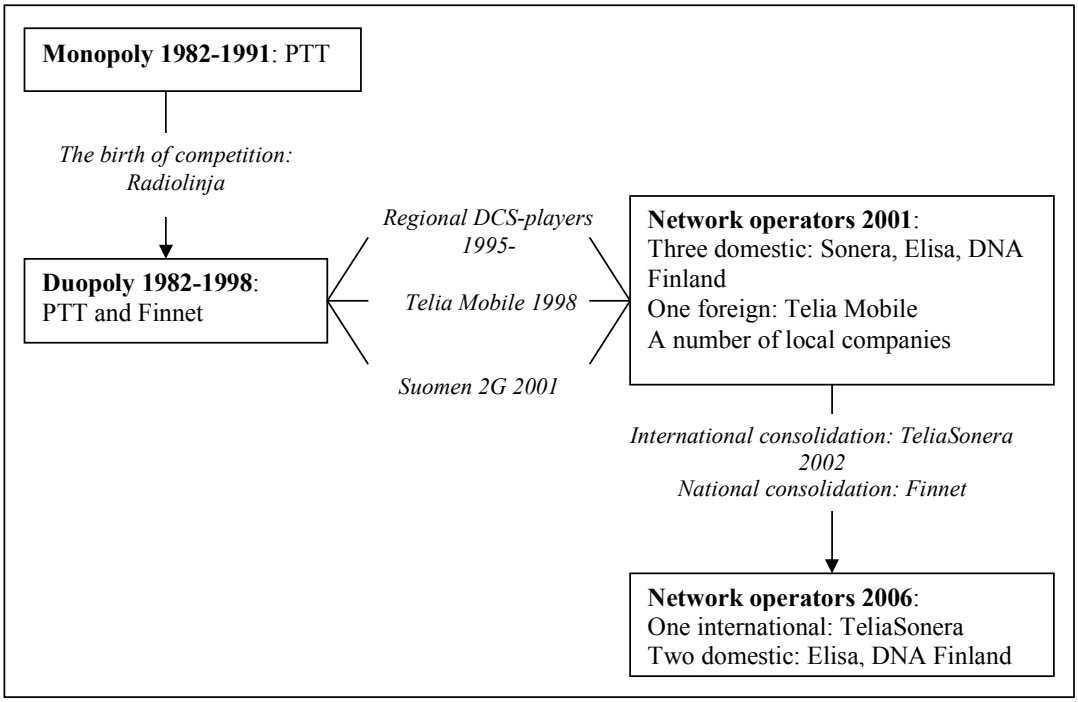

Figure 19. The development of the mobile network operator structure (modified from Nordic Adviser Group, 2005, p. 22).

When EU legislation was implemented in Finland, the telecommunications industry found itself in a process of change. The year was 1998 when EU legislation forced telecommunications markets in Europe to be deregulated, which had already taken place in Finland. According to the Communications Market Act, "an operator is an operator with significant market power if, on the basis of market analysis, it is seen in a particular market to exert economic influence, alone or with others, that allows it to operate, to a considerable extent, independently of competitors, consumers or other users" (FICORA, 7.6.2007). In economics, market power is the ability of a firm to alter the market price of a good or service. In telecommunications, an operator is presumed to have SMP if it has more than 25% of a telecommunications market in the geographic area in which it is allowed to operate (OECD, 2004). The new Communications Act furthermore suggested that service production and network infrastructure are separate businesses. An operator is furthermore obliged to offer network capacity to competing operators, which the regulator viewed as a prerequisite for competition to open up in mobile communications. After the year 2000 several service operators who did not own mobile networks of their own appeared on the market, leasing capacity from the mobile operators with infrastructure (Elisa, Sonera and Finnet), e.g. Tele2,

ACN, Saunalahti. When the price wars began most of the smaller service operators were not able to remain in their positions, and were forced to abdicate from the market. Some informants refer to this period as "consolidation" (e.g. Informants X10, X13, X16). The number of operators decreased drastically (see figure 20 below for a comparison of Nordic countries).

When mobile communications was introduced in Finland a decision was taken not to bundle the mobile terminal and the subscription. According to Informant X14 the prohibition to bundle is a good thing, because "it sort of created the market in the early stages of NMT and GSM". Operators were thus able to act as resellers and Sonera was the first one to liberalize distribution of mobile phones so that any dealer was able to sell terminals. Informant X22 states that in the early days of NMT, in which the PTT had a monopoly, the company had to decide among two potential models for distributing mobile terminals to customers. Firstly, the PTT could manufacture the mobile phones themselves or, secondly, mobile phones were sold freely in shops. Sonera chose the second alternative, i.e. free distribution of mobile terminals. The reason behind this decision was, according to Informant X22, that Sonera did not have the money to buy terminals since Sonera was under the Government's authority and budget at that time. Thus a new market was established for manufacturing and developing mobile terminals. Sonera received a budget for building networks but not for manufacturing or buying mobile terminals.

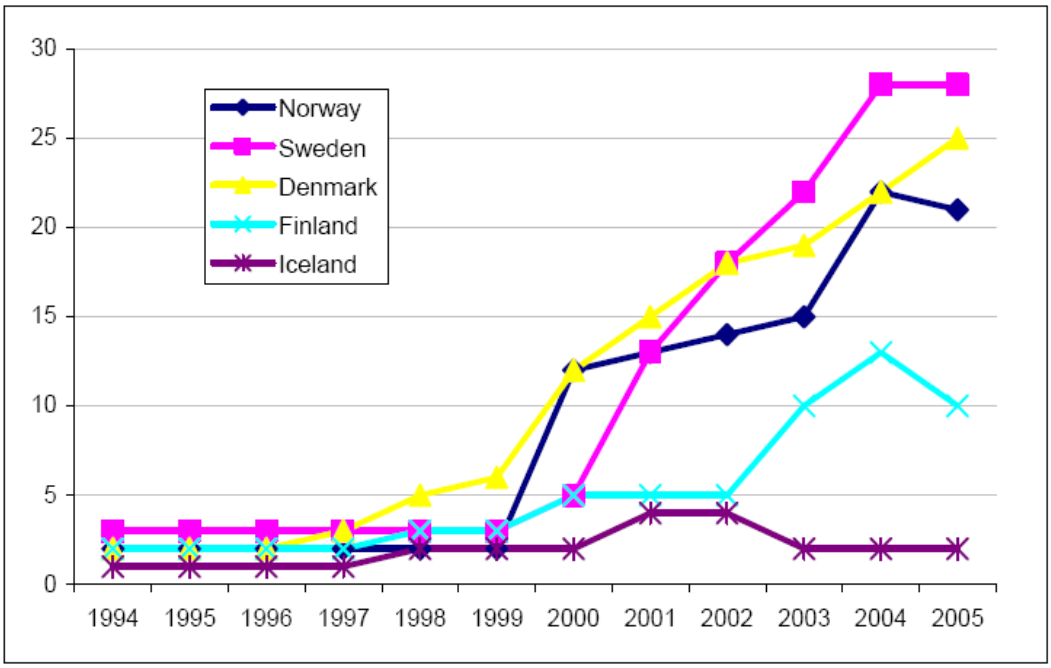

Figure 20. Change in the number of mobile operators per country (Source: PTS, 2006, p. 13)

EU legislation implementation

Joining the EU meant more complicated and time consuming legislation to be implemented on a national level. Informant R23 comments that regulation in Finland is always a bit behind the

technical and business developments, but a large part of this has to do with including the EU legislation into the process and directing national legislation to align with directives given by the EU. Informant R23 also notes that the current legislation concerning telecommunications was implemented in 2003 and based on technology standards and contexts before 2003. Thus, the current legislation cannot take into account future developments and advancements in technology, which means that the directives must constantly be developed and updated. Furthermore, Informants S1 and R23 find the EU and especially the EC unable to understand the Finnish market structure, which has not historically had one incumbent, like most other European countries. Also, the number of directives and laws has increased in Finland since the joining of EU, which according to Informant R23 has complicated Finnish regulation of telecommunications. Informant R23 also comments that convergence of technologies influences legislation and regulation since the borders between traditional telecommunications and e.g. IT and media have become blurred.

Service operator model

The division of service operator and network operator is *per se* a critical event as it also allowed for changes in regulation with the aim of increasing competition. Networks must be open for all actors, including the own service operator (Informant X10). Informant R4 states that the current structure of the market is based on decisions implemented by the regulator, such as the separation of service and network operator. Informant X29 views the division of operators as a remarkable change, which has led to the creation of an MVNO layer. This forces actors to possess competencies related to different stages in the value chain. Efficiency receives a focal position in this equation. Informant X14 argues that the division of operations and obligation to lease capacity was a mistake in regulation, as it brought with it more than 17 service operators, "who did not strive at anything else but cheap prices", which fuelled the emerging price war.

Number portability

Number portability is an issue which can be regarded as a critical event due to the fact that it fueled the price war among mobile operators. The prices decreased when DNA Finland was introduced to the market. On the other hand, Informants X22 and X36 argue that the price war began when mobile network operators were obliged to lease capacity to competing operators. Informant X36 is of the opinion that the existing mobile network operators access prices were too low, which eventually led to the price war. The leasing operators were able to decrease the price level. The impact of letting competing operators into the network too easily was noticed only later, according to Informant X36. Number portability can also be seen as the next step in a process initiated by the critical event of establishing DNA Finland. Informant X16 considers number portability an extension of the liberalization of markets, which was underestimated by practically all operators in Finland. Informant X29 comments that number portability allowed for service operators to position themselves on the mobile market. Informant X10 notes that Finland is a forerunner in telecommunications also in the sense that Finland is the first country to experience challenges in the form of tough price wars, which has not been experienced to the same degree in other countries. Informant S26, on the other hand, comments that the price war was a result of the fact that bundling was not allowed in GSM in Finland whereas in other countries the situation was, and still is, opposite. Even though number portability has been introduced in other countries, they did not experience a noteworthy boom of switching subscriptions. This was due to the fact that mobile terminals and subscriptions were bundled and changing subscription for such users would mean buying a new mobile terminal. Since

bundling was not allowed in Finland, the introduction of number portability coupled with decreasing prices brought with it a boom of subscription switching. The fact that Finland had over 100% penetration rate of mobile subscriptions led to the only strategy being competing on price, which Informant X14 considers to be the reason for the low investment inclination. Informant X22 argues that the industry's inability to compete must also be considered a reason for the heavy price war that followed the introduction of number portability and criticizes operators for being too quick to take price as a strategy. To implement number portability was furthermore a decision taken on an EU level, not by the Finnish regulatory authorities (Informant X16). The regulator in Finland was, however, able to decide on *how* number portability was introduced and thus contributed to the high figures of switching. It costs nothing for an end-user to switch and it is fairly convenient to switch provider through one SMS. The means for end-users to switch were thus made easy, which is an important factor in the discussion. Number portability is also allowed for fixed telephony, both residential and corporate, but no high churn has been experienced in this area due to the fact that changing providers costs.

Summary of critical events in the regulatory environment

Liberalization of markets began in Finland before the rest of the European telecoms markets as a consequence of deregulation, which in turn was triggered in part by the establishment of Datatie. This was *per se* illegal at the time. However, the market and regulation complied with the local telephone companies and their strategies. Regulation and legislation originating from an EU level later on affected the industry in terms of making regulation a slow process lagging behind technological advancements. Also, the Finnish market for telecommunications was ahead of other EU member states and some informants mention this as a factor that restricts and slows down development in Finnish telecommunications. This has caused reactions from smaller members states, i.e. that EU regulation restricts the ability of operators to expand their territories e.g. to other countries. The fact that operators must distinguish between service and network operators was also a directive imposed by the EU and has led to the entrance of new actors. Number portability is said to be the prime critical event which explains the current features and characteristics of the mobile market. A price war was commenced in Finland, only to slowly stabilize after two years. Finland still has the cheapest prices per minute for mobile telephony in Europe. Table 19 summarizes the main critical events concerning regulation and its impact on industry structure.

Event	Trigger	Process	Outcome	Informants
Liberalization	1. Deregulation 2. The establishment of Datatie and Radiolinja	1. Granting license to Datatie and Radiolinja	Free competition	X15, X20, S24, X27, X32
EU legislation	Political preferences	1. Implementation of EU legislation on a national level 2. Alignment of EU and national legislation/regulation	1. Process of regulation/legislation slower 2. Finnish industry structure different; causes problems	S1, R3, X21, R23, X29
Service operator model	Closed markets needed to be opened up	Regulatory decision on an EU level	1. Competition in infrastructure networks 2. Emergence of new actors (competitors)	R4, X14, X29
Number portability	Wish for lower prices through competition	Regulatory decision taken on an EU level	1. Price war 2. Low investment rates 3. Consolidation of actors	X10, X22, S26, X29, X36

Table 19. Summary of critical events in regulation

6.9 Summary

In 1985, the Finnish telecommunications sector was in a situation of "shared monopoly", where the local telephone companies had monopoly over local telephony and the PTT took care of long distance and international telephony, data networks as well as mobile telephony. The main actors in mobile telephony thus have a background in monopoly culture, which causes friction when the companies today have to compete in a market-oriented environment. For instance, Informant X22 argues that the actors do not control this way of competing yet, even though the industry has come a long way from duopoly. The critical events in the structuring and development of the telecoms industry have been divided into three main categories, (1) critical events in the competitive landscape, drawing on the actors, (2) critical events in technology and (3) critical events in regulation. The first category has examined the actor landscape and identified the actions and reactions of Datatie, Radiolinja and DNA Finland as the main critical event which has led to shaping of the industry. The hype period was also treated as a collective critical event. In terms of technology, digitization, mobile technology and specifically the GSM technology as well as mobile handset development and the Internet are treated as critical events. Regulation shows the main critical events in liberalization, EU legislation, the division between service and network operations as well as number portability. These critical events have shaped the industry structure en competitive environment into the current state of telecommunications. The structure and context of the Finnish telecommunications industry is explored further in the next chapter. Chapter 7 focuses on perceptions and implications of convergence on the industry and its business networks.

7. PERCEPTIONS OF CONVERGENCE IN FINNISH TELECOMMUNICATIONS – MAKING SENSE OF THE BUSINESS ENVIRONMENT

The chapter studies convergence through content analysis of annual reports and through presenting and analyzing perceptions expressed by informants. Convergence perceptions and effects are categorized and compared to the literature review in chapter 3. Convergence is finally illustrated through two mini-cases, namely Aina Group and MTV3 Handy. The aim of the chapter is to answer the second research question theme; what is the significance of convergence in the development of Finnish telecommunications.

My path to finding a definition of convergence has largely centered around a sensemaking process, where I, together with 39 interviewees, have tried to look at convergence from different perspectives, tried to find a common language in order to talk about convergence and tried to find signs and evidence that convergence is indeed something that affects the way actors in the telecommunications business view their reality and how they decide on the future. It has become clear that convergence means different things depending on who you ask, but some commonalities in the informants' perceptions can, however, be found. Weick (1995) argues that sensemaking is about, among other things, interpretation, creation and discovering. The informants have been contacted in their role as a representative of a particular company. However, in Weick's (1995, p. 28) words, "[…] the past has been reconstructed knowing the outcome, which means things never happened exactly the way they are remembered to have happened." It is thus easier to make sense out of events when they are placed in the past, even though they have not yet happened. One must thus keep in mind that the informants are recalling events and happenings which occurred possibly as long as 20-30 years ago. Taylor and van Every (2000) as well as Weick and Sutcliffe (2005) argue that sensemaking involves turning circumstances into a situation that is comprehended explicitly in words and that serves as a springboard into action. Sensemaking is thus the primary site where meanings materialize and eventually inform and constrain identity and action (Mills, 2003). Weick and Sutcliffe (2005, p. 409) continue that sensemaking is, among other things, an issue of language, talk and communications where "situations, organizations, and environments are talked into existence". Therefore, convergence as a concept is something that has been created during the past decades by looking back over earlier observations and seeing patterns. One should not refer to convergence as being discovered at a particular point in time, but rather, as mentioned, *created* through various events and developments that have taken place within telecommunications, and also within the media and IT sectors. Thus a sensemaking process in relation to convergence is evident. The abstract has been connected to the concrete, leading to a perception of convergence as an outcome of that sensemaking process.

7.1 Convergence as presented in annual reports 1985-2005

One source of analyzing convergence may be found in annual reports. Annual reports (AR) of related telecom, media and IT companies from the time period of 1985-2005 have been analyzed through content analysis. For instance, in Telecommunications Statistics from 1990 Korpela and Saarinen state that the convergence of computer science and telecommunications has been central especially during the 1980s. A clear definition of convergence is offered in Telecommunications Statistics 2000; "convergence means converging and convergence" (in

Finnish "konvergenssi tarkoittaa lähentymistä ja yhdentymistä"), which shows an example of the difference in use of concepts in the Finnish language. One distinguishes between what is converging at the moment (lähentyminen) and what has already converged (yhdentyminen). The Finnish word for convergence, "yhdentyminen" (indicating that the process of convergence has already occurred, i.e. has converged) was in use during the early 1980s but the English equivalent word, convergence or "konvergenssi", appeared in the Finnish vocabulary only during the 1990s (Informant S26). Informant X8 states that today people start to understand convergence since the development is visible on the technical side. Informant X8 furthermore argues that even though convergence can be seen in concrete products, services and processes, people do not necessarily use the term convergence; the development is referred to using other concepts.

The annual report of NetCom (Tele2) from 1994 (p. 6) offers one of the early observations of convergence:

> *"And the spread of IP is spurring the convergence of fixed telephony, mobile telephony and data transfer."*

Ericsson, on the other hand, writes in its annual report of 1994 (p. 12), that telecommunication and computer technology are the most important separate information technologies. They are becoming increasingly difficult to distinguish from each other. Ericsson further views telecommunication as the key technology that opens up the way for the breakthrough of computers. Concerning the Finnish telecom companies, one of the early indications of convergence can be found in Telecom Finland's annual report of 1994 (pp. 8-9):

> *"The ongoing integration of telecommunications, computer technology, information and entertainment services will eventually create a completely new kind of communications infrastructure. […] Technological development will lead telecommunications towards closer integration with the computer and communications clusters. At the same time the traditional divisions will change according to choices made in the market place."*

Similarly, one of the few annual reports from the 1990s mentioning convergence is Telecom Finland's, referring to convergence in the following way:

> *"In the rapidly growing field of telecommunications, the key trends of development are increased networking in the direction of data processing, and the broad-scale integration of computers and telecommunications. Mass media and telecommunications, too, are joining forces in implementing new broadband multimedia services. In this area, totally new possibilities are being created through the digitalization of electronic mass media."* (Telecom Finland, AR 1995, p. 4)

> *"The boundaries between data transfer and information processing are becoming blurred as computing, the media and telecommunications all converge. […]Information technology will increasingly cover the production of systems and innovations in services for both mobile and fixed network operations. This will require closer cooperation with information technology companies."* (Telecom Finland, AR 1996, pp. 2-3)

> *"But it is also important to develop new operations for rapidly growing business areas that may still be partially undefined. New business opportunities will open up with the*

> *convergence of telecommunications, information technology and the content production for new channels of distribution. […] The telecommunications market is becoming more complex. Sector boundaries are becoming blurred, operations are globalizing, and the retailing of telecommunications services is opening up to competition. […] Corporate customers are increasingly viewing data communications and information technology as a single entity.* […] *To succeed in this new market it is necessary to have a full grasp of both data communications and information technology and the ability to merge them effectively.*" (Telecom Finland, AR 1997, p. 3, 41)

Based on these quotations, we can see that the idea of convergence has developed from year to year. In 1994, convergence, defined as the integration of telecommunications and IT, was acknowledged for the first time in an annual report of Telecom Finland. Industry convergence was what practitioners believed was the goal of the convergence process. Technology was recognized as a driver of this process. Digitization is mentioned in relation to convergence indicators in the annual report of 1995 and the phenomenon of blurring boundaries, which has a long time been associated with convergence, is raised as an issue for the first time in the annual report of 1996. In the same annual report, the need for cooperation is addressed as well, indicating that telecom operators need to work closer and cooperate especially with IT companies, i.e. actors representing adjacent industries. It furthermore seems like the belief in convergence has taken a step back in the annual report of 1997, as it is noted that new business areas are needed in order to "open up" convergence of the three areas of telecommunications, media and IT. One should also keep in mind e.g. globalization which was a much discussed and barely understood topic at the time. The actors were living in a hype period, when the Internet boom was at its peak. The annual report of 1997, however, implies that telecom actors must treat other industry players as potential partners and/or competitors – at least as part of the competitive landscape of telecommunications.

In Telecom Finland's annual report of 1997 it is mentioned that corporate customers and their demand for interoperable and converged services is an important factor shaping the convergence process. Informant X32 also recognizes this trend and mentions it as one of the internal drivers of convergence. In Sonera's annual report of 1998 one can clearly read that the convergence of IT and telecommunications is moving ahead especially in the communications environment of large corporations. One can also read about Sonera's new customer focus and business opportunities "resulting from the convergence of telecommunications and information technology" (Sonera AR 1998, p. 7).

What strikes as interesting in the annual reports 1994-1998 of Telecom Finland/Sonera is that the focus becomes on the merging of telecommunications and IT rather than the merging of telecommunications, IT *and media*. Media is for the first time explicitly addressed as a part of the convergence process in Sonera's annual report of 2000 (p. 10):

> *"Information technology and telecommunications are merging together, with media and content services becoming ever more closely integrated into the total capability."*

In Ericsson's annual report of 1996 (p. 5) one can read that the areas of telecommunications and computer technology are converging. Ericsson furthermore states that they previously recognized the convergence of telecommunications, computer technology and media, but now the focus in the convergence process is believed to be "growing together of the

telecommunications and computer technology markets". In Ericsson's annual report of 1998 (pp. 4 and 6) they claim that the process of convergence (telecommunications and computer technology) has become more intense. Consolidation of operators around the world is mentioned as an example. Visions of a convergence of branches, technologies and services are painted up. Telephony and data will merge with multimedia into one business area. Fixed and mobile telephony will merge. The interesting part of these scenarios is that Ericsson explicitly mentions that the driving force behind this fast development lies with the operators. In terms of how the perceptions of convergence have affected business strategy, Ericsson offers a good example in its annual report of 1999 (p. 1) where it states that Ericsson's "main goal is to be the leading company in the future *integrated* tele- and datacom markets" (my highlight). In Finnet's information booklet from 1998 (p. 7) one can read that the telecommunications sector is transforming into a communications sector. The competition around customers is said to increase as portals, software companies, private and public media companies compete against telecom companies; "The companies within this communication industry will partner differently with companies from different industries".

It is, however, worth noting that the actors in telecommunications have had a belief in convergence since the mid 1990s. For instance, Nokia expresses itself in the following way in its annual report of 1996 (pp. 7, 11, 15):

> *"We believe that the on-going deregulation, the rapid technological development and the convergence of wireless/wireline as well as voice/data will produce us new business opportunities. [...] In the future, telecommunications and information technology as well as different media technology applications will increasingly often merge. More differentiation from the competition is required in these new markets. [...] With deregulation and intensified competition among operators, the boundaries between wireless and fixed networks will continue to diffuse."*

Nokia (AR 1996, p. 19) furthermore state that digitization is the main even that has started a new era in the business and bought with it more competition.

> *"New businesses are emerging alongside the traditional TV companies and telecom operators. The rapid evolution of technology is further increasing the versatility of the equipment and services.* […] *Nokia is a major player in this convergence* […]."

In its annual report of 1998 (p. 6), Nokia states that it is not only participating in the convergence process ("the convergence of the digital industries"), but also shaping the change and influencing its directions with their own ideas, strategies and expertise, thus acknowledging its own role in convergence processes (cf. organizations driving convergence in section 3.2.1). In the annual report of 1999 (p. 12) convergence is referred to as "removing our limits" and in the annual report of 2000 (p. 6) Nokia recognizes the potential of convergence by stating that "an all IP environment presents excellent opportunities for convergence and cost savings", which indicates that IP would be an extension of the convergence process, rather than the convergence process *being* the transition from old infrastructure networks to IP networks. In its annual report of 2004 (p. 6) Nokia also clams to have "continued to take advantage of digital convergence" by announcing new smartphones and products "in the area of imaging, games and new enhancement products". The various annual reports and the way convergence is addressed signals different levels of convergence.

All-IP as an outcome of convergence indicates that convergence takes place on a technical/technological level explicitly. Smartphones enhanced with new functions and features signal convergence on a functional level.

From a media point of view, one can read in SanomaWSOY's annual report of 2005 (pp. 8-9) that:

> "[…] *technological advancements in electronic communication facilitate media consumption irrespective of time and place.* […] *Technological progress will mean drastic and unpredictable changes in communications. We believe that the majority of electronic media will gradually move onto the internet, applying to not only TV, data, voice, and messages but also, partly, radio."*

This can be viewed as a sign that media companies have acknowledged convergence as a process that affects them as well, not just actors within the telecommunications field. Alma Media recognized the process in its annual report of 2002 by stating that the newest challenges have been born by the convergence between information and communications technologies and digitization. Alma Media continue that telecommunications and IT, Internet and electronic communication will converge in such a way that the whole economy, society, culture and ways of working and thinking will change. These were quite large visions and it is also the only reference to convergence that can be found in Alma Media's annual reports. In terms of the identity crisis during the century shift, where telecom operators thought they were media companies and vice versa, Elisa states in its HPY Offering circular from 1997 (p. 31):

> *"The market is giving rise to new distribution channels. Concatenation and partnership cooperation are growing. Companies which previously sold mobile phone and information technology are now shifting towards selling telecommunications services, too. Information systems companies are also arriving in the same market. Telecommunications is becoming increasingly integrated with other information technology. In the future, these companies could become both partners and competitors."*

Elisa further addresses convergence scarcely in its annual reports, e.g. in the annual report of 1998, Elisa states that the convergence of industries requires ability to cooperate with content producers and IT companies as well as the ability to define the company's business borders in a flexible way. In the annual report of 1999 Elisa speaks of convergence in past tense, saying that the long discussed convergence of media and IT was getting its forms through ownership arrangements, establishing businesses and partner relationships.

Annual reports from 1985 to 2005 therefore mention convergence to some extent. The selected highlights from annual reports show a few features in common, namely (1) a belief in technological advancement, (2) a vision of where telecommunications is heading, or where business opportunities will emerge and why, and (3) a focus on partners, selecting partner, partnerships etc. and also indicating specifically which kind of partners are or will be increasingly important for telecom actors.

7.2 What is convergence? Stories and perceptions from Finland

This section aims at presenting the points of view on convergence articulated by the informants, which have participated in the study. The informants' ideas of convergence are presented through discussing the definition and the process of convergence. Are there some common identifiable features? What is the influence of convergence on business activities? What is technological and industry convergence? The section is divided into (1) the 1980s, (2) the 1990s, (3) the century shift, (4) convergence as a revolution and (5) convergence and the end-user.

The 1980s

> "*Convergence is more like a happening fact. Not news per se. It requires no introduction and need not be ordered, it just happens. One must adjust.*" (Informant R4)

During the 1980s, convergence was often considered to imply the coercion of telecommunications providers to produce content in its network, an idea which was opposite to the core function of a telecom provider, namely providing the infrastructure or access to transmitting voice and data in the form of faxes. Until then the telecom companies had focused on producing the network themselves and that "real" content providers would build their own networks for content transmission. Categorization of actors based on belonging to industry was strong at this point in time. In terms of the first signs of actors engaging in activities, which would traditionally be regarded as another actor's business, or as being outside the scope of telecom operators' core activities, Informant R3 recalls the Miss Finland competition during the 1980s and views it as an example of convergence. Viewers at home were able to vote for their favorite by phone (0700 number). Also, services such as offering medical advice via fixed telephony are mentioned by Informant R3 as examples of early convergence. Informant R3's view of convergence stems from the 1980s' developments within fixed telephony when 0700- and 0800-numbers were introduced. This was an innovative way of allowing the viewers to interact with real-time events. During the 1980s convergence was perceived to be a type of business strategy (e.g. Informant R4). The above mentioned services can be regarded as examples of innovative use of technology, not perhaps examples of convergence in the form of technical advancements leading to the creation of submarkets. What these services on the other hand indicate, is a need for cooperative partners. For instance, telecom operators would partner with broadcasters in the case of voting and a service provider would provide medical expertise for advice given via telephone, a competence which of course telecom operators do not possess. The early convergence examples imply that technological innovativeness gives rise to the need for cooperative partners.

The 1990s

Around 1985 convergence was a frequently used concept, but the use of it in every day language diminished for a few years only to be resurrected during the late 1990s' hype period (Informant R4, R23). Around this time, or in 1997 to be exact, the EC published its green paper on convergence. Most informants have at some point in time acquainted themselves with this report, or are at least aware of its content. The end of the 1990s was considered the golden ages of telecom operators: a few informants point out that telecom operators were not involved with the IT world due to the fact that "it was considered unreliable from a technological point of view". Telecom operators thus had very little practical cooperation

activities with actors specialized in IT. However, a new way of thinking was initiated in the early 21st century, as telecom companies realized their dependency on IT in producing services, products and solutions for their customers.

> *"It is a new way of thinking and a complete new competence set and it is related to convergence"* (Informant X16)

Informant X16 chooses to relate the discussion of telecom operators becoming dependent on IT companies to convergence, saying that the technological advancement (cf. critical events in technology, section 6.8.2) practically has forced the actors to move towards each other and initiate cooperation. Also, Informant X16 mentions that IP has developed mainly during the 1990s, which brought with it the idea of infrastructure being based on IP rather than e.g. PSTN. If the infrastructure is based on IP, it allows actors from the IT and media sector to be active in the telecommunications sector, even without partnering with telecom operators.

The century shift

Informant X12 states that the peak of convergence occurred when Sonera's shares were at their highest during the century shift. Several global events occurred, such as the collapse of the Soviet Union, the Berlin wall being torn down etc., which colored the years to come. After the collapse of the Soviet Union, a recession was dominating the Finnish markets, which hampered investments done by telecom actors. After the recession, for instance Nokia's success showed that there lie opportunities in globalization. Finnish telecom operators, however, managed to lose billions in bad investments abroad. Sonera paid 3.6 billion euro for UMTS licenses in Germany. Jippii acquired a German IT company Gigabell in 2000 for a price of approximately five million euro, only to lose nearly seven million euro in additional costs and investments within a few months after the acquisition. Jippii was close to liquidation after this adventure. Elisa, as another example, bought German telecom companies and launched its Mäkitorppa retail chain in Germany at the century shift. Elisa invested approximately 400 million euro in its German-based operations, but received only 70 million euro when these operations were sold in 2004. The hype period (approximately between 1998 and 2002) indicated that media companies wanted to become operators and operators wanted to access content. Informant X12 is of the opinion that this period offered good experiences, since is broadened the view of many actors, especially concerning convergence and what it meant in terms of business activities. After the convergence hype diminished, actors concluded that they were wrong and left the scene "with their tail between their legs". Informant Y30 therefore defines convergence as a sort of identity crisis (role confusion), where media companies aim at becoming telecom operators, while telecom operators, on the other hand, pursue a media business strategy. Informant S24 on the other hand recognizes convergence in business through insecurity among actors; "a sort of insecurity concerning what others are doing and should we go there and sell now as well".

Convergence as a revolution?

Informant X8 furthermore compares convergence to the industrial revolution, motivating the choice of words by saying that convergence is a general concept used in order to describe and label a larger change process that is taking place. The concept of convergence has dimensions which are everything from technical to societal, just like the industrial revolution; it affected every corner of society in some way. Informant X8 thus advices not to define convergence as an individual issue, but rather as a breakthrough with several dimensions. Informant X29

expresses that the current problem is not to understand how convergence affects business, but rather to understand what convergence *per se* is and how it is defined. An interesting definition of convergence is offered by Informant X35 who considers convergence as equaling cooperation and gives Aina Group as an example where media, telecom and IT actors have cooperated or in this case consolidated. This opinion seems to correspond to mergers among actors, not just partnerships and relationship establishment and acting in business nets and networks.

Definitions of convergence differ in content and point of view. Some argue that convergence at its purest means that everything will be integrated (e.g. Informant X34), leading to some kind of ubiquitous technology or service or that services and networks are integrated (e.g. Informant R3). Informant X8 chooses to view the fact that technology is heading more and more towards IP as the convergence process. The concept of IP-technology is thus important in the discussion and has been mentioned by a majority of the informants, indicating that convergence at the moment is perceived as taking place on a technological level. According to Informant X19, we will not one day wake up in a "convergence world". Rather, convergence occurs in stages. For instance, first VoIP is introduced, then webcasting and mobile TV, for instance. Small events will occur at different locations, which are considered as pre-steps to a larger process, namely convergence. This causes problems for, for instance, regulation. Informant X19 proposes that a road map needs to be done in order to avoid overlapping regulation on different kinds of technical solutions and applications

For Informant Y33, convergence is the same as "the air I breathe". Informant Y33 does not consider convergence to be a technical process, even though Informant Y33 acknowledges the fact that technology is an "enabler" of the process, but however not a driver. One has to know "how to use convergence", otherwise one will not survive. The fact that the borders between speech, data, television and radio are blurring and one cannot distinguish between them is considered to be convergence by Informant Y33. The challenge merely lies in finding sensible applications and services; what is technologically possible does not always make commercial sense.

Convergence and the end-user

The point of view of the end-user is one of the main aspects that emerge from the interviews. Convergence is perceived as enabling relevant and new services for end-users (e.g. Informants R4, X29). Informant X11 states that an end-user may choose a service from several different locations and naturally, a provider may offer services from several different locations. Informants X14 and X15 also see convergence as enabling a multiple channel distribution, mainly though the use of IP networks. Concurrently the handset terminals develop in terms of battery capacity, easy to use, security, which furthermore supports the advantages of convergence for end-users. Informant X34 points out that convergence depends on whether the end-user wants it and whether it is technically possible. Similarly, Informants X15 and X27 mention "experience convergence" as a type of convergence, which will become very important in the future. The end-user is thus the one to benefit from convergence processes. Convergence depends on the end-users, both residential and corporate, (Informant X15) and via this fact convergence affects the way business is done (Informant X27), since actors must correspond to market demand. Technology-driven strategies have proven to be difficult and often unsuccessful (cf. WAP launched by mobile operators, which failed due to poor communication of benefits and possibilities for use).

7.2.1 Typology of convergence identified by informants

Based on the interviews a number of different "types" of convergence processes have been identified, which show the current state of the convergence process in Finland and how it is viewed and taken into consideration in business strategies. Drivers of convergence have in general been recognized as the Internet (Informants R3, X6, X14, S26, X29). Technology is seen as an enabler (Informants X11, S26, X29). End-users' demand for simplicity has also been mentioned as a driver of convergence processes and human social interaction (Informants X11, X32). The transition to IP networks has also been named as a driver of convergence (Informant X32). The types identified based on the interviews are (1) convergence within telecommunica-tions, specifically between fixed and mobile telephony, (2) product and service convergence, (3) technological/technical convergence, (4) industry/branch convergence; convergence between IT and telecommunications as well as convergence between media and telecommunications.

Convergence within telecommunications: Fixed-mobile convergence

A frequently mentioned type of convergence is the convergence between fixed and mobile telephony (FMC) (e.g. Informant X29). Convergence between fixed and mobile has been discussed during the past few years as one of the concrete examples of convergence. Informant X34 recalls discussions about the convergence between fixed and mobile telephony as prevailing during the 1990s. In a technological sense this was the decade when call centers were developed in such a way that an employee could be reached through both mobile and fixed terminals, but on the same number. This was at the time considered convergence and was, according to Informant X34, mainly occurring *within* the telecommunications industry. In other words, on a technological level convergence was taking place within the telecommunications industry until the late 1990s.

The outcomes of fixed-mobile convergence are likely to be found in services, products and/or solutions delivered to corporate customers. Fixed-mobile convergence originates in technology convergence, meaning that technological advancements make it possible for features of fixed and mobile to be integrated. The aim of FMC is therefore to provide both services with a single phone, which can switch between networks ad hoc. One example of FMC is the BT Fusion offer in the UK, where British Telecom offers a Vodafone handset capable of making calls through the ADSL line via a local wireless connection. In terms of the informants' view of FMC, Informant X19 views fixed-mobile convergence as one stage in the convergence process. Informant X32 comments on the notion of fixed and mobile convergence:

> "*From a consumer perspective, if we accelerate the fixed-mobile convergence we will have the same services in our laptops and in the PC and it's nicer if it looks the same*"

Informant S26 argues that convergence has occurred "through the Internet" and distinguishes between levels of convergence in telecommunications. Digitization is the driver of convergence between fixed and mobile telephony. This development can clearest be seen in private branch exchange (PBX) switch systems. After this process the industry focused on services classifying them as software or data. Informant S26 criticizes telecom operators for being unable to exploit and benefit a new focus area, an issue that handset manufacturers understood better. Informants also comment telecom operators' internal reorganization as a means to cope with FMC (internal reorganization will be discussed in section 7.3.6).

Product and service convergence

One of the clearest evidence that convergence occurs can be seen on a product and service level. A definition of service convergence is offered by Informants X12 and X36 who believe service convergence means that "what ever can be reached through which ever terminal". For instance, Informant Y18 mentions mobile TV as a prime example of product convergence. Informants S1 and S24 mention Nokia's mobile phone model "Communicator" as an example. Other examples include games and music players (MP3) in mobile handsets (Informant X34). Informant X32 believes there will be a revolution in the range of services, due to convergence, in such a way that they will be referred to as IP-services.

Informant R23, as already mentioned, raised the question whether service convergence is a viable concept, taking into consideration that service convergence can be regarded as pure technological convergence. In order for mobile TV to become a reality, the network infrastructure must support such an application. In the case of mobile TV a completely new infrastructure network is being build based on the DVB-H standard, which then enables broadcasting to mobile handsets. Is mobile TV then really service convergence or merely technological convergence with a concrete and accessible result? Mobile TV is basically originated through technological development and a wish to converge two technologies, but the converged result resembles service convergence rather than technological convergence. From an end-user perspective, the visible converged product/service is a mobile device which allows the users to watch TV.

Technological convergence

When conducting interviews and discussing convergence, it quickly became clear that engineers found it easier to talk about convergence and usually had much to say about its history as well as its future. For instance, Informant X7 views technological convergence in telecommunications as the transition from PSTN to IP-based networks and states that convergence occurs mainly on a technology level and that this will offer an opportunity for new types of actors and players, since "nothing stops these companies from making new services". Informant X9 views convergence as a technological process with a goal, i.e. "telecommunications and IT merge into one". Informants X11 and X13 also consider convergence as technical or technological, but do not necessary see the goal of the process as industries merging. Informant R23 also defines convergence as technological and technical, referring to infrastructure networks and their development. From previously separate fixed telephony, mobile telephony and data transmission networks, digitalization has lead to these networks sharing features and merging. IP networks and Next Generation Networks (NGN) will revolutionalize network infrastructure, leading to convergence on a technological level (Informants X9, X13, X20, X21, R23, Y30, X32). Voice and content will move to IP networks in the future.

From a media point of view, Informant Y18 states that technological convergence means that "IT reaches everywhere" and associates strongly with digitization and multiple distribution channels for various kinds of content. Informants X10, X17, X21 and S26 articulate similar definitions, e.g. digital transmissions of content. Informant X8 refers to convergence as a breakthrough and specifically defines it as "all material becomes digital". When all content is in digital form, they will "converge on the same infrastructure" (Informant S26). Informant X17 defines technological convergence in terms of handset or product convergence, saying

that different types of services (mobile TV, GPS, e-mail, calls) in the same terminal equals technological convergence, and therefore also, multiplicity increases.

Informant Y30 argues that convergence does not mean consolidation of companies or systems, even though they seem to increase in amount. Instead, convergence means using IP networks, i.e. one particular technology for several different applications across different industries. In the same manner, Informant X21 also sees convergence as indicating one transmission protocol, namely IP, meaning that an end-user is able to access any service through different types of handsets or media. Similarly, Informant S24 considers convergence as enabling the end-user to decide which handset he/she wishes to use. Thus convergence means that the end-user has different types of terminals via which content and services can be accessed. Informants X17, Y18, X28 and R37 define convergence as being able to access all kinds of services in all kinds of networks through any kind of handset. The worth of services will increase and it will become more and more important under which brand the service is offered, not so much the service itself. The end-user perspective of technological convergence is therefore once more acknowledged:

> "*[…] it is not trendy to say so. Everything should come from the customer. But de facto I don't believe customers know their needs*" (Informant S24)

Therefore, technological convergence may also be categorized as one specific type of convergence process, rather than *the* convergence process. Technological convergence, however, refers to the transition from PSTN to IP-based networks, after which the technological base is the same for an increasing amount of actors, not only from the telecommunications industry. Indeed, technological convergence defined in this way contributes to the blurring of boundaries between industries and allows actors from other kinds of industries to seek roles based on the new, ubiquitous infrastructure. The basic point and commonality between informants is however the fact that actors now acknowledge that convergence really is taking place.

> *"[…] the cat is on the table. It is no longer a fairy tale. It is clear and it is happening*" (Informant X13)

Informant X12 states that technical and technological convergence is a big driver for other types of convergence processes, which again lead to, for instance, the disappearance of gatekeeper positions and other closed structures. Convergence means that everyone has to discuss within the same framework of reference because convergence is *per se* a technical concept. What these above mentioned definitions and statements indicate, is that when convergence is referred to as *technological convergence* explicitly in Finnish telecommunications, it is defined as *the transition from PSTN to IP networks, enabling any type of content to be accessed from any type of handset*. At a first glance very few informants acknowledge technological convergence leading to other kinds of convergence processes. They seem to view the goal of technological convergence to be integrated infrastructure and an all-IP network.

Industry/branch convergence

> "*[…] there has been a beautiful cloud somewhere, where all of them [IT, media and telecommunications industries] are one and the same, but this has been discussed for 30 years and we have never reached this cloud*" (Informant X21)

Informant X15 explains that industry convergence was discussed between the end of the 1990s and the beginning of the 21st century. By industry convergence Informant X15 understood at that time, and understands today, the merging of media, IT and telecommunications. Informant X15 mentions "the three blobs drawn in order to show how these three areas converge" when defining convergence, which draws attention to the green paper on convergence by the EC (1997). Informant X15 associates the discussions and expectations of industry convergence with the hype period which was going on at that particular point in time. The hyped convergence ideology motivated several investments and company acquisitions, since industry convergence was expected to offer new possibilities and opportunities. The blurring of industry borders would allow new actors to enter previously adjacent industries and these would be considered the winners in the new economy. The media sector started investigating whether the printed media will disappear and old established actors in all industry sectors concerned were planning for their defense towards new, competing actors. At the end of this hype period, the actors discovered that their business is not disappearing. Rather, complementing business areas will arise and had, at that time, already been established.

In terms of new, competing actors joining the field due to convergence, Informant X8 states that it is completely possible that this occurs in the future (thus implying that it has not yet happened) and that a phone call will not anymore be the sole right of the telecommunications industry. Rather, a phone call service will be considered data transmission in the same way VoIP is considered data transmission and practically anyone is able to build a data receiver. Thus, Informant X8 believes that the telecommunications field will disappear as a separate business area and converged into an IP field based on IT. Informant X8 continues that the only reason this has not yet occurred is because technology has not reached a sufficiently low level in prices, which is needed in order to make large investments. These industries will moreover not convergence. Rather, one will merge into the other. Informant X8 also states that it is especially the actors in telecommunications that need to re-evaluate business models and ways of conduct in the future, not necessarily e.g. the actors within IT.

One of the most frequently mentioned examples of industry convergence is the Time Warner and AOL merger which occurred in the U.S. in 2000. AOL acquired Time Warner for 164 billion dollars. After the merger the profitability of AOL decreased significantly. However, when asked about industry or branch convergence in Finland, the informants usually have to think for a short while, after which they come to the conclusion that such a convergence process does not exist in Finland. They try hard to come up with some kind of examples or evidence that this type of convergence process, even though it generally is considered to be non-existent in Finland. Informant X34 gives mobile Internet as an example of industry convergence. Informant R3 gives mobile TV and IPTV as examples of industry convergence but questions whether there are enough viewers (critical mass) for both types of broadcasting. Informant R3 also mentions VoIP as a clear example where two separate industries have converged, but stresses that one (fixed telephony) will wither away rather than converge with the other industry, which here is considered to be the Internet and IT. Informant X8 expresses

similar thoughts by stating that the telecommunications industry could possibly disappear or at least its role will change dramatically when IP traffic comes to dominate the scene in the future. Informant X8 states that when convergence has advanced far enough, the telecommunications industry will merge *into*, not converge or consolidate *with*, the IT industry. One is the main stream, into which the other will sink. Informant X8 also mentions as an example the fact that Nokia already has expanded and is constantly expanding to neighboring industry areas such as entertainment and music. This is, according to Informant X8, enabled by convergence processes, which eventually will reform Nokia into a solutions provider, not merely a "telecommunications actor". For instance, the fact that Nokia combined games with mobile handsets forced Nokia to start developing games themselves, as no such actors existed on the market. Lately, Nokia has outsourced most, if not all, of its games production for mobile terminals since a sufficient amount of content/service developers specialized on mobile gaming has been established. Informant X8 considers it extremely important that, due to convergence processes, industry borders need to be re-evaluated since the technology used in various industries is becoming increasingly similar. Informant X6 raises as a problematic issue the fact that one cannot often distinguish from which industry a product, service or a solution originates, but mentions on the other hand that this is irrelevant for the end-user. The end-user wants the service to function properly and expects the service or product to fill a need, want and/or desire. Informant X6 thus questions the division of industries and expresses that industry borders are invented by the industries themselves. Industry borders are not necessary in reality. Informant X6 also thinks that industry convergence is easier to realize led by the old, established actors since such a convergence process requires large amounts of investments. A new player might thus find it hard to enter an environment where convergence is taking place, especially if significant change processes leading to, for instance, heavy competition among actors, have started.

> "*[…] the PC-world and mobile world and program industry and handset manufacturing, they are all integrated with each other*" (Informant X19)

> "*[…] and one can see a shift over borders, i.e. IT actors start to come into telecommunications stuff and telecom operators do IT stuff. One recent example is TietoEnator in Sweden, which is IT stuff, does the IT traffic including phone traffic for the city of Stockholm, and in a role as a telecom operator. And then from the media side of course, for example, MTV3 had broadband subscriptions at some point and then, for example, TeliaSonera or […] MaxiNet has IPTV, i.e. TV transmissions on the Internet*" (Informant X13)

Informant X19 defines convergence as specifically industry convergence and mentions broadcasting as the latest influencing factor in the process. The fact that industries are converging leads to facts such as Nokia no longer competing solely with Ericsson and Motorola; today Nokia competes also with Microsoft and Intel. Informant X19 considers the change in competitor landscape an example of what convergence means in practice, namely convergence causes constant change to the fields of competition and markets. As such, constantly changing business environments are nothing new in the telecommunications industry. The rapid development of technology has already taught the industry to keep a certain speed in their business processes and activities. However, the largest threat is in the changing competitor landscape, as market positions are re-evaluated and possibly captured by

newcomers, with more flexible organizational structures and more attractive offerings to end-users (or possible B2B customers).

Informants X15 and R23 state that industry convergence was a hot topic during the century shift, when telecom companies had an identity crisis and considered becoming content providers, or actors in the media industry (cf. Sonera's attempt to acquire Digita). Telecom companies historically had a view of media services as value added services, on which they are able to profit by making use of their infrastructure networks (Informant R23). Media companies, on the other hand, considered telecom companies as mere distribution channels. Informant X12 considers this identity crisis to be the foremost example of industry convergence in Finland. The retreat brought with it a "big trauma" for all actors. Informant X12 does not by any means consider the industry convergence process to be over. Many informants believe it will take place in the future. For instance, Informant X12 thinks that industry convergence will occur in a much slower pace and controlled manner than was expected during the century shift. Informant X29, on the other hand, associates new markets with industry convergence and states that new markets and sub-industries will evolve from industry convergence, since vertical relationships will diminish and horizontal relationships will increase, giving birth to new actors and new markets. Informant R37 does, on the other hand, not believe in industry convergence and states that new areas and industries are born through the improvement of infrastructure networks and technology. Informant X22 refers to the merger of three areas, telecommunications, IT and media, and states that the driver of this process is digitization, also in Finland. Informant X20 gives several examples; one example is Fujitsu Services, traditionally an IT company, which has entered an agreement with Elisa in order to offer complete solutions to its customers, including mobile and broadband subscriptions. Another example is provided by Sonera, which had an Internet content portal Sonera Zed. However, the fact that actors engage themselves in activities in other industries does not equal industry convergence. One can talk about industry convergence when there are no borders between the industries left and the actors are able to offer the same kinds of services to customers, i.e. regardless of a background in IT, telecommunications or media. Informant X22 also states that knowledge and competence is being transferred from other industries into telecoms and vice versa, i.e. employees drive industry convergence by moving their professional knowledge and competence into new areas and industries. However, Informant R23 argues that the competence and knowledge that is possessed by people in the telecom industry does not transfer easily, an issue which is often forgotten in the discussion on convergence.

During the 1980s and the 1990s convergence was referred to as digital convergence or digitization and concerned only the integration of speech and data and how to make these compatible. Several informants explicitly mention that they have not witnessed or do not believe in industry convergence (Informants X5, X16, X21, R23, X27, Y33). A few informants explicitly mention that industry convergence has not occurred in Finnish telecommunications, e.g. Informant X16 considers convergence to lead to better use of transmission resources rather than any kind of industry or branch consolidation. Informant R23 argues that industry convergence has not occurred according to expectations but considers traditional markets to be overlapping each other and explains convergence processes as actors in concerned industries to have learnt from each other in such a way that they have not consolidated but they have been influenced by each other and developed their business according to other industry actors' strategies and deployed technologies. Informant X35 was

earlier of the opinion that industries will converge, but does not anymore see the prerequisites for industry convergence to occur. Informant X10 is rather skeptical towards industry convergence and states that it might be visible on the service side. Rather, the industry has a technical approach and way of thinking towards the convergence process. Informants X20 and X21 point out that industry convergence is, however, quite clear on the IT side, showing convergence of IT and telecommunications. Informant R23 states that it is "self-evident" that IT has converged with content and telecommunications, thus indicating that some form of convergence between industries indeed has taken place. Informant X11 also states that convergence is today largely understood as convergence of media and IT, and not as solely technological/technical.

It is acknowledged that IT and telecommunications share similarities and may thus be regarded as converged industries in many ways. However, if one defines industry convergence as the merging of telecommunications, IT and media, one cannot say that such a process has taken place in Finland, due to the fact that the examples and proof thereof are scarce. Some signs of industry convergence are visible through the informants' answers, such as mobile TV, mobile Internet, VoIP, IPTV etc. Examples of industry convergence are given in the form of converged services. For instance, Informant S24 argues that

> *"[…] thanks to convergence and the rapid development, the IT sector has bypassed telecommunications. IP technology and a lot of things come from the IT side, not from telecommunications. ISDN, ATM and SDH originate from telecommunications, as does UMTS actually. They are very complicated and heavy systems. Wireless LAN and VoIP originate from the IT sector and are significantly easier and faster to develop. Cultural differences between the sectors are enormous."*

Approximately 30% (12) of the informants state that industry convergence will or is currently taking place, whereas 72% (28) view convergence as purely technical, i.e. taking place on a technological level. In general, the informants define industry convergence as *the merging of three industries, namely telecommunications, media and IT*.

On the convergence between IT and telecommunications, Informant X9 states that telecommunications has learned in essence how to deal with the Internet from the IT industry. Informants X15, X21, X32 and X34 continue that convergence between telecommunications and IT has been particularly strong on the corporate customer side. Informant X16 also mentions that one has to adjust to the overlapping features of IT and telecommunications; it is a new way of thinking and a new competence set for the telecommunications world. Informant X15 states that e.g. Elisa has outsourced service offerings to Fujitsu Services and maintenance of applications to IBM.

> "*[…] Elisa is capable of selling complete solutions to large clients, containing also application entities including IT […] and the other way around, IT houses sell to their clients solutions where they offer complete entities and fixed traffic. […] and we have concluded that we need each other. Convergence has occurred in such a way that it requires closer cooperation in order to offer solutions to clients where both are needed. […] Customers do not buy only IT; they need a solution and we have to build models where we ensure that both in its equivalent competence area are able to produce the end result to the customer."* (Informant X7)

On the convergence between media and telecommunications Informant X19 states the following, indicating that the relation to actors from adjacent industry areas has changed:

> *"It was indifferent to us [handset manufacturer] ten years ago what mass media was busy with. Now we are in the situation where they are our central partners*."

Informant Y33 continues that already a service operator and a network operator think in different ways, just like differences can be found also between printed media and a broadcaster on the media side. The reason for this lies in the different roles e.g. a network operator plays in relation to those played by a service operator. By this statement Informant Y33 wishes to express that the media industry and the telecommunications industry speak different languages. From a telecommunications perspective, Informant X19 states that media companies have never been interested in intelligence services and that this business area has been the sole right of telecom operators. However, "when one starts to get closer to picture and sound, one is in a completely new situation" and a bunch of new actors will enter e.g. mobile TV or mobile telephony business areas, specifically due to convergence processes. Informant X19 views media companies as important actors due to their multifaceted content production. Informant X16 is of the opinion that media will not converge with telecommunications or IT:

> "*[…] from media will come merely new ways of distributing things. Their core business is in content. […] Media is media and they too compete over eyes, ears and everything, and that is why they want to be a part of the content market*"

Informant Y25 explains that media companies and telecom companies have for a long time cooperated in terms of revenue sharing. Informant X35 states that neither one of the two parties has the competence to act in the other's industry:

> *"Media companies are not at all interested in telecom business, and there is no competence […]. And then the cooperation models can be found in the infrastructure network, some in aggregation, distribution and with us [telecom] in billing […]. People speak different languages, telecom people and media people do not understand each other.*"

Several examples were mentioned of the so-called identity crisis that led telecom operators to try their luck as media actors and media companies to offer telecommunications services during the late 1990s and early 21st century (Informants X10, X12. X21). For instance, Informant X15 mentions MTV3 offering mobile telephony and broadband subscriptions as an example of the identity crisis during the hype period. SanomaWSOY sought convergence through multiple channel strategies and established e.g. Kauppalehti Online and Kauppalehti Talousuutiset (English: Business news) via TV and radio. Informant X14 recalls Sonera's Zed and SoneraPlaza as attempts to enter the content business and media sector. Informant X14 refers to the identity crisis in the following way:

> "*[…] both failed. Now we could maybe use common sense and think together. And I think this gives a picture of the central relationships; both try to bypass the other and then we still conclude that neither one had the required competence*"

Informant Y30 mentions that telecom operators produce some content but, on the other hand, media companies are involved in activities which from a traditional point of view are telecom activities. Telecommunications in relation to media is the focus of Informant Y18, who explains that according to his point of view, the first convergence wave took place when Sonera tried to buy Digita, but had to give it up since the FCA would not grant them a digital TV license. After Sonera withdrew from the deal, YLE sold Digita to French TDF and received approximately 300 million euro in the deal (Miettinen, 2006). This deal enabled YLE to invest in the digitalization of TV networks. Informant Y18 states that the second wave of convergence can be seen in the dilemma of broadcasting TV in mobile terminals.

Informant Y25 considers media companies important for telecom companies due to the fact that media companies "bring demand and use to the [infrastructure] network". Informant Y25 continues that a win-win-win situation has to be reached, i.e. the end-user, the operator and the media company all reach some kind of added value out of a situation, let it be a service, an experience or similar. Informant Y33 considers the development in both industries to be different in the sense that telecom companies have gone through quite a transition from "giant operators to requiring dynamics through mobile networks". Informant X34 concludes that some of the inflexibility that telecom companies previously possessed still exists in the media industry. The way of thinking is furthermore different, as e.g. broadcasters are some sort of "gate keepers" and calculate listener or viewer shares in number of minutes and/or contacts rather than in terms of number of subscriptions as does a telecom operator. Informant X34 considers "the timid and careful use of brands" as prohibiting the development of convergence processes, i.e. every one wants to use their own brand and offer services under their own brand.

7.2.2 There is no convergence, only divergence?

Divergence is specifically mentioned by several informants as a major part of the convergence process (Informants S1, R4, X10, X16, X21, Y25, X27, Y30, Y33). By divergence is most often meant that as the number of handset and mobile terminal increases, it is possible to access different types of services through different types of channels etc. In short, the range to choose from for end-users increases dramatically and the end-user will always have to make a choice through which type of terminal (mobile phone, PC, laptop, TV) content is accessed. The end-user will always be "connected" (Informant X10). Informant Y25 explicitly mentions that there is no convergence, only divergence. The fact that media companies aimed at becoming operators and telecom operators wanted to control the content business, indicates, according to Informant Y25, that these companies "diverged" from their paths. Thus, divergence would be the correct concept for explaining the adventures of these companies. Informant Y25 also argues that the word convergence gives a picture of everything becoming simpler and draws a picture where an arrow leads from A to B. In reality the arrow goes from A to B and from A and B further to C, D, E, F, and so on. Informant Y25 sees a complex development in the convergence process which means that the range of services and mobile terminals and handsets is becoming more complex. One should not refer to convergence as a process that makes our lives easier. The number of services, service providers, terminals and end-users will increase, which leads Informant Y25 to the question what exactly is converging in this development. Informant Y30 also mentions divergence as a big part of the convergence process. By divergence Informant Y30 refers to the increase in ways of receiving content.

Informant Y30 sees convergence as a change in value chains, which ultimately leads to divergence and the increase in amount of mobile terminals.

Informant Y33 also mentions divergence as a part of the convergence process. The convergence process is acknowledged by Informant Y33, but divergence implies that the amount of handsets will increase and one cannot talk about convergence without referring to divergence. Depending on from where the end-user wants to access a particular service, the handset is chosen accordingly. Thus, Informant Y33 considers convergence from the end-users' perspective to be very strong. On the other hand, Informant Y33 also put forward the fact that divergence affects network operators and service operators. It was previously clear that if an end-user wanted to access content such as logos and ring tones he/she would use the mobile terminal, but today, as divergence increases, it is no longer self-evident that the mobile terminal will be the first terminal by which end-users access content. The big question for operators is thus with which terminal it keeps a grip on the end-user, its customers, according to Informant Y33.

7.2.3 Resistance towards convergence

> "*[...] convergence seems to be as good a word as information society. Everyone sees it in their own way and this leads to there being no ability to discuss [the issue]*" (Informant X27)

Informant X14 argues that the telecom companies way of thinking is prevailed by "we have always done it this way, we have managed before", which *per se* shows their resistance towards not only convergence, but change in general. Informant X14 mentions that this might be a question of human attitude and indicates that the resistance towards change usually lies in the people leading a company, not the company itself. Informant S24 points out that companies resisting change are usually those who want to maintain their positions, as development might "weaken the position, at least in terms of power".

Informant X7 states that actors do not necessarily want industry convergence to occur. For instance, Elisa has outsourced its media production, which can be seen as a sign of resistance towards convergence processes on a technological level. The infrastructure network and technological development enables actors to broaden their competence areas and e.g. Informant X7 states that in a few years time, complete convergence will be enabled, something that e.g. Informant R4 refers to using the ubiquitous–concept. Informant X7 states that Elisa does not have the capability to offer e.g. media services and content, but it is willing to cooperate with partners in order to provide such services to its customers.

7.3 How does convergence affect the business environment in telecommunications?

> "*IT companies can slowly take the roles of telecom companies and media companies may take the telecom operators' traditional role*" (Informant X22)

Informant X22 considers convergence as an opportunity to develop business and expand the company's business area to traditional media and traditional IT. Vice versa, convergence also

becomes a threat to telecom companies, as media and IT companies may have the same plans. Informant X5 mentions that the focus in telecommunications has switched to data and content. Revenues are increasingly drawn from this side of business rather than voice, which historically has been the main revenue source for telecom operators. Table 20 shows the changes, which have taken place during the late 1990s and early 2000s. For instance, a clear decline in the revenues from fixed telephony is visible, as is an increase in the use of mobile telephony. The share of revenues allocated from data transmission has increased to 16.9% in 2006, which shows that telecom companies are increasingly focusing on this business area as well. Informant X36 reflects over whether network operators with both a fixed and mobile telephony side are more concerned with convergence than e.g. mobile and service operators, which focus on mobile telephony. Informant X36 believes that operators with both sides may aim at cost savings through increased volume by converging fixed and mobile telephony. The need for convergence thus seems to be larger for operators with both fixed and mobile telephony, whereas pure mobile operators may not be that concerned with convergence at the moment. Informant X11 argues for actors in the Finnish telecommunications sector being unable to react to convergence processes fast enough. For instance, Informant X11 criticizes mobile operators for firing people several years in a row. This is partly due to convergence, not only price pressures or the loss of investments during the hype period. Convergence will temporarily cause investment pressure, then savings and finally a return to a stable situation, like the one actors feel they have today. When new things are added to the network, capacity is increased.

Turnover[1)]	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Turnover million €	3270.2	3798.5	4364.5	4691.2	4582.8	4442.7	4592.6	4259.8	4510.5
Change, %		16.2	14.9	7.5	..	-3.1	3.4	-7.2	5.9
Share of turnover, %									
Local telephony[2)]	21.4	19.2	18.6	17.3	13.3	16.7	14.8	12.8	11.6
Long distance telephony	2.1	1.9	1.6	1.3	1.3	1.4	0.9	0.5	0.4
International telephony	6.2	5.0	3.8	4.9	5.0	2.0	1.2	0.8	0.6
Mobile telephony[3)]	35.6	39.3	41.6	42.6	45.2	50.4	52.0	50.3	50.1
Data transmission [4)]	..	..	9.2	..	11.0	14.4	15.8	18.2	16.9
Other	34.7	34.6	25.1	33.9	24.2	15.1	15.3	17.4	20.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 20. Telecom companies' turnover and shares 1998-2006 (Source: Televiestintä 2006, Statistics Finland)

1) As of 2002, the turnover is limited to domestic business. Until year 2001 the business shares were partly estimates.
2) Includes costs for interconnection and among others, local network fees and initial fees as well as installation fees of subscriptions.
3) Includes both voice and value added services and wireless data transmission. Includes also monthly fees, among other fees.
4) Includes also Internet activity and fees for installation, opening, monthly and security services concerning broadband subscriptions.

Informant X32 considers corporate customers as the first ones to try convergence products and services. Corporate customers drive convergence. This type of demand has been hidden for quite a while, but today the actors understand it as convergence; they must provide their corporate customers with converged solutions, services and products and in order to do so an actor must define a strategy for convergence. Informant X32 points out that two thirds of corporate calls go through the mobile network in Finland. For instance, the equivalent figure for mobile calls made by corporate customers in Sweden is approximately 20%.

During the interviews questions concerning observable influences of convergence processes on business activity were posed in order to find some kind of evidence of concrete results of convergence processes in business activities. A number of themes were identified in the informants' answers, which they perceive to be signs of convergence, or rather, examples where they believe convergence has affected, affects or will affect their companies' activities and actions. These themes were identified as (1) business nets, (2) role and position, (3) core competence and outsourcing, (4) value chain and value network, (5) brand focus, (6) internal reorganization and (7) regulation.

7.3.1 Business nets

Informant X12 states that convergence can be seen in the form of "networking". Informant X16 views technological convergence is a driver of cooperation. Also, Informant Y30 mentions that cooperation is initiated when either of the parties is the strongest actor in the sought field. For instance, in 3G mobile operators aim at accessing content whereas media companies need access to the 3G network as a distribution channel for its content. Informant Y30 mentions that in such a case they "have to ask for help when we ourselves do not have any kind of position in 3G" and continues that when both actors go into areas where neither one has a strong position or the needed competence, they will start to "hit their heads together". Informant X28 explains that in order to deliver a new product, service or solution one has to "network with the right partner".

> *"If it makes business sense to partner with an actor, our lawyers negotiate a contract. It is the task of engineers to ensure that what comes out of the partnership is convergence and that it is executed"* (Informant X28)

Informant X21 argues that telecom companies do not make good media companies and vice versa and criticizes industry convergence for being non-existent. Telecom companies do not have any reason to become actors in the media sector and neither does media companies for becoming telecom actors. Informant X21 states that it is rather a case of networking and establishing cooperative business networks than seeking industry convergence. Acting in business networks would then be a strategy in a converged environment, where the industries have not (yet) merged together.

7.3.2 Role and position

Convergence has to some extent been associated with change in role and position (e.g. Informant X22). Informant X9 states that certain industries and actor roles have been based on a particular technology. Due to the fact that technological convergence occurs, i.e. in Informant X9's words "telecommunications and IT merge into one, so that there is only ICT

technology and everything happens as normal IP traffic", actors within each industry are forced to seek new roles or defend their old ones. The discussion about role and position is often associated with the question whether industry convergence takes place or not. For instance, Informant X12 considers industry convergence to be associated with changes in roles and positions of actors in telecommunications and states that

> "*[...] media will then take on an operator role and that would then be industry convergence*"

Informant X14 considers operator roles to be clearer today. An operator's core competence is enabling distribution and billing, but should not be concerned with content or creating content. Informant X21 states that it is hard to imagine that telecom operators would be good content producers on the media side or would be able to compete "in some program stuff" with TietoEnator or IBM. In other words, Informant X21 does not believe the convergence process will reach such a level that the roles would change drastically. Informant X21 furthermore asks whether anyone has a need or a desire for such a change and states that the competition in the media industry is equally tough, i.e. a telecom operator has no reason to enter media or vice versa. Informant Y33 believes that convergence will give rise to clearer roles in terms of technology and entertainment, not necessarily a distinction between e.g. telecommunications and media and roles accordingly. Some actor will take on a technical role and some the role as an "entertainer", "informant", "content role" etc. The borders between infrastructure networks will become clearer, according to Informant Y33, whether it concerns broadcasting, radio, data or speech network. Informant S26, on the other hand, believes that telecommunications will diffuse in such a way that companies' networks will have the same characteristics as telecommunications operators' networks:

> "*They can really not anymore be separated, do operators have services or do others have services. Different public governance and company networks will emerge and the network is as such not interesting, but the applications and services. This will affect actors' roles and positions to a large extent. In other words this Schumpeterian development; a lot of players will exit the game.*"

According to Informant Y25 the roles of media and telecom companies became clear after the identity crisis. Informant X34 argues that during the identity crisis each actor wanted the whole cake, after which there were problems finding a common language between telecom and media companies. Cooperation has been scarce both before and after the identity crisis. Informant X34 states that during the 1980s until the mid of the 1990s, the roles were clear; mobile communications was speech and SMS, nothing more. A critical event put forward by Informant X34 is the development and use of GPRS, enabling new types of content via mobile terminals. GPRS paved the way for media actors, which took a pure distribution channel point of view on the development. Informant X35, however, argues that there are no clear roles for telecom and media companies. Roles are always changing, which also explains the experiments of crossing industry borders. Since none of the actors had the competence to succeed in the other industry, they had to retreat. The roles became somewhat clearer after these adventures and cooperation has been initiated, e.g. around mobile TV. Informant X22 states that the activities of telecom companies have stabilized after the identity crisis:

> "*[...] we don't do such things which are not natural for us, we don't have the competence, or it just doesn't fit us*"

Informant X22 comments the different points of views between media and telecommunications. Media views telecom companies as mere distributors, i.e. the bit pipe between content production and content consumption. Media companies see telecom companies merely as an in-between actor that enables them to distribute content to end-users. Telecom operators view the same situation from a different point of view, i.e. telecom companies "own the end-user" or has a relationship to the end-user, which the telecom company takes care of. And besides offering communication services to its end-users, telecom companies see that in the same customer relationship and technical interaction content can be added. Media is thus only a sub-contractor. Informant X22 states that these business models are contradicting each other and there is a competition for which model will prevail in the future. However, Digita as an example considers itself a neutral partner, matchmaker or catalyst, which aims at attracting partners and business. Informant Y33 believes that "without such a role pure convergence will not happen".

Informant X8 paints a picture of convergence as an opportunity to enter new business areas and those operators who are not capable of changing and finding a new role for themselves in the future converged area, will lose. Informant X8 describes the change of Nokia as a sort of change in role *per se* which has forced Nokia to acknowledge the fact that it cannot do everything itself and that partnering with other actors is an attractive alternative. Nokia thus allowed e.g. co-branding.

A lot of outsourcing has occurred since, i.e. partners perform certain activities instead of the telecom operators themselves. This has also given rise to new types of actors. According to the traditional model an operator runs all function by itself, i.e. outsourcing has become a strategy only in the late 1990s. Informant X14 further raises global actors as an issue in the Finnish convergence development and structure of telecommunications. Global players may bypass domestic actors, e.g. Disney might decide to distribute its content directly to end-users, Amazon and eBay may overtake markets where domestic service providers become obsolete.

7.3.3 Core competence and outsourcing

The concept of core competence has evolved from the work of Prahalad and Hamel (1990), who argue that core competencies are not physical assets. Core competencies are considered to be skills, knowledge and technologies, which an organization possesses and base its success on. Informant X34 argues that the core competence in telecommunications has changed drastically during the recent decades. Previously technology was stressed, as was reliable and high quality infrastructure networks and the building of them (Informants X13, X15). Today the focus lies in understanding the customer, marketing ease of use. Informant X34 states that much remains to be done in this area. Informant X27 argues that the most critical change in core competence in Finnish telecommunications occurred when Datatie was established:

> "*[...] you had to manage, not only offer [services]. The whole industry became a part of the competition society, before it was a monopoly. How can you imagine a greater change in core competence?*"

Informant X21 argues that as the competition grows stronger and costs need to be reduced, an actor must focus on its core competence area, which means partnering and outsourcing. Informant X21 also sees a trend where telecom companies are increasingly focusing on telecom activities and media companies are focusing on media business, as "a telecom company's core competence is not media production".

Informant X19 considers the positions of telecom operators as being strong since they possess the contact to the end-users. Telecom operators understand network distribution, what it means and its cost structure, pricing, identification etc. and they have a long experience in handling these customer contacts. Informant X16 is of the opinion that the core competence of mobile operators has remained the same but that competition has moved from residential customers to corporate customers. Informant X14 considers an operator's core competence to be the enabler of distribution and billing and mentions that it is difficult to be concerned with content and content production. Traditional telecom companies have already seen a transition in the focus from fixed telephony to mobile telephony and consider infrastructure networks as the core competence in their business (Informant X15). Informant X14, however, is of the opinion that the core competence of mobile operators has not changed enough.

Informant X8 argues that the core competence of handset manufacturers' has changed. Nokia's core competence is currently technology. Informant X8 speculates whether understanding the consumer or end-user should be Nokia's core competence rather than technology, which easily can be replaced by new technologies, in which Nokia would not necessarily have the required competence. Informant X16 states that the competence of combining data/IT and fixed telephony is a new challenge for handset manufacturers, which brings with it completely new rules. Informant X20 has witnessed a trend of handset manufacturers expanding their core competence areas into maintaining infrastructure network. Informant X17 also mentions e.g. Nokia's strategy and broadening of its core competence area into maintaining infrastructure networks of operators. Informant X16 also mentions the same trend and adds that Ericsson has been active in this field for 4-6 years and considers this a critical change also internally, as sales personnel have to learn new business models.

Informant X29 states that the convergence between fixed and mobile has lead to a sort of specialization of what "the house does itself and what it buys from outsiders" and mentions that operators are increasingly focusing their businesses. According to recent research (cf. McIvor, 2003) an organization should outsource such activities in both production and service where it can develop no strategic advantage. Outsourcing is primarily concerned with transferring production, parts of it or production processes that have been carried out internally to an external provider (cf. Domberger, 1998). The reasons behind outsourcing are according to McIvor (2003) (1) most competent source, in the sense that the best available source has been chosen to carry out activities on behalf of the company. (2) Increased flexibility leads to a better position to reach to market changes and be more responsive to customer change. (3) Reduced risk exposure, (4) cost reduction and (5) supplier management are further reasons for outsourcing activities mentioned. Outsourcing has been mentioned in relation to core competence, as outsourcing activities help actors to focus on their core activities (Informants X16, X19, X20). Typical examples from telecommunications are the outsourcing of installation and network building; Sonera outsourced its installation and maintenance crew to Primatel, which later on was acquired by YIT. Elisa outsourced its equivalent business to Relacom. Informant R3 argues that outsourcing has contributed to the emergence of new

markets, e.g. installation and network maintenance business areas with new actors such as Primatel, Relacom and Flextronics. Informant X19 mentions that outsourcing also offers opportunities for handset manufacturers, e.g. network maintenance as outsourced by operators. Informant X22 distinguishes between two new types of markets or business areas within the telecommunications industry, (1) installation and maintenance of infrastructure network and (2) content production. By content production Informant X22 means e.g. SMS, logos, ring tones and other mobile services that became a huge success and attracted new content producers to be established. Content production is *per se* not a new business, but in telecommunications it brought with it a whole new business area and structure: "content in the mobile terminal was a new thing" (Informant X22).

Informant X19 also discusses the games for mobile terminals and states that Nokia first had to develop the games themselves. Slowly new actors specialized in games for mobile terminals started to emerge and Nokia has today outsourced a large part of its gaming section. This is also an example of new business area or market emergence through convergence processes and pressure to outsource and focus on articulated core competence areas. Informant X29 comments the change in core competence and the trend of outsourcing by stating that in 1985 the industry did practically everything by itself and in 2005 a lot was outsourced and done "in cooperation with partners". As a reason for the outsourcing activities Informant X29 gives competition and the maintenance of a service operator layer as well as convergence, which is "a blurry phenomenon which circles around at the moment". Informant X29 continues that one of the first outsourcing activities concerned the distribution channels for selling phones, which was done to a large extend with the help of others. Informant X21 claims that the outsourcing process started in the early 1980s, but its speed is accelerating. Informant X15 explicitly mentions that convergence affects actors and gives as examples operators' outsourcing and reduction in number of employees. Informant X12 comments outsourcing in the following way:

> *"Outsourcing is done quite often and I see it mainly as a move to seek competitive advantage by focusing on the core functions and by outsourcing the necessary layoffs. In these situations one tends to talk about partnering, but this is mostly bullshit intended mainly for the press. There is a clear buyer- seller relationship between the parties"*

An example of a mobile operator outsourcing functions is DNA Finland, who has chosen to outsource mobile service production to TietoEnator. TietoEnator acts as an integrator, collecting content producers and content creators together and providing DNA with complete services. DNA focuses on the access network and more or less takes a role as a "bit pipe". Partners that DNA is searching for are such actors that focus on products, product development and especially on a global level in order to increase volumes for the content creators. DNA feels like they do not have the resources to create content in-house. It is not regarded as their role (Informant X36). The aim is not to be the first on the market with innovative services but rather to create volume for those who produce services and content. All of DNA's content business has been moved to TietoEnator. A revenue sharing model is agreed upon; TietoEnator is responsible for content and DNA is responsible for billing. Ericsson was also an alternative but DNA did not want to "put all the eggs in the same basket" since they already have a buyer-seller relationship with Ericsson from beforehand. Ericsson is, however, still considered to be a candidate for providing services to DNA in the future. The reason why TietoEnator was chosen was that they possess relationships with most of the

European operators. This means that they have established channels through which they can sell content.

7.3.4 The value chain and value network

When it comes to the question whether a telecom operator's position in the value chain has changed, Informant X34, for instance, mentions that the position in the value chain has changed "surprisingly little", but stresses that it may change dramatically in the future. Informant S26 also thinks the value chains have changed little, but gives manufacturer patent and the SIM card lock-in as reasons, which has led to a situation where it is impossible for new actors to create value. Informants X8, X10 and X12, among others, prefer to use the concept of value network rather than value chain due to the fact that the players are many and the links between them are complex. The reason why it is important to be aware of the value network is because an actor has to understand with whom it is dealing and competing, with whom it wants to partner and with whom the firm generally forms a value network. Several influencing actors surround a company as well, of which a part are competitors and a part are neutral actors. Informant X8 is of the opinion that it is of great importance to understand the value network as a whole. Informant X19 talks about a change in the value chain in form of "horizontal development", by which Informant X19 means that the value chain will change so that one cannot consider it vertical. Rather, a value chain becomes horizontal. Informant X10 expresses similar thoughts, i.e. a shift from value chains to horizontal markets is taking place, which leads to an increased dependency on other actors (i.e. partnerships). From a legislation point of view, such a shift is complicated, since legislation is based on a vertical market model. Informant X19 does not believe actors will be able to maintain their positions in horizontal value chains. Informant X10 argues that no one controls the whole value chain anymore. Informant X22 explains further that previously an operator bought a network from the manufacturer and from there onwards, the operator took care of everything by itself, even selling telephones.

> "*The operator controlled the value chain almost from the beginning. […] The value chain was inside the industry*" (Informant X22)

Informant X16 believes that the position of operators has changed in the value chain due to the fact that "operators do not understand their strengths" and criticizes operators for focusing on their infrastructure network and technology instead of customers. The customer data bases of mobile operators should e.g. be screened for a deeper understanding of the customers. The customer focus is also the focus of Informant X27, who states the following:

> *"How has it changed? Well, previously operators went to bed with handset manufactures, with mutual clients. An operator has to earn value in the eyes of their customers, not in the eyes of the handset manufacturers."*

Informants X11 and Y30 think that the basic business principles and earning logics will preserve, but value chains will be amended into new ones. Value chains will be rearranged, split up and built back in pieces into new chains. Informant X12 argues that

> "*[…]the hot spot on the playing field of the value chain has moved all the time closer to the consumer; earlier it might have been at the level of the supplier*"

Informant X20 does not share the opinion that convergence affects the value chains of telecom companies. Informant X20 considers the main driver on the Finnish telecommunications market to be the FCA and FICORA together with MINTC, who want a service operator layer on top of the infrastructure network.

> "*And this forces you to be able to handle different parts of the value chain and that competence is based on everybody's efficiency and price pressure*"

7.3.5 Brand focus

Informant Y30 comments the small success of industry convergence by stating that the problem lies in brand and image, which eventually drives the business in media and telecommunications.

> "*If you are on the other side and want to build a business here you have to make people believe that your content is what they want*"

When actors base their core competence on the same technology, let us say IP, the brand becomes increasingly important, as it distinguishes an actor from the mass. Informants X8 and X15 consider an actor's brand to be vital in the convergence process and Informant X27 argues that telecom companies want to compete on their own brands. For instance, representatives of the media industry, Informants Y30 and Y33 both state that actors in media and telecommunications consider their own brand as the most important part and e.g. providing services under some other actor's brand is not desirable. At the same time, if a telecom operator slides into the media business, it has to build a strong brand for itself in a new industry in order to convince end-users. Informant X12 states that after outsourcing and focusing on core competencies, an actor in telecommunications is left with marketing and brand management, which eventually becomes an actor's core business. Informant X17 also considers an actor's brand as becoming more and more important in the convergence process. For instance, France Telecom recently rebranded its Wanadoo broadband division and Equant corporate-networks division in order to align them with Orange, which is a far stronger brand than any of the above mentioned. The rebranding allows the firm to sell bundles of services to both residential and corporate customers under a single brand (cf. the Economist, 12.10.2006).

There is also the case of co-branding. For instance, Nokia uses co-branding (i.e. the pairing of two manufacturers' brand names on a single product or service) as a strategy in order to communicate high quality features of their products. If a Nokia handset contains a camera, Nokia assumes that the customer will always consider a separate camera device as more reliable, and therefore Nokia feels it needs to convince the consumer that their converged mobile terminal and camera device is equally as good (Informant X8). Added value is thus the benefit Nokia seeks when it partners with another actor. In its simplest form, partnering enables the customer to receive a full package, i.e. something Nokia otherwise would not be able to provide. Informant X8 states that allowing co-branding has been difficult and refers to it as "giving up", but at the same time it has been vital that Nokia learned to do so.

> "*[…] every time you give up you also give up your property. And if others can add their brand to ours it means that our brand is diluted*" (Informant X8)

7.3.6 Internal reorganizations

Informant X32 mentions that internal reorganization is an important step in the convergence process. Informant X8 argues that internal reorganization is a direct result of the fact that markets and the competitive situations are changing. A better business model is sought through reorganization of company structures. Informant X8 states that e.g. Nokia goes through some kind of reorganization "approximately every two years". Actors such as, for instance, handset manufacturer Siemens, where mobile, fixed and Internet departments are separate, experience a lower satisfaction level on service delivery by its B2B customers. Siemens can, for instance, not respond in a desired and sufficient way to e.g. Elisa's questions, whereas Ericsson, on the other hand, manages fluently in this area. In order to turn the situation around, Siemens would need to e.g. consolidate their departments for fixed telephony and mobile communications. Elisa itself has gone through reorganization in 2003 when a new CEO was appointed. A process of consolidating companies was initiated. Informant X15 points out that internal reorganization is linked to events and trends in the company's external environment, e.g. hype periods, decreasing revenues, realizing that the industry growth is diminishing, which has led Elisa to seek cost efficiency, synergies etc. Elisa owned firms were consolidated in order to build a different kind of organization that would be able to respond to the requirements from the external environment. Merger plans were initiated in 2003, according to which all Elisa's entirely owned subsidiaries (such as Radiolinja, ElisaCom Ltd, Riihimäen Puhelin Oy with their subsidiaries, Elisa Networks Ltd and Soon Net Ltd) were to be merged with Elisa Corporation by 1 July 2004 (see table 21).

Fusions within Elisa 1989-2004
Oriveden Puhelin → fusion 16.11.1989 Tampereen Puhelinosuuskunta → 1.1.1998 Tampereen Puhelin Oyj → 2001 Soon Communications Oyj → fusion 31.12.2002 Elisa Communications Oyj → **Elisa Oyj**
Liedon Puhelinosuuskunta → 10.10.1996 Liedon Puhelin Oy→ fusion with Lounais-Suomen Puhelin Oy → 13.3.1997 Turun Seudun Puhelin Oy → 1.12.2000 LOUNET Oy → fusion 30.9.2007 **Elisa Oyj**
Joensuun Kaupungin Puhelinlaitos → 1990 Joensuun Puhelinlaitos → 28.6.1993 Joensuun Puhelin Oy → 2001 Tikka Communications Oy → fusion 2005 **Elisa Oyj**
Helsingin Puhelinyhdistys → transfer of business activities 21.7.1993 Helsingin Puhelin Oy → 1.9.1997 Helsingin Puhelin Oyj → 1.7.2000 Elisa Communications Oyj → 2003 **Elisa Oyj**
Riihimäen Puhelin Oy → fusion 2004 **Elisa Oyj**
Keski-Suomen Puhelin Oyj → 2000 KSP-Yhtiöt Oyj → 2002 Yomi Oyj → fusion 31.12.2004 **Elisa Oyj**

Table 21. The creation of Elisa through fusions (telephone companies) (modified from Finnet, internal material)

Informant X15 strongly points out that the reorganization started when the top management was replaced. Before 2003 units within the group were independent units. Informant X29 points out that within Elisa, different roles are appointed to e.g. Saunalahti (focus on early adopters), Kolumbus (cheap brand) and finally Elisa as a concept. Elisa's current structure is explained by Informant X32; three main areas constitute the structure of Elisa. Firstly,

production is a separate area, including networks, IP technology, manufacturing and services. Fixed, mobile and cable are bundled into one focus area. On top of this base two business units have been created, (1) consumer and small enterprise customers and (2) business customers. Elisa states that the aim of the new operational model is to further increase customer orientation and cost efficiency (Elisa, 16.5.2007). One can argue that the consolidation of all subsidiaries in order to form one Elisa is part of a branding strategy for making the Elisa-brand more controllable.

Sonera has experienced several internal reorganizations since the early 2000s. Informant X14 recalls that around 1985-1988 such functions as marketing and sales were established within the company, which at the time was a PTT. Informant X15 states that the changes taking place were initiated within Telecom Finland, which Sonera was called at that time, but the demand for it came from the external environment. First, Tele added a new logo by hiding the postal logo. Informant X35 also states that Sonera became more customer-oriented through the process of internal reorganization. In 2002 business areas were integrated so as to form a stage structure consisting of (1) production and networks, where fixed and mobile telephony networks were fused together into one business area, (2) products and services and finally, (3) customers and marketing. Before this e.g. mobile telephony was a separate unit with little or no interplay with other units of the company. The latest structural change is based on three divisions, (1) information society's structures and services, (2) mobile services and entertainment and (3) corporate solutions. TeliaSonera's current strategy "is based on dual opportunities stemming from operations in markets with different degrees of maturity" (TeliaSonera, Annual Review 2005, p. 6). The current market share (both Sonera and Tele Finland included, based on number of customers) is 47% with 2 507 000 mobile communications customers (ibid, p. 5). In 2005, the company still struggled with the consequences of implementing number portability, which was introduced in 2003. Competition was intensified and mobile prices fell dramatically (a price erosion of 20%). However, the company maintained its position at the cost of weaker earnings. Sonera also took over the customers of ACN which contributed to the weaker earnings. Also, the withdrawal of Saunalahti from Sonera's network had negative effects on the net sales. At the end of 2005 focus shifted from price to the contents of mobile offers. The strategies in both Finnish and Swedish profit centers are characterized by cost seeking processes (TeliaSonera, Annual Review 2005). A turnaround program was launched in order "to restore profitability" during 2005 in Finland.

7.3.7 Is there a need for regulatory convergence?

In terms of industry convergence it is clear that e.g. regulation and legislation in media and telecommunications are different and based on separate terms. Informant Y18 is of the opinion that convergence leads to a re-evaluation of regulation as the industries develop but points out that regulation in media and telecommunications has not yet converged. Informant R23 states that legislation has not taken convergence into account, whereas Informant R4 argues that the MINTC has implemented convergence thinking several years ago in its statements and directives. Informant S1 mentions that legislation is a strategy by which convergence can be impeded or promoted. Informant S1 views regulatory convergence as something mainly concerned with ownership structure. For instance, telecom operators in Finland own Finnish cable TV companies with one exception, Welho, (active in the capital area) which is owned by Swelcom (SanomaWSOY). Informant S1 views this structure as "ownership convergence",

which is hampering e.g. competition among technologies. If ADSL is to face competition by e.g. cable modems the ownership structure will prevent it from happening, as the operator will then cannibalize its own revenues.

7.3.8 Summary of the effects of convergence on business activities

Informants state that the effects of convergence have partly occurred and are partly believed or expected to occur in the future. According to Weick (1979) one cannot form an understanding of the past and the present without having some kind of idea of the future. The fact that a number of informants mention the same issues for convergence influencing business activities allows for the categorization of the effects of convergence. The main outcomes of convergence processes that affect business activities in Finnish telecommunications have therefore been identified as (1) engagement in business nets and networks, (2) changes in actors' roles and positions in both markets and existing business networks, (3) changes in core competencies and outsourcing, (4) value chain deconstruction into value networks, (5) an increased focus on brands, (6) internal restructuring in order to correspond with change in e.g. the external business environment and finally, (7) regulation aligning with technological change and possible industry convergence (see figure 21).

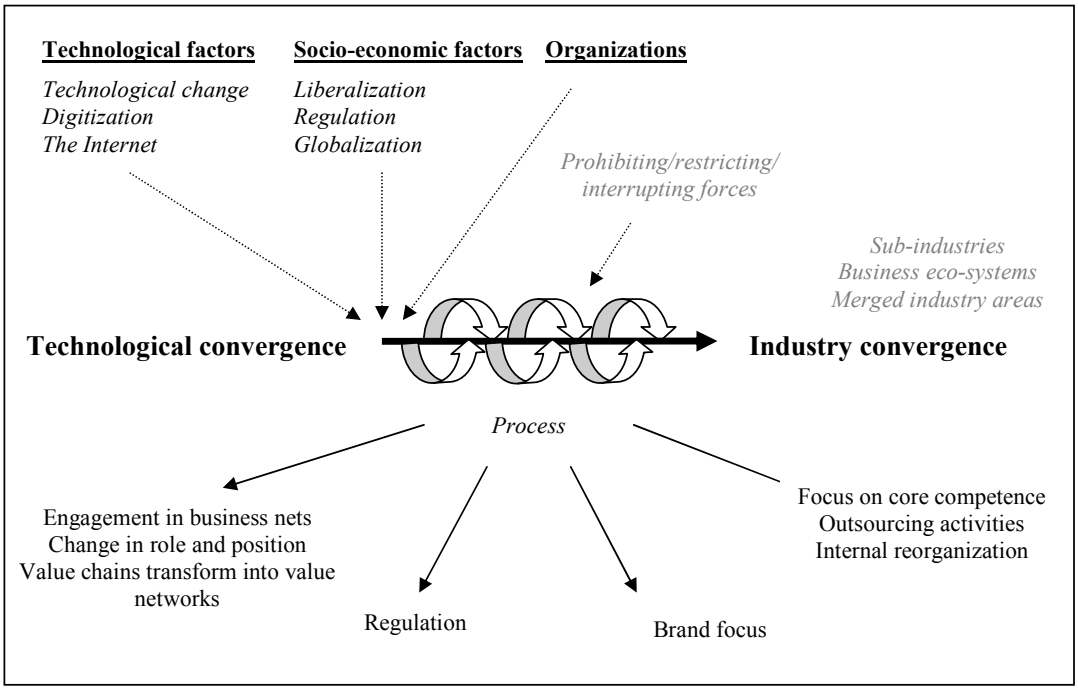

Figure 21. Summary of the effects of convergence

7.4 Mini case: Aina Group

Interviewer: "Have industries converged in Finland?"
Informant Y30: "No, only in Hämeenlinna."

Hämeen Puhelin, established in 1883, was a local telecommunications services provider in the city of Hämeenlinna and its near regions. Originally Hämeen Puhelin belonged to the Telephone Association or the Finnet Group. During the 1990s, the management of Hämeen Puhelin was on one hand observing how revenues from fixed telephony were decreasing and how, on the other hand, mobile telephony was gaining ground. At the same time, Hämeen Puhelin was taking part in Finnet's strategy to establish DNA Finland after Radiolinja had been sold to HPY (Elisa) in 2000. Hämeen Puhelin was not quite satisfied with participating in building up Finnet's mobile strategy, as it quickly became evident that a successful implementation of the strategy required a large amount of investments in a nationwide mobile network. Hämeen Puhelin did not considered a nationwide mobile network to be part of its focus areas. Rather, Hämeen Puhelin aimed at acting as a local and regional telecommunications service provider. Therefore, during the late 1990s and early 21st century Hämeen Puhelin was faced with making a decision. How could a relatively small local telephone company survive when the call minutes were moving from fixed to mobile telephony[6] and a lot of money was spent on building national mobile networks.

One of the critical factors that led Hämeen Puhelin to a decision was the fact that the president of the board of directors at Hämeen Puhelin was also acting as the CEO of Hämeen Sanomat, the local news paper. Also, Hämeen Puhelin was cooperating with Hämeen TietoKeskus Oy (HTK), a local IT company, owned by the city of Hämeenlinna. Hämeen Puhelin acquired 40% of HTK in 2000. At this time discussions were initiated whether a business strategy could be found in combining the three areas of telecommunications, media and IT:

> "*[…] telecommunications, IT and media, they somehow converge. Can we find a local thing in this, in order to get the business rolling? So when it rolls here, the same concept could be implemented in other locations, either through media, telecoms or IT. The end result is that everything will converge."* (Informant X20)

Hämeen Puhelin was explicitly looking for a strategy to gain in on mobile telephony, as they saw that fixed telephony subscriptions were decreasing and, also, broadband subscriptions were increasing. The convergence process was also well known, and for instance in the annual report of Hämeen Puhelin from 2001 the CEO, Seppo Lamminaho, writes that since data traffic, IT and media are converging as industries it creates new opportunities for offering new services and developing new concepts. However, in the convergence process referred to here telecommunications is not yet mentioned as a significant part. Informant X20 states that the plans for consolidation of telecommunications, media and IT, specifically, were indeed initiated around year 2000. The cause was found in a sort of role-seeking due to the fact (and observations made by managers) that the telecommunications industry was changing. In 2001 Aina Oy was established for the purpose of developing local content. A local portal was launched in autumn 2001. Hämeen Puhelin was changed from a private telecommunications provider to a public corporation in 2003 and changed name to HPO-yhtymä Oyj at the end of 2002. In January 2003, HPO sold its shares in Finnet Oy, DNA Finland, Suomen 2G, Kaukoverkko Ysi, Finnet Logistiikka and Suomen 3G. At the same time HPO resigned from the Finnet Group.

[6] Table 12 in chapter 6 shows the increase in amount of mobile subscriptions in Finland during 1980-2006.

In the annual report of 2003 (p. 3) HPO is presented as a "company entirety, which has three industries supporting each other: media, data and information technology". In 2003 the aim of HPO was to take part in the cooperation between these industries and especially in regional activities. In the annual report of 2002 (p. 5, own translation), CEO Reijo Syrjäläinen writes that a central part of HPO's strategy was to "seek benefits for our customers from the convergence of different industries". In order to achieve this, cooperation with other actors within various industries was required and the most important goal of 2002 was to find partners in the IT industry, "who understands and wants to support a regional strategy". Hämeen Puhelin thus signed a cooperative agreement with Sonera for access to providing fixed telephony (long distance) and broadband services in August 2002. The cooperation was aimed at combining Sonera's national way of conduct with HPO's regional strategy and benefiting from each other's strengths. HPO also made an agreement to resell Sonera's mobile telephony subscriptions. Before this Hämeen Puhelin resold DNA Finland's mobile subscriptions as a part of belonging to the Finnet Group.

> *"As a result of the continuous structural changes in the telecommunications field three significant national actors have arisen in Finland: Elisa, Finnet and Sonera. When it started to be impossible to cooperate tightly with several telecommunications operator groups, we initiated in the beginning of 2002 negotiations with the aim of finding a strong national cooperation partner. The choice of Sonera as the main partner was affected especially by its genuine interest in the convergence of industries […]"* (Lamminaho, 2002, p. 27)

Sonera was chosen as the main cooperation partner in 2002, "as neither Elisa nor Finnet showed any interest" in the business model Aina Group was proposing. A service operator contract was set up between Aina Group and Sonera. The situation on the IT side was also changing during 2003; parts of Telekolmio, a service provider specialized on corporate customer's data, IT and security solutions, was transferred into ownership of HPO, while 40% went under Sonera's ownership. Elisa owned shares in Telekolmio, which HPO redeemed. In 2004 HPO was consolidated into Aina Group together with other subsidiaries. Later on in 2005, Aina Group acquired the remaining shares of Telekolmio due to the fact that cooperation with Sonera was not running smoothly, since Sonera considered Telekolmio to be competing with Sonera's corporate sales. Another local telephone company, Riihimäen Puhelin, was sold to Elisa and a third local telephone company which traditionally was seen as a part of the Finnet Group started cooperation with Sonera. HPO had traditionally cooperated with Elisa and Finnet. Cooperation between Elisa and Finnet had in fact been terminated already in 2001, which influenced Hämeen Puhelin at the time. Informant X20, however, states that "it just does not work to cooperate with everyone". Aina Group was established and all companies belonging to the group consolidated into Aina Group at the end of 2004. In the small and medium enterprise (SME) business Aina Group established a virtual network operator contract with DNA Finland, which enabled Aina Group to use DNA Finland's base stations and network even though Aina Group has own centrals where the services are produced. This means that the residential customer business takes place in Sonera's network and the corporate customer business in DNA Finland's network. Informant X20 gives the inability to come to a consensus with Sonera on using networks and stations as a reason. Aina Group is also cooperating with Nokia concerning the DNA Finland contract, mainly in the mobile business area, whereas Ericsson is the main partner in the broadband business area. In March 2006, Nokia and Aina Group announced a frame agreement to develop Aina Group's

media-based MVNO concept. Nokia also supplies Aina Group with a circuit switched core network including e.g. number portability solution. Aina Group also accesses around 100 service providers through its contracts with DNA Finland and Sonera:

> "*[…] we don't have to make separate contracts with all of them; we get them automatically through DNA*" (Informant X20)

DNA Finland thus acts as a kind of integrator, collecting a number of service providers and offering a bundled solution for Aina Group. Informant X20 states that Aina Group could not compete on the mobile side as the only strategy available to them would be to compete on price, which was a crazy idea considering the fact that a price war had already been initiated when DNA Finland was established. Aina Group later on decided to launch a different kind of mobile subscription, which would focus on local and regional factors. In the words of Informant X20;

> "*[…] on one side we have the EU and globalization, but a person has to live somewhere and there one spends most of one's life and well, one would seek information about events, sports events and other types of information, news on a local level. […] local retailers are involved and they offer shorter and one month long special offers. Like Armas mobiili, if you go to the store and show it you get other offers.*"

Aina Group revenue fields			
	2001	**2004**	**2006**
Revenues	28 477 552	54 663 529	96 965 000
- of which ICT business		-	77 175 819
- of which media business	7 640 621	14 394 339	17 890 430
- of which data traffic	17 647 539	33 366 287	-
Employees	215	580	834

Table 22. Central figures for Aina Group

The services that Aina Group offers residential customers (Armas, launched in February 2005) are firstly basic subscription including voice, SMS and GPRS. As value added services are considered entertainment services (jokes, horoscope, ring tones etc.), communication services (e-mail, instant messaging etc.), HPK Insider Ice hockey-gossips, regional event calendar, regional directory, discount channel, weather channel and mobile news paper. Table 22 summarizes the most important revenue fields of Aina Group. Hämeen Puhelin had around 40 000 customers, 5 000 customers of cable TV and 12 000 broadband subscribers in 2005. Telekolmio is responsible for corporate customers in both Hämeenlinna and to a certain degree in neighboring Riihimäki and Lohja. Aina Group's largest target group is long-term news paper subscribers, i.e. mobile and news paper (media) are combined. Hämeen Sanomat, the local news paper, is considered to be quite small with its 30 000 readers. Another 4 000 customers read Kaupunkiuutiset (English: City news), a free of charge city paper. A regional radio station, Iskelmä, with a population coverage of 100 000 people also belongs to Aina Group. The region contains 90 000 inhabitants and is increasing due to improvements in traffic infrastructure and Hämeenlinna's relative closeness to Helsinki, Turku and Tampere.

The media value proposal of Aina is content plus delivery equals contacts with the motivation "creation of the most interesting and high quality content; providing the best means of receiving the content; selling of the most widest contact network in Hämeenlinna" (internal material, 20.3.2006). Aina Group also acquired Gomobile in June 2007. 50 000 prepaid customers were transferred to Aina Group, which through the acquisition became the largest virtual operator in Finland. Cooperation with six Finnet-companies was announced in 2007, in which the companies cooperate around FMC-products and mobile services.

7.4.1 Convergence in Hämeenlinna?

The uniqueness of Aina Group lies in the fact that their current strategy is based on the convergence of three industry sectors, namely media, IT and telecommunications. What enabled Aina Group to form was the ownership structure that prevailed; the company saw an opportunity in converged services within the media, IT and telecom areas. Aina Group states at the end of 2006 that its two focus areas are media and ICT and sees that there is a need for "a full house ICT provider which takes care in real life". The company combines two sides of the revenues in digital media. Figure 22 below shows Aina Groups business idea.

Due to the fact that Aina Group has combined three areas inside one organization, Aina Group can be labeled a pure example of convergence in Finland. The process of convergence started when it was clear that fixed telephony was diminishing and it became evident that the future lies in mobile telephony and broadband Internet. After the shift in focus was recognized it took some special circumstances to decide on what would happen next for the local telephony company Hämeen Puhelin, in order to stay in business. The fact that one and the same person, the chairman of the board of directors for Hämeen Sanomat, was also an actor in the decision organs in Hämeen Puhelin, is one of the crucial factors in this case, as is the cooperation that took place between Hämeen Puhelin and HTK. It seems like the distances for convergence were very short due to the right persons being in the right place at the right time.

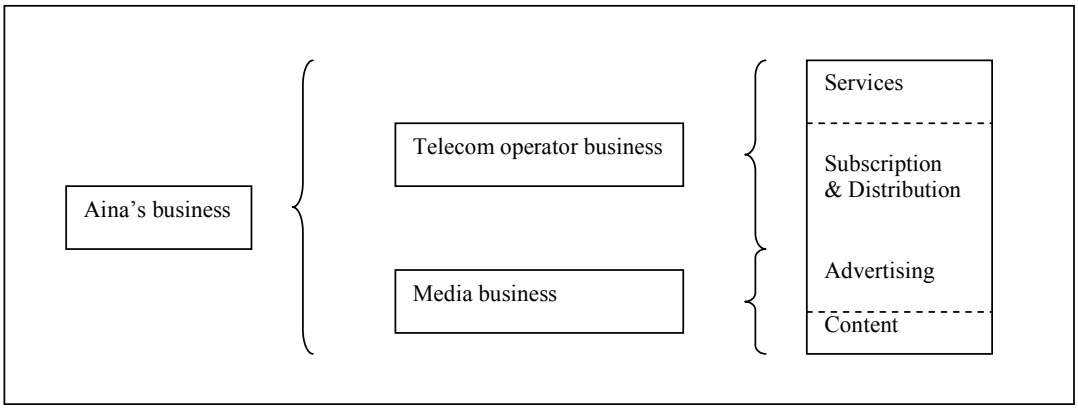

Figure 22. Aina Group's business idea (modified from internal documents)

Also, the recognition that the telecommunications industry (the external business environment) was changing is something that affected the decisions taken. At the same time, during the end of the 1990s, the EC commissioned its report on convergence, which may have

had a large input in the decision process to merge industry areas. To some degree it can be argued that the convergence process that has taken place in the Aina Group case is based on historical reasons (e.g. according to Informant X35). Informant X22 states that

> "*The industry is observing with great interest what they [Aina Group] are doing, because they have the means to change the industry. Inside are small parts of convergence.*"

In terms of other informants' perceptions of Aina Group, a number of them give Aina Group as an example of convergence in Finland (e.g. Informants X7, X22, Y30, X34, X35) and even compares it to the merger between AOL and Time Warner in the U.S (e.g. Informant X34). Informant Y30, on the other hand, considers Aina Group to be an example of divergence and states that Aina Group has bought and built up their own customer control and traffic control functions as well as provisions. Only mobile transmissions or radio traffic is bought from DNA Finland, but not any type of customer or traffic control systems, only bit transmission capacity.

The convergence process that has taken place in the Aina Group case resembles industry convergence as there are three separate industry areas combined into one area. On the other hand, one can argue that Aina Group offers a sort of converged product or services as they provide services with characteristics from different industry areas in the same service or product package. Then again, in order to be able to offer such packages, the company must be organized accordingly and only internal structures based on a convergence perspective can allow for successful "converged service offerings". From a technical point of view mobile services have been enhanced by media features and mainly concern marketing. For instance, media content can more easily be accessed through an Aina Group mobile subscription and by combining the subscription with e.g. broadband and cable TV customers may receive additional special offers or price advantages. One can argue that Aina Group has only organized itself internally in such a way that it is able to offer converged services and end-users can access different kinds of content via the mobile device. The industries *per se* are not merged, neither technically nor in a business sense. A convergence process has occurred on a local and/or regional rather than on a national level. One important question thus emerges, namely *what is the difference between industry convergence and convergence leading to mergers between companies*? *Does the merger between firms equal convergence*? The idea of convergence between industries or on any other level may be one of the driving factors between mergers, but it is unlikely that a few mergers will increase the pace of the industry convergence process. Therefore, Aina Group is a small player in the convergence process leading to industries merging, even though on a local and regional level, the merger offers several implications and a good case of how convergence thinking can be implemented in practice.

7.4.2 Critical event analysis

Company acquisitions have taken place several times during the process of establishing Aina Group as a firm. The early critical events that led to the development of Aina Group were the breakthrough of mobile telephony. In brought with it a new perspective on telecommunications as an industry as well as on its future (cf. critical events in technology, section 6.8.2). Hämeen Puhelin felt compelled to revise its strategies and the wish to gain in

on mobile telephony grew stronger. Whether the EC report on convergence is a critical event in this case is rather impossible to prove, but it is certain that the ideas and decisions to establish Aina Group based on three industries came along right after the convergence report had been published. Informant X20 mentions the exact model that was used in the EC report (convergence of media, IT and telecommunications) (see figure 5) as a base for the current structure and strategy of Aina Group. Furthermore, the fact that one and the same person acted as a CEO in Hämeen Sanomat and as chair of the board of direction in Hämeen Puhelin cannot be neglected. Rather, this must be seen as a critical event in the evolution of Aina Group and its convergence process. The evolution of business is very often dependent on one or a few core persons, whose entrepreneurial set of mind drives firms forward.

In terms of the development of the concept of Aina Group and a strategy based on convergence ideas, the initial critical event can be seen as a group of events that took place after the Finnet group sold Radiolinja to HPY (Elisa), which also corresponds to the critical events in the competitive landscape found in chapter six (section 6.8.1). The Finnet Group members received a large sum of money that had to be invested and the decision was taken to establish a third mobile network operator in Finland. Hämeen Puhelin was participating in this establishment and Informant X20 has rather negative thoughts on this process, saying that it was not a part of Hämeen Puhelin's strategy, which focused on local and regional matters rather than national. Building a new operator also required investment. At the same time, mobile communications was developing and conquering minutes away from fixed telephony. Broadband connections were becoming common. These critical events, building DNA Finland and development of mobile telephony, forced Hämeen Puhelin to rethink its position on the market and which role it wanted to play. Hämeen Puhelin decided that it wanted to have a piece of mobile telephony. The cooperation which had existed for a long while between Hämeen Sanomat and HTK was recognized as a potential. A strategy based on convergence of industries was developed at the end of the 1990s. The convergence process can thus be identified in the process of building and structuring Aina Group, but the source for convergence can be found in general events in the telecommunications industry as well as the structure of cooperative patterns between actors representing telecommunications, media and IT at one location in Finland. During the same time convergence was a hyped concept, which labeled the idea practitioners had of how the industry would evolve in the future. Thus, the decision by Hämeen Sanomat to pursue a new strategy came during the same time convergence was hyped. This can be viewed as a critical event in the convergence process, i.e. identifying a need to change and making decision according to what at the current time is believed to be happening in the industry. In order to execute the vision of providing converged services, Aina Group was formed and successively transformed into a functioning organization, first on a local level and later on through expanding operations to other regions. Contracts with Sonera and DNA Finland were crucial for Aina Group, as it was the only way to access required resources (network access). The regulatory environment enabled these buyer-seller relationships, which can be considered another critical event in the process of developing Aina Group and its vision of convergence and the convergence process. One should also note that the reason for Aina Group moving towards a business strategy based on convergence is to a large part a result of external events in the business environment. Indeed, the personal link between Hämeen Sanomat and Hämeen Puhelin exists, but the initiatives for change were taken due to the fact that changes were occurring within the Finnet business network – changes that were not adopted easily by HPO. Therefore, convergence became a

solution to changes taking place externally and led to HPO exiting the Finnet business network. Table 23 summarizes the critical events.

Critical event	Motivation
1. Mobile telephony	Shift in focus from fixed to mobile telephony
2. Establishing mobile operators Radiolinja and DNA	Experience, knowledge gained but consumed investments, decision to focus on a regional strategy rather than a national
3. Identifying a need to change	Decreasing revenues from fixed telephony, increasing costs to build national mobile operator
4. Favorable regulation	Service operator layer created
5. Personal relationships	Short personal distance between media, IT and telecommunications
6. Action	Decision to withdraw from Finnet, company acquisitions and mergers in the fields of IT, media and telecommunications
7. Networking	Access to resources, forming cooperative relationships

Table 23. Critical event analysis of Aina Group

7.4.3 Cooperation patterns

One might wonder what the cooperation patterns found in the Aina Group case mean and stand for. First of all, the relationships between Aina Group and e.g. Sonera and DNA Finland are pure buyer-seller relationships, where Aina Group is acquiring a resource they need – access to mobile networks. In terms of relationships with handset manufacturers Nokia and Ericsson the focus is on these companies supplying Aina Group with needed equipment, solutions and technical support in order for Aina Group to be able to deliver broadband and mobile services to its customers. Developmental work is also included in the relationships and Informant X20 especially mentions that cooperation with Nokia was initiated at the same time as the service operator contract with DNA Finland was completed.

An interesting point in this case is the fact that Hämeen Puhelin dissolved its relationship with the Finnet companies in 2002. Until then Hämeen Puhelin had closely cooperated with other Finnet companies. Hämeen Puhelin participated in the establishment of Datatie, Radiolinja and witnessed HPY's departure from the Finnet group. As members of the Finnet Group both Hämeen Puhelin and HPY had cooperated earlier, which made a cooperative relationship between Hämeen Puhelin and Elisa in the future possible. The external business environment also provided examples of changes in cooperative patterns, e.g. Riihimäen Puhelin was sold to Elisa and a third local telephone company which traditionally was seen as a part of the Finnet Group started cooperating with Sonera. Hämeen Puhelin also had bad experience of cooperating with Sonera within Telekolmio. The past loadedness that Hämeen Puhelin had has influenced the way the company's relationships have formed. Informant X35 acknowledges the relationship between Sonera and Aina Group and mentions that it is partly based on personal contacts. Thus, the buyer-seller relationship between Sonera and Aina Group did not seem to meet any problems, whereas e.g. Informant X20 states that Elisa and Finnet showed no interest in establishing a buyer-seller relationship with Aina Group. In terms of internal relationships, Informant X20 states that close cooperation between Hämeen Sanomat, Hämeen

Puhelin, Telekolmio and HTK enabled the strategy of combining business areas within the same company to take its form. Figure 23 shows the network horizon of Aina Group.

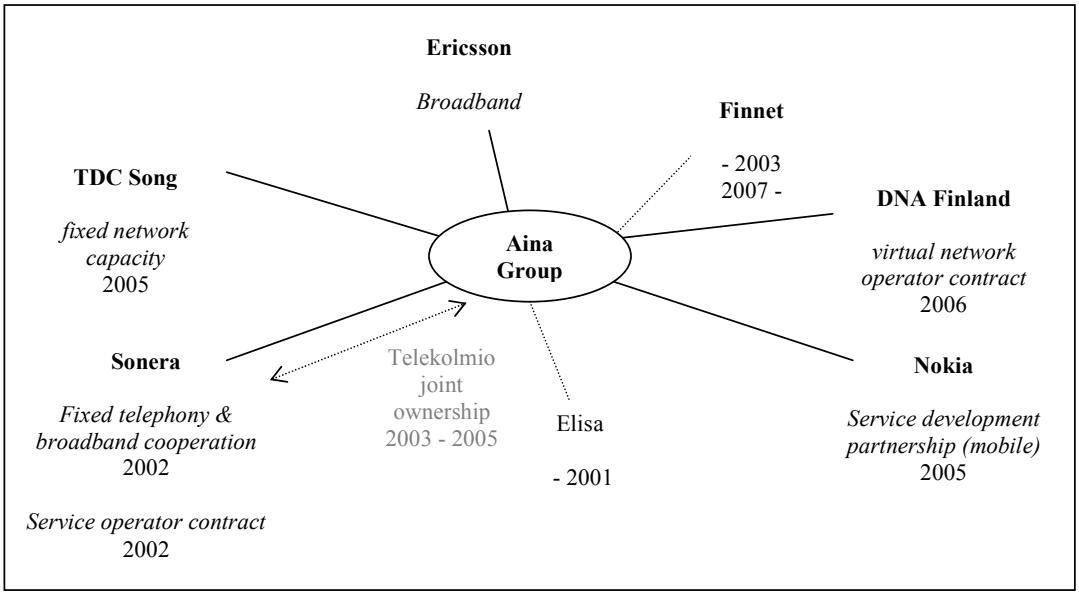

Figure 23. Focal net of Aina Group

HPO remained in a position as a local and regional actor until 2006-2007, when it acknowledged its plans to become a national actor. Thereby Aina Group is willing to move into a new position (national actor compared to local actor) and does so by acting in different roles. Acquisitions of firms with specific core competence have led to Aina Group gaining more power and market positions in new geographical areas. Aina Group is investing in an expansion strategy based on acquisitions. Aina Group has shaped its position and role through acting on a local and regional level. From a telecommunications perspective the company has gone through a role transition by transforming itself from a local telephone company focused on providing fixed telephony, to an actor who offers converged services. Aina Group is one of a kind at least in Finland.

7.5 Minicase: MTV3 Handy

MTV Oy (MTV) is a part of the Alma Media Corporation and manages commercial television and radio broadcasting. MTV is responsible for the national channels MTV3 and Subtv. MTV reaches around 3 million Finnish viewers every day (MTV3, 12.2.2007). MTV is a pure business to business (B2B) actor, who receives most of its revenues from advertising. Informant Y25 comments this by saying that MTV is highly sensitive to e.g. recession: when customers make fewer investments in advertising, MTV also suffers since they are dependent on these revenues. Informant Y25 continues that this is one of the reasons why MTV as a pure media actor designed a strategy to get its share in the Internet and mobile business after the century shift; to decrease risk and to access residential customers. Informant Y25 feels it is only natural that MTV would receive a piece of the pie.

> *"On the Internet the situation is that customers pay some amount of money for the subscription and the payment is based on the fact that you get some kind of information, content, moving pictures from there, but the money stops on the way so that the producer and aggregator of data, typically for instance us, do not get anything of the payment a customer makes even though it is partly because of us he is there."*

Informant Y25 states that MTV cannot and could not always react fast enough to changes, such as B2B customers decreasing advertisement investments for any reason, and therefore the strategy of accessing the residential customer layer in electronic media became important. The aim was to reach higher revenues and a decreased dependency on pure B2B relationships. During the same time a music channel had become a virtual mobile operator in another part of the world (MusicTV) and Hesburger, a local fast food restaurant chain, had introduced its own mobile subscription in Finland, which MTV considered to be examples of strategy composition, not knowing whether it was successful or not. Informant Y25 states that it felt like "things fell into places" when MTV got some kind of proof that going into telecommunications would be a viable strategy. The regulation had already been changed to such a degree that it enabled service operators to lease capacity from mobile network operators. MTV still had no right to build a network of its own (Informant R4). Mobile handsets had developed to such a degree that practically all of the newest models had color displays, which simplifies the use of different services and applications on the mobile terminal.

The first ideas of this strategy were introduced in spring 2003, but the main idea of establishing a residential customer layer date back to 2001-2002, according to Informant Y25. MTV initiated meetings with the largest telecommunications companies around the role of media companies in the Internet and mobile business. During these meetings the idea of MTV becoming an operator was introduced (Informant Y25). MTV was introduced as a telecommunications operator in early 2004 by launching MTV3 Laajakaista (broadband subscription) in TDC Song's network and MTV3 Handy (mobile subscription) in Elisa's mobile network. Thus MTV had a direct buyer-seller relationship with Elisa and TDC Song. Informant Y25 states that MTV never aimed at a leading position in the telecommunications field and that the targets were relatively modest compared to traditional telecommunications and mobile operators. MTV was merely seeking alternative revenue sources and believed that with their "marketing machine" they can affect consumers to such a degree that a user layer is created. MTV was not seeking hundreds of thousands of subscribers, rather tens of thousands, according to Informant Y25. MTV3 launched advertising campaigns on its own channels in order to attract customers.

MTV decided not to go into the price war that was growing in Finland at the time of the mobile subscription launch. MTV always kept a higher price on its subscriptions than the cheapest on the market. MTV bundled services in their subscriptions (mobile games, quizzes), but unfortunately these were not a hit among customers. The price war was getting tougher, but MTV still did not want to compete on price. The main target group of MTV3 Handy was such users that normally would watch sports events on the MTV3 TV channel. For instance, advertising of MTV3 Handy centered on being able to view Formula 1 GP races. The target group was set to MTV3 viewers who would be able to find some kind of added value of receiving related content via a mobile subscription.

> "*We decided beforehand that we will not compete on price. Then we played a little hockey with this approach, we did not tackle much. Rather we played by being nice. That will not get you far."* (Informant Y25)

Even though MTV was able to execute a large advertisement campaign of the new services, and free of charge since it owned the media channel itself, customers were not interested in MTV's subscriptions and MTV ended up with only a few thousands subscriptions. The services were stopped later during 2004 and mobile subscriptions transferred to Elisa and broadband subscriptions to TDC Song. Informant Y25 states that the role of MTV has become much clearer since the "adventures in the telecommunications sector".

According to Informant Y25 MTV is today a customer of telecommunications companies in the area of billing and regards its role in telecommunications as a pure content provider. An example of this billing relationship is any type of TV program which asks viewers to vote by calling or sending an SMS to a certain number (e.g. Dances with stars, Idol). A contract between telecommunications companies and MTV is signed so that if a viewer is billed 96 eurocents for making that call, the telecommunications operators are entitled to keeping a part of that fee for themselves and the rest goes to MTV. Informant Y25 considers media companies useful for telecommunications companies, since they bring demand and usage into the infrastructure network.

7.5.1 Does convergence lead to an identity crisis among ICT actors?

When asked about MTV's mobile operator strategy, several informants associate it with convergence (e.g. Informants R4, Y18, X21). Informant X12 states that MTV combined a traditional advertising logic with operator logic and that the strategy should be seen rather as an exercise. If you do not own a mobile or a broadband network, it is close to impossible to establish oneself as an actor in this segment in Finland. A media company that thought it would be able to differentiate by offering content in its subscription and thus receive a better price got it wrong, plain and simple. Price is too important, says Informant X12. Informant Y33 points out that MTV went into this strategy using their own brand, which is quite important in the discussion. MTV could have partnered with a telecom company, but still chose to go about it alone.

Informant X22 argues that if Sonera would have used the same amount of advertisement time it would probably have attracted at least 10 000 new subscriptions. By this statement, one can say that Informant X22 criticizes the idea behind the subscriptions themselves and the concepts that were developed. For instance, Informant Y25 also mentions that branding the mobile subscription as "MTV3 Handy" was not a very good strategy. It seems like MTV did not evaluate the customers correctly. Informant Y25 implies that the main target group was 25-40 year old men (e.g. the mobile subscription services included sports news etc.). Informant X22 argues that if MTV would have chosen the whole of Finland as a target group, i.e. all mobile operator customers, and expressed its role as a content provider more clearly, it might have had a chance.

Two Informants comment MTV entering the telecommunications field as a scary thought. Informants X7 and X14 mention that the idea was "sold as the most complicated and worse threat there could exist" because MTV had "the content and all the nice stuff" that the

customers wanted. Here one can interpret a fear from telecommunications companies' side that the content providers will run over operators. It is also true that content providers, or media actors, view their own position (within the media and ICT industry) as having a strong base and they are confident that their content will have a demand also in the future.

7.5.2 Critical event analysis

In terms of which critical events led MTV to pursuit a position within the telecommunications field, Informant Y25 mentions a few. One can argue that (1) the success of mobile telephony and technological advancements in terms of Internet access speed and mobile terminals encompass the first critical event that led MTV to start re-evaluating its role and feeling a need to move in on telecommunications companies' hold on the end-users. These events in the technological environment contributed to identifying an opportunity. Another critical event is (2) change in regulation, i.e. the fact that it was even possible for MTV to take on a role as a mobile and broadband service provider – a new role in a completely separate industry area from where MTV's core competence otherwise would be found. Links to the discussion on critical events in the regulatory environment (see section 6.8.3) can be identified, e.g. network operators being obliged to lease capacity. A contributing factor can furthermore be found in (3) events taking place both nationally and internationally in the competitive landscape; Informant Y25 mentions Hesburger mobile subscriptions and Music TV becoming a virtual operator as examples which supported MTV's plans. As a fourth critical event can be mentioned, i.e. (4) MTV3's strong position in the media sector, which allowed it to take a new role in the telecommunications sector.

In terms of critical events in terminating MTV's mobile and broadband business strategy, the by far largest critical event was the price war that was reaching its peak around summer 2004, which was too much for MTV and forced the company to retreat from the telecommunications industry. Of course, the fact that MTV failed to build a solid customer base can be viewed as another critical event that led to the termination of both mobile and broadband services. The role of MTV in the media sector also became clearer after MTV had attempted at creating a new role for itself in the telecommunications sector.

7.5.3 Role transition and position seeking in convergence settings

The fact that digitization had occurred and the content industry was hyped, MTV saw a window of opportunity to expand their field of business into encompassing also telecommunications features. The company was not purely driven by reasons directly associated with convergence thinking. Rather, MTV stepped on the other side of the border in order to strengthen its position within its own market by establishing contact with end-users. The goal was more or less to receive a hold on the end-users, which would give MTV a position within the telecommunications market, where it considered the lucrative Internet business taking place. Convergence as such is not recognized by Informant Y25 at MTV as a main driver of MTV's strategy to pursue a role and position within telecommunications. However, convergence had of course shaped the market and the field of business that MTV was in, which one may argue influenced MTV's decisions. The regulatory environment favored new service providers (more competition and thus better offerings for customers), which *per se* enabled MTV to enter the telecommunications field in the first place. The idea

was to offer a complete solution for end-users, i.e. they would have a mobile and broadband subscription from MTV and watch the MTV3 TV channel as well. The strategy can be said to encompass convergence thinking, even though MTV takes a distance to the concept of convergence.

The role transition *per se* was seen merely as a new strategy; one that was designed in order to diminish dependence on B2B actors purchasing advertisement space and time. A second reason for the role transition was the wish to receive a part of the Internet business revenues. MTV considered its role as a content creator and provider being a self-evident reason for also getting a share of the incomes, since the paying customers also used MTV's content, but MTV was not compensated for it.

Further, MTV's position remained the same; telecommunications representatives mention that they were confused as to what will happen when a content provider enters the telecommunications market since content is what sells to end-users. MTV did not perhaps make use of its position as a content provider, which might have been the reason, or part of the reason to why MTV failed as a service operator in telecommunications. MTV however acted in a new role (service operator), based on its position (content provider). Convergence therefore allows for changing the role set, for acting in new roles e.g. over industry borders, while position and core competence in "home market" stays the same - only role varies. MTV underwent an identity crisis which is similar to role conflict and role ambiguity (Kahn et al., 1964) and role overload (Örtqvist, 2007), which constitute role stress; there is a pressure to take on new roles because technology develops and allows new business opportunities. The hype period is also an influencing factor in the MTV3 Handy case, as is the search for new customers generating revenues (thus being less dependent on existing customers in the B2B segment).

7.6 Discussion: comparing convergence from theoretical and empirical points of view

The perceptions of convergence in Finnish telecommunications are quite versatile and show inconsistency in the use of the concept. When the term "technological" is added to convergence, the concept becomes easier to comprehend and is almost always related to advances in technology and fusion between different kinds of technologies within a handset terminal, the PC, in infrastructure or similar. In the interviews the informants were asked to explain what they understand by the term convergence. I did not ask them e.g. what they understand by *technological* convergence or *industry* convergence from the very beginning. As the account for perceptions of convergence above shows, a large part of the informants associated convergence with technical features and technological developments in telecommunications and the computer industry. One must also keep in mind that a large part of the informants have a degree in engineering and may thus base their perception of convergence solely on technology rather than trying to see which other aspects of convergence may be found. A few informants acknowledge the importance of technology and technological development, but focus on talking about the effects convergence has on various corners of the economy or end-users' habits, rather than stressing which kind of convergence processes may take place on a technical level, e.g. transfer to IP technology based networks.

Practically all informants were initially skeptical towards the concept of convergence, saying that the word as such is a child of the hype period during the late 1990s. However, it is still

recognized that the telecommunications industry is de facto changing and convergence is used as a word to describe the changes taking place. The green paper on convergence issued by the EC in 1997 seems to be well known as many informants refer to the three blobs or clouds merging into forming one unified market for telecommunications, media and IT. None of the informants mention the report explicitly, and it is therefore difficult to assess the impact the report has had on the industry and the perceptions of convergence. Similarities in definitions of convergence can be found between the green paper and the informants' answers, such as convergence processes taking place on different levels, of which services and products are on level and infrastructure (networks) are another level. However, annual reports which were published before the green paper on convergence give a slightly different picture of the perception of convergence. The first time the word convergence is used in an annual report related to the Finnish telecommunications market is in Netcom's, today known as Tele2, annual report of 1994 where fixed telephony, mobile telephony and data transfer is estimated to convergence. The early perception of convergence indicates that it occurred within the telecommunications industry, as also noted by e.g. Informant X34. The 1980s and 1990s were decades when digitization occurred, which *per se* colored the ideas and expectations of the future of the telecommunications industry. Furthermore, several forces helped shape the industry during the 1980s and 1990s, such as liberalization, globalization and deregulation. These change processes have eventually also shaped perceptions of current events in telecommunications, e.g. which opportunities does digitization bring with it and what does it mean in practice. Digitization can actually be considered an early convergence process on a technical level, as it allowed for transmitting data in bits over traditional telephony networks. Digitization can, on the other hand, be seen as an enabler of convergence processes, as it became evident that digitization involved new combinations on technical levels and efficiency in various processes within the organization.

In terms of applying a sensemaking perspective on the perceptions of convergence, one must firstly remember that interaction between individuals within the telecommunications industry take place every day through buyer-seller relationships or cooperative agreements. The fact that agreements with actors from adjacent industries are engaged signalizes that the individuals initiating the cooperation have an idea of the benefits cooperation across industry borders brings. There is always an agenda behind business relationships of all kinds, but the individuals may be aware of what is driving them to form cross-industrial business relationships. In fact, it may not always be driven by convergence processes, which effects force actors into acting. Interaction with other human beings is what constitutes identity, according to Weick (1995), and identity construction is obligatory for the sensemaking process to start. In terms of identity construction in Finnish telecommunications, its history and stories about crossing industry borders and taking roles in new business areas, clearly indicate that a process of identity construction has taken place among organizational actors in the industry. The reasons for the identity crisis, if one can call it crisis, are many, but the most important ones are grounded in technological development which has led to regulatory and societal change. Consumer behavior has changed, which forces companies to re-evaluate their offerings, their way of conduct, their organizational structure etc. Finnish telecom actors have diverged from their traditional core competencies and pursued a role as content providers, whereas media companies have pursued a strategy which would give them the much desired contact to end-users. In trying to understand the changes occurring in telecommunications, actors were also constructing identity, e.g. focusing on mobile telephony, content provision, being regional or national providers. The sensemaking process of convergence started when

actors began to question their own realities and identities, the competitive landscape, core competences as well as future roles and positions, a process which also the Aina Group and MTV3 Handy mini-cases show.

Whatever the informants have told me as a researcher, the sensemaking process is always retrospective (Weick, 1995), meaning that people can know what they are doing only after they have done it. It was relatively easy for the informants to talk about convergence from a historical perspective and all of them also had some kind of picture of where convergence will lead us in the future. Weick (1995) points out that future expectations are a vital part of the sensemaking process. Weick continues that people shape and are shaped by the context in which all sensemaking takes place. Thus, it is impossible to separate the people from the context. Throughout this thesis I have assumed that convergence is a part of the context, in the same way as technological development is a part of the context, enabling fast advancements and rapid product/service launches. Furthermore, sensemaking is a social process. Meanings are intersubjectively shared (a collective mind) and sensemaking is thus "never solitary because what a person does internally is contingent on others" (Weick, 1995, p. 40). This notion of sensemaking indicates that a collective understanding or perception of convergence as an influencing process would have been created within the Finnish telecommunications sector. A large part of the informants associate convergence with the transition from PSTN networks to IP technology based networks, which *per se* allows for a whole set of new competencies, products, services and solutions to be created. Convergence to most of the informants equals change and development and the most obvious change ahead in telecommunications is the transition to IP networks. However, as Weick points out, sensemaking is ongoing; it neither starts nor stops. It is a dynamic process. The perceptions of convergence continue to form even after this account has been given and it may change directions or take on new features in the future. As we remember, convergence is based on technological development and advancement.

Furthermore, sensemaking is focused on and extracted by cues, indicating that people can make sense of anything and they tend to see the product rather than the process. Therefore it has been difficult for informants to evaluate the process of convergence as such. They indeed tend to give examples of concrete products or services when asked about convergence and how they understand and/or perceive it. If informants are asked to describe a sequence of events or development of the telecommunications industry, they are however able to indicate or point out where and when something is linked or associated with convergence. Convergence is thus always related to another change process, such as regulation, e.g. liberalization of markets, or technology, e.g. development of ISDN, PBX, and mobile TV. Sensemaking is also driven by plausibility rather than accuracy, meaning that sensemaking is an individual activity. The interpretation need not be accurate, merely plausible and acceptable. Accuracy is secondary to plausibility due to e.g. the need to filter information (data, signals) or otherwise they would be overwhelmed by incoming information. The informants in this study have also gone through a sensemaking process, where they interpret, sort out and choose information that is relevant to them in performing professional tasks and making decisions.

In summary, the perceptions of convergence indicate that a collective sensemaking process has been underway since the early 1980s, as sensemaking *per se* is never-ending. Convergence is seen by the informants rather as a product, not as a process, even though narratives on

industry change indicate that convergence indeed has a processual dimension. Perceptions of convergence are driven by what the informants believe will happen in the future, which evidently is a part of the sensemaking process, i.e. to have pictures and images of the future. The fact that convergence is included in future scenarios also highlights the importance of convergence processes. Convergence processes are not abstract and diffuse concepts, which need not be taken seriously; they are already taken seriously. Organizational structure is changed in order to better serve customers, among other reasons, and both Sonera and Elisa are examples where organizational layers are organized in such a way that technology becomes neutral. This enables convergence to occur on a technical level. Corporate customers drive the demand for convergence based solutions and having an organizational structure where convergence is allowed and facilitated also allows and facilitates the company to offer the demanded products, services and/or solutions. In this sense convergence can be said to be demand-driven rather than supply-driven (see Pennings & Puranam, 2001). Internal reorganizations further allow for convergence to take place on a technical and service level within the company, and therefore firms themselves are an important factor driving the convergence process. However, the informants argue that convergence may be the reason for the need of internal reorganization in the first place.

Convergence is clearly perceived to take place on a technological level, but its effects and their articulation take different forms in the informants' answers. Convergence is viewed from different perspectives, namely the end-users' perspective on one hand and a technological perspective on the other hand. The technological perspective often involves ideas on how to efficiently use technological convergence within the company as well as in buyer-seller relationships. Furthermore, convergence is understood as a force strong enough to affect roles and positions and this is strongly tied to the question of focusing on core competencies, brand management and outsourcing activities. Change in general contributes to redefinition of role and repositioning activities, but convergence seems to increase the need for search of identity, role and position as the notion itself is associated with such words as change, opportunity, threats, winner, loser etc. Similarly, Bohlin (2000) found that what is being perceived as converging mainly relates to technology. In the EC green paper on convergence it is mainly technologies that are converging, which in turn leads to consequences in other parts of the industry, i.e. services, markets etc. Bohlin (2000) and Shepard (2000) both note that technology is only a part of the convergence process. Industry convergence, on the other hand, seems to be a convergence process which has largely been exaggerated by various reports. Industry convergence appears in informants' future visions, but none of the informants can point at specific events that would imply that industry convergence has happened or is happening in Finland at the moment. An amendment of figure 5 in chapter 3 is thus suggested, as it is clear that the process of convergence does not necessarily lead to industries converging. Furthermore, in terms of the affected areas, telecommunications, IT and media, the informants have not expressed an extensive interplay between the IT and media sectors. Even though such a question is outside the scope of this research, some indications of equal convergence should be visible if this were the case. Informants mention that in the early days convergence took place within the telecommunications industry, then between telecommunications and computing, today labeled IT, and later on media joined as technology advanced enough to provide real media content through e.g. mobile networks into mobile terminals. In figure 24, the important part is not the common area in the middle, as is the case in figure 5. Rather, the figure shows how the telecommunications industry is expanding its borders into concerning

also media and IT, without merging into one unified market. The figure also indicates that telecommunications is the dominating area for these industries.

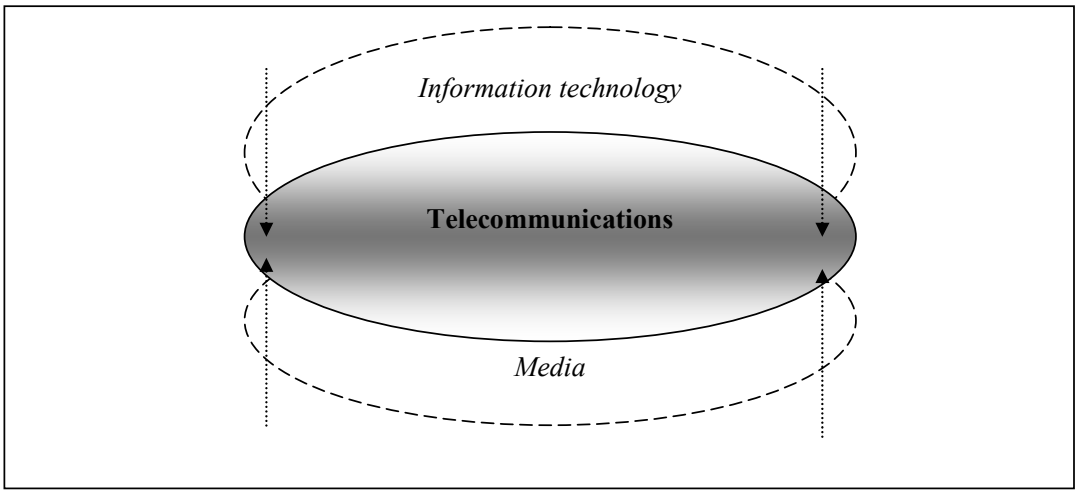

Figure 24. Convergence revised

The process of convergence in Finland has occurred in stages. According to the theoretical review convergence was becoming a viable concept in telecommunications already during the 1970s. A few informants recall convergence during the 1980s when they perceived it as a process occurring mainly within the telecommunications sector. During the 1990s, convergence was understood as concerning telecommunications and the computing industry. One must keep in mind that data transmissions were the hot topic of the late 1980s and early 1990s. Media came into the picture and was perceived as a part of the converging area during the late 1990s. This time was characterized by the hype period. High expectations were laid on e.g. 3G, data computing was developing in rapid pace, the telecom operators were self-sufficient and still had strong revenue flows. The informants share one opinion, which is the current perception of convergence, namely that it is silently accepted as a process and a factor that affects not only the telecommunications industry, but also media, IT, computing, broadcasting etc. Convergence may be a concept that when pronounced loudly, some people smile slightly or do not take comments related to convergence seriously. However, the fact still remains that the idea of convergence has affected the telecommunications industry in Finland at various levels and from various directions. The way convergence was understood during the 1980s has influenced decisions and strategies of telecom operators just as much as it has influenced regulation. Regulation is one of the important factors that has both enabled convergence processes and been altered due to the power of development in technology and markets.

In the Finnish telecommunications sector, the *perception* of convergence has gone through four stages, namely (1) convergence within the telecommunications industry, (2) convergence of telecommunications and computing or IT, (3) convergence of telecommunications, computing or IT and media and finally, (4) convergence is materialized into concrete examples such as mobile TV, VoIP or PDA handheld devices. The last stage indicates service and/or product convergence. The first stage is characterized by a prevailing technical

perception of the concept, whereas stages two and three are more focused on industry convergence. The fourth and final stage on this continuum has shifted the focus back to the technical level. However, another aspect has been included, which is that of the end-user's and what convergence means for them, both residential and corporate customers. In terms of an actor's role and position, the continuum shows the most turbulent times, when actors experiences an identity crisis which later on leads them to e.g. focusing on core competencies.

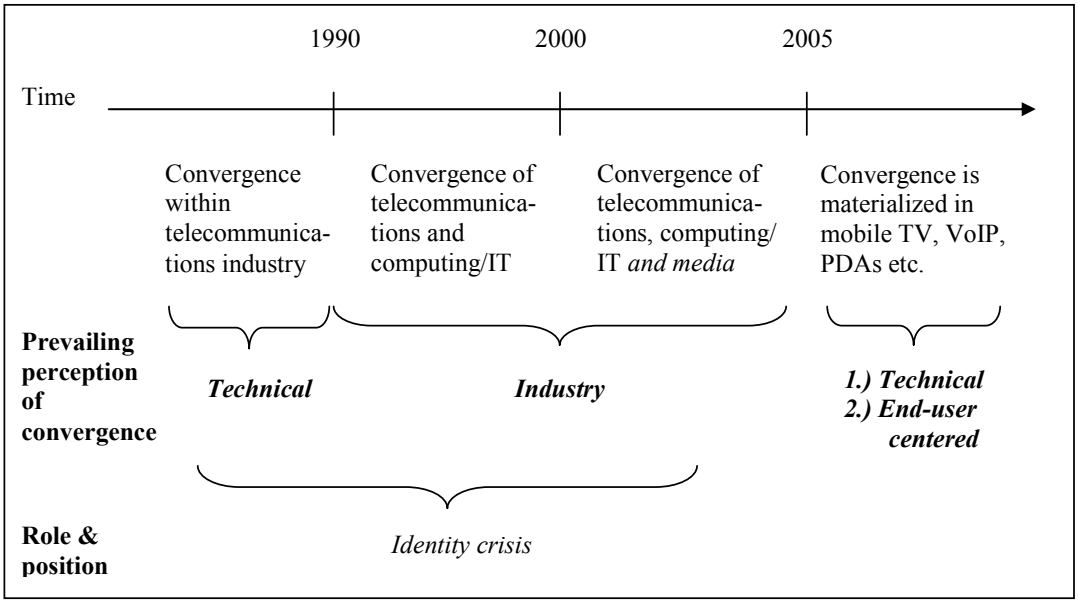

Figure 25. Convergence process in Finnish telecommunications

Today convergence in the telecommunications sector means technological developments, which aim at providing end-users with a wide range of services available through different types of media, such as mobile phones, laptops, PCs, PDAs etc. Content can be accessed through any device and the content is the same for all access channels. This is what convergence means from an end-user's perspective. In terms of actors within the telecommunications industry, convergence means reassessing roles and positions and interacting with actors who possess resources needed in a converged (all-IP) environment, may these actors stem from the IT, telecommunications or media sector. Industry convergence as such is not taking place at the moment in Finland. As written in the Economist (12.10.2006), "At its heart, convergence is the result of the telecoms industry's embrace of internet technology. […] Convergence, then, promises operators the means to defend themselves against competitors today and the prospect of new revenues tomorrow". Based on the review of informants' answers and compared to the literature review in chapter 3, convergence for telecommunications actors is in this study defined as:

> *A process by which telecommunications actors are forced to re-evaluate their roles and positions on a market and engage in cooperative business networks in order to access resources needed in a converged environment.*

7.7 Summary

What is convergence? Convergence is understood mainly as implying change and development, without referring to its processual dimension. Convergence indicates that things change; organizational structure, the market place, end-users' preferences and user habits etc. On a firm level convergence means that telecom actors are increasingly focusing on their core competences, outsourcing and redefinition or role and position. During the 1990s convergence was understood as a means to enter non-traditional industries, as it was becoming technically and technologically possible. Telecom actors became media actors and media actors became telecom actors only to soon realize that they do not possess the needed resources or the required capabilities to position themselves within a new industry. The lessons were learnt, i.e. sense was made out of the experiences, and after a few years of heavy identity crisis, actors started to perceive convergence as a technical factor, a transition to future networks. Thus, a shift in the perception of convergence occurred during the century shift, right after the hype period slowed down. Convergence is nowadays understood as a part of the context; it has been created through a collective sensemaking process and through looking back in retrospective and analyzing events from history. The sensemaking process also contains pictures of the future. These perceptions of the future are also important in shaping the current perception of the process of convergence. One of the important questions that this poses is whether there is a stability dimension in telecommunications at all, since convergence *per se* indicates change.

How does convergence affect the actors in the Finnish telecommunications industry? Convergence as such has mainly affected the way the industry looks at the future, but also in terms of increased role and position seeking, focus on core competencies, outsourcing, brand awareness and focus, internal reorganization and the forming of partnerships and acting in business nets and larger business networks. Convergence can hardly be seen as the sole reason for these activities, but has to a large degree contributed to them. The notion of convergence as presented by the EC in 1997 has e.g. influenced the structure Aina Group has built. In the following chapters the effects of convergence are examined further, with special focus on role and position in business nets, presenting the case of mobile TV.

8. CASE: MOBILE TV IN FINLAND

The chapter presents mobile TV in Finland as a case, where business net dynamics and convergence is analysed. Out of 39 informants, 26 discussed mobile TV during the interviews. Two interviews concentrated mainly on mobile TV (Informants X38 and S39). The chapter starts with a description of mobile TV and how it has been developed through pilots, whereafter business net emergence and dynamics are analysed, with specific focus on roles and positions. The convergence process in relation to the business net formation is furthermore analysed. The chapter aims at providing answers to research question theme 3, namely how do convergence processes affect the roles and positions of actors in a specific business network in the Finnish telecommunications industry?

8.1 Introduction to Mobile TV in Finland

For end-customers mobile TV means watching television from a wireless pocket-size terminal or phone. Mobile analogue television receivers have been on the market for tens of years but have never gained a huge success. For instance, Sony launched their Watchman in 1984, but it eventually disappeared from the market. Some believe that the reason for this is their lack of new features over the normal television and that the new interactive television that is part of the digital television thus offers new opportunities for mobile TV (cf. Södergård, 2003a). Mobile TV in Finland is based on the Digital Video Broadcasting Handheld (DVB-H) technology, which is currently being standardized; ETSI, which officially is responsible for standardization of information and communication technologies within Europe, has in 2004 accepted it as the main standard for mobile TV transmissions. According to Nokia (2005) DVB-H is a combination of conventional digital video and IP and scales especially for smaller devices such as PDAs and mobile terminals. The current standard in digital video broadcasting is Digital Video Broadcasting Terrestrial (DVB-T), but it was not designed for mobile devices. Since handheld devices simply do not have the battery life to make DVB-T reception an option for end-users, a new solution was needed, i.e. DVB-H. Mobile TV is also available in the 3G mobile network, but the major difference between DVB-H and 3G lies in frame rates and battery life. Also, 3G is based on a unicast architecture, where each user makes a request to view video. DVB-H is pure broadcasting. DVB-H reduces power consumption in mobile phones to roughly the same level as a voice call. According to Finnish Mobile TV, the capacity of the current or even the planned 3G networks is not sufficient for full scale TV-type mass broadcasting. DVB-H is therefore more suitable for simulcast transmissions, whereas 3G is suitable for on-demand download of e.g. video clips and programs. An additional factor is that analogue TV broadcasting in houselholds with antennas stopped in Finland in late summer 2007.

DVB-H can furthermore come in many forms (cf. Blomberg, 2007), such as (1) free-to-air simulcast broadcasting, where nationwide commercial and public service terrestrial main TV-channels are shown as such in the DVB-H network. (2) Pay-TV simulcast mobile broadcasting involves encrypted, pay-TV channels, i.e. the user pays for channels. (3) Mobile TV broadcasting services involving broadcasting TV services which are specifically made for mobile devices. (4) Mobile interactive TV services, where both the DVB-H and 3G network is used, i.e. interactive services designed for mobile are offered by combining broadcasting and

mobile telephony services. (5) Mobile services with video refers to downloading video services as mobile TV services in mobile phones using only the 3G network. Competing technologies also exist, e.g. Multimedia Broadcast/Multicast Service (MBMS), built on existing 3G networks and developed and deployed by Ericsson, which offers users the ability to view content on demand rather than according to a pre-set schedule like in the DVB-H network. There are currently three major standards developed for mobile TV transmissions; Terrestrial Integrated Services Digital Broadcasting (ISDB-T) in Japan, Digital Multimedia Broadcast (DMB) and its variations in South Korea and DVB-H in Europe and the United States. In the U.S. non-standardized applications, like Qualcomm's MediaFlo (closed system), are also available (Finnish Mobile TV, 2006) and big operators such as Verizon and Cingular have already chosen MediaFlo as their standard for mobile TV transmissions (Kotilainen, 2007). DVB-H is slowly gaining ground and e.g. Motorola and Sony Ericsson has signed an agreement with Nokia in order to receive licenses for the DVB-H technology and Ericsson is cooperating with Nokia in order to make MBMS compatible with DVB-H. However, in the case study, the technical development is not the focus, nor is mobile TV service concepts. Rather, the focus is on interaction between actors involved in the mobile TV development.

Nokia is the main developer of the DVB-H technology and has unofficially tested TV in mobile devices since 1998. Developments of the DVB-H technology started in 2000 as a technology project (Informant X19). According to Falck (2004) mobile TV was initially driven by Nokia's interest in bringing television transmissions into mobile devices, which was at the time the only medium missing from the terminals. One of the early concepts for TV in mobile devices was MediaScreen, introduced by Nokia in 1999. MediaScreen combined TV, Internet and mobile phone technology:

> "*Nokia Multimedia Terminals is a pioneer in digital terminals for TV viewing. MediaScreen creates opportunities for mobile use of terrestrial (DVB-T) digital television […]. This device enables interactive access to the Internet and the selection of web pages offered by the broadcasting company within its digital signal stream, even for people on the move. Moreover, MediaScreen makes it possible to send and receive e-mails, watch television and listen to the radio with digital quality.*" (Nokia, 1999)

MediaScreen was mentioned by e.g. Informants X19 and S39 as early developments towards a mobile broadcasting technology. IPDC, Internet Protocol Datacasting, was the next step in the development. Informants in this study view mobile TV specifically as a convergence related mobile service, which offers a complement to traditional TV. Concerning the DVB-H technology, a number of trials were commenced in a number of countries, e.g. the UK, Germany, Finland. Nokia has been very keen on testing mobile TV in Finland and the first mobile TV service consumer experiences in Finland happened "via a friendly user test" and were carried out in late 2004 (Finnish Mobile TV, 2005a). The test showed that users did indeed like to watch TV on mobile devices, especially in cars or other types of transport, at work or at home and in public places (e.g. cafés). Mobile TV was considered a complement to traditional television. Viewers were reported to prefer watching mobile TV during traditional TV off-peak hours. A commercial DVB-H network was opened in Finland in December 2006 in the capital area and the cities of Turku and Oulu. Currently, the DVB-H network covers 25% of the population and the aim was to cover 40% by the end of 2007 (Kotilainen, 2007). In the initial stage between 21 and 24 channels fit into the DVB-H network, providing a number

of service providers room for offering e.g. interactive services to mobile TV customers. For instance, SBS Finland and Digi TV Plus have signed contracts for sending content via the DVB-H network.

8.2 Focal and supporting actors of DVB-H based mobile TV in Finland

The actors involved in commercializing mobile TV services may be grouped into three main categories based on (1) access to end-users, (2) content and (3) the role as technological enabler. Mobile operators Sonera and Elisa provide the link to end-users by "owning" the SIM-cards, i.e. without mobile operators a mobile device cannot function. Mobile operators also possess customer relationships with the end-users, facilitating e.g. billing. In terms of content, the main parties to digital television broadcasting are the television companies (YLE, MTV and Nelonen) who control multiplexes. Media companies also own rights to content. Television companies are to a certain degree producing content, but most of the content is made by production companies such as e.g. Filmiteollisuus. Commercials are made by advertising agencies. Technological enabler refers to both Digita and Nokia. Digita in the role of a network provider is responsible for broadcasting the television and radio programs to the consumers. Nokia, on the other hand, provides the market with DVB-H enabled handsets and develops technology platforms for the DVB-H infrastructure network.

Nokia is the world leader in market share concerning mobile communications and is actively lobbying for making its DVB-H the standard for TV transmissions to mobile devices. Other handset manufacturers have joined Nokia behind the DVB-H technology for mobile television transmissions, e.g. Motorola and Lucent. Sony Ericsson has signed an agreement with Nokia for interoperability between mobile TV transmission technologies. Siemens and Samsung also develop and manufacture DVB-H enabled mobile devices.

Digita is a part of the international TDF group. Digita is a Finnish distributor of radio and television services. Digita further develops data communication networks and network infrastructure. Digita's customers include television and radio broadcasting companies, as well as mobile and broadband operators.

MTV Oy is a part of the Alma Media Corporation and manages television and radio broadcasting. MTV is responsible for the national commercial channels MTV3 and Subtv. MTV reaches around 3 million viewers every day (MTV3, 12.2.2007). According to YLE, MTV's share of daily viewers was 32.4% in 2005 (YLE AR 2005, p. 5).

Nelonen is a part of SanomaWSOY's electronic media company, Swelcom. Nelonen reaches 2.1 million viewers every day (Nelonen, 12.2.2007). The share of daily viewers is 11.5% according to YLE's annual report 2005 (p. 5).

YLE, the Finnish Broadcasting company is Finland's public service broadcaster. YLE is a major player in the production of content for TV and radio transmissions and is obliged to provide comprehensive broadcasting services to all citizens under equal conditions. YLE is financed by television fees paid by the viewers (90%) and operating license fees paid by commercial companies. In 2005 YLE's share of daily television viewing was 44.3% (YLE, 12.2.2007).

Elisa Oyj focuses on providing fixed and mobile services as well as Internet services. Elisa serves over 2.4 million mobile customers (Elisa, AR 2005). Elisa offers their own mobile TV service in the UMTS and GPRS networks and viewers can access YLE's latest news, Urheilukanava, MTV3 Extra, Nelonen, The Voice, BBC World and CNBC for the price of 1.90€/24 h. For an additional 1.49€/24h the Finnish league of ice hockey is accessible. Other programs are available for the price of data transmission, e.g. Finnish Idol. The data transmission fee is 4€/month (25 MB, within national borders).

TeliaSonera Finland is the Finnish profit centre of TeliaSonera (Sweden) and offers products and services under the Sonera brand. Sonera is the leading telecommunications company in the Nordic and Baltic regions. Sonera offers fixed and mobile communications services as well as broadband services. Sonera's mobile subscribers in Finland currently amount to around 2.5 million (Sonera Annual Report 2005). Sonera offers its own mobile TV in its UMTS network. The service is also available in the GPRS and EDGE networks. Mobile TV costs 1.90€/24 hours or 9.90€/month. Sonera's mobile TV features live streaming of Nelonen, JIM, The Voice, BBC World and TV7 as well as the latest news cast from YLE and the financial newspaper Kauppalehti's (part of Alma Media) news. Among additional services can be found sports events, music videos, movie trailers and news e.g. for hearing impaired. [7]

Supporting actors play important roles for the whole mobile TV project in terms of funding technology development and/or testing, encouraging cooperation between the focal actors, creating new business models and attracting alternative service and content providers and creators. The supporting and the focal actors are summarized in table 24, of which the idea is inspired by Heikkinen *et al.* (2007).

Forum Virium is one of the supporting organizations in the mobile TV project. Forum Virium is referred to as a cooperative business network and aims at supporting the emergence and development of new innovative services through cooperation among network members. The goal of the project is to promote the creation of innovative and interactive services for mobile TV in cooperation with both national and international developers. The cooperation is of non-commercial nature. Each member of the network decides in time when a service or product is ready to be commercialized and on which terms. The commercialization is referred to as the "second stage" in the Forum Virium Mobile TV initiative and was set to start in January 2007 (see figure 26). The first stage is non-commercial cooperation, taking place among actors who are members of Forum Virium. All members of Forum Virium have the right to use the DVB-H test network and the year 2006 was dedicated for developing and testing infrastructure and solutions for end-users (Blomberg, 2006a).

As of 8th November 2005, Forum Virium runs mobile TV tests and collects a number of actors for cooperation around mobile TV. For instance, Informant S39 claims that the interest to participate in Forum Virium originates in the fact that mobile TV is developed within this particular business network:

> "*Mobile TV was actually the reason why many firms entered [Forum Virium]. They were very interested in mobile TV.*" (Informant S39)

[7] The prices and channel alternatives for both Elisa and TeliaSonera refer to the situation as of the beginning of 2007.

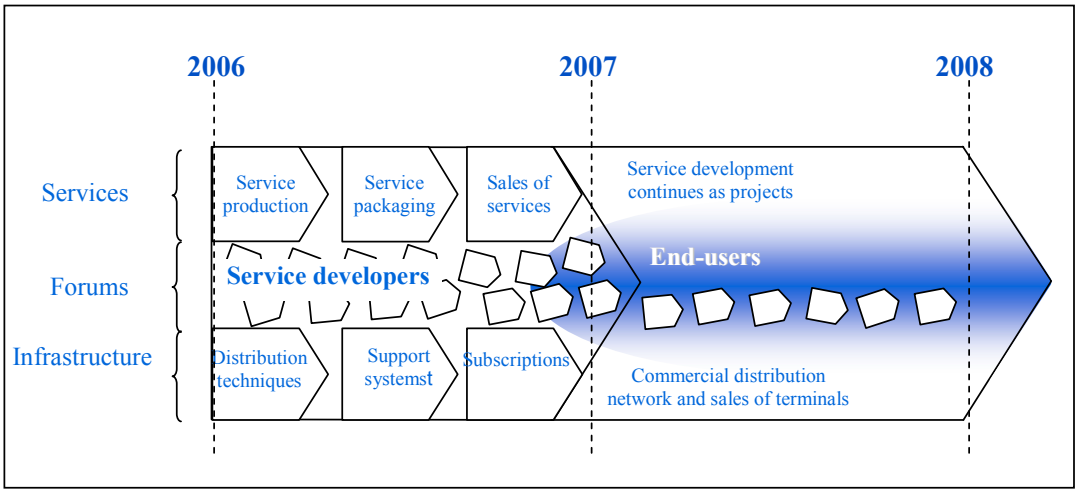

Figure 26. Finnish Mobile TV time schedule (Blomberg, 2006b)

VTT, Technical Research Centre of Finland, also plays a vital role in the development of both the DVB-H technology as well as the business net surrounding the creation of markets and mobile TV services. Currently VTT provides a DVB-H test network in the Helsinki area.

RTT is another important actor in mobile TV. Participants are Digita, Elisa, MTV, Nokia, TeliaSonera, Finland, Swelcom, Teleste and YLE (RTT, 22.3.2007). The aim is to "understand the possibilities IPDC can provide and [to] look at which services were the most promising" by using different types of terminals, including PCs and additional equipment which could be connected to them (Arjona, 2005, p. 34). In relation to mobile TV, RTT has a "subjective mobile audio-visual quality testing"-project in the DVB-H environment that started in 2004.

According to **Dimes** their mission is to offer an open innovation environment for the Finnish ICT cluster, in order to turn technology and competences into customer driven services earlier than elsewhere, which *per se* benefits business and society. The aim of Dimes is to collect "ICT players in Finland for joint effort to utilize the results of R&D work for the deployment of new services benefiting the national economy" (Dimes, 10.11.2007). Cooperation between the Finnish innovation organizations forms an operating network with the ability to represent the Finnish national actors in activities towards EU technology opportunities. Dimes runs six different programs with the aim of networking and building new relations as well as establishing new innovative ideas. New projects are started inside the programs and the acquired results are shared between the project participants. Dimes has around 50 participants, such as telecom operators, IT and media companies, universities, banks etc.

TEKES (Finnish Funding Agency for Technology and Innovation) funds innovative research and development projects in companies, universities and research institutes. TEKES views itself as a gateway to the best technology partners in Finland (Tekes, 10.11.2007). TEKES has especially been involved in funding development and testing of the DVB-H technology.

Focal actor	Description	Resources
Sonera	Mobile operator	Infrastructure access (3G)
Elisa	Mobile operator	Infrastructure access (3G)
Nokia	Handset and equipment manufacturer	Equipment
Digita	Distribution and infrastructure	Infrastructure access (DVB-H)
MTV3	Media company	Content
Nelonen	Media company	Content
YLE	Media company	Content
Supporting actor	**Description**	**Resources**
Forum Virium	Cooperative organization	Relationships
VTT	Technical research organization	Relationships, test beds
RTT	Technical research organization	Technology test bed
Dimes	Cooperative and research organization	Relationships
Tekes	Funding	Funding

Table 24. Actors of the case net

8.3 Towards commercial mobile TV services through pilots

Mobile TV has evolved to its current state through a number of pilot studies, which are here categorized in numerical order, starting with VTT (Technical Research Centre of Finland), who was the first actor to conduct a pilot based on user tests. Nokia was concurrently developing Internet protocol Datacasting (IPDC), a mobile broadcasting technology used to bring TV-like services to mobile terminals. IPDC conforms to the DVB-H technology which was later on developed by Nokia. The second pilot included the focal actors presented in the previous section. The cooperation between these parties was prolonged into yet another, third, pilot (FiMTV), which was reaching its end in early 2008.

8.3.1 Pilot I: VTT

The first mobile TV pilot was executed between 1st August 2001 and 1st July 2003, in which the studied area was how terminals, content and services were suited to various user situations (Södergård, 2003b). The pilot was initiated through a consortium consisting of content providers Alma Media (MTV) and Sanoma WSOY/Swelcom (Nelonen), telecommunications operators Sonera and Elisa, a start-up company Malibu Telecom and terminal manufacturer Nokia as well as Digita. The project was named "mobile television in fourth-generation networks" and carried out by VTT Information Technology together with the University of Tampere. 81 end-users had the opportunity to test the service between October 2002 and February 2003 in hotspot areas in the centre of Tampere. The trial took place in a WLAN network and the handsets were provided by e.g. Compaq (Informant S39). Nokia and Digita participated as observers, while the media companies provided content. YLE was not an active party of the project even though they allowed the use of their content. YLE reckoned that as long as Digita is participating, they need not to[8] (Informant S39). The aim of the project was to define what kind of interface, content and service was suited for mobile television and what kinds of business models were possible. The main funding besides the seven participating companies came from TEKES and VTT. In the early project years actual IPDC terminals were

[8] Digita was at this point in time a part of YLE.

not available. The Nokia 7700, which enabled mobile TV through a streamer capable of receiving IPDC streams, was launched as a prototype in 2002 (see figure 27).

Simultaneously to the VTT trial on mobile TV, Nokia was developing the DVB-H technology. Technology development for enabling mobile TV thus took place at two instances, VTT and Nokia who was cooperating with RTT. RTT initiated a project on IPDC test networks in 2002 with the aim of carrying on until the end of 2007.

8.3.2 Pilot II: FinPilot I

On December 15th, 2003, a number of actors joined forces again and signed an agreement of cooperation in order to test IPDC. These actors were Nokia, Digita, media companies MTV, Nelonen and YLE and telecom companies Sonera and Elisa (at that time Radiolinja). The agreement covered testing commercial broadcast service to mobile devices in a pilot project, with the aim of learning about ”real end-user acceptance for mobile broadcasting services”, i.e. market demand. Other goals of the pilot project were also to “support ongoing standardization work” and to “further clarify the regulative and spectrum issues for the planned 4th digital multiplex [digital television terrestrial network] in Finland” (Finnish Mobile TV, 2003). During spring 2005, a three-month (March-June) mobile TV pilot was implemented in Helsinki, with three main transmitters providing coverage for an area between the Kehä I and Kehä III ring roads. In terms of device equipment, the Nokia 7710 phones (see figure 27) were equipped with TV receivers and distributed to 500 pilot users, half of whom were Elisa’s and the other half Sonera’s mobile customers. The pilot featured the national TV channels and foreign theme channels, including BBC World, CNN, Euronews, Fashion TV and VIVA Plus. A small number of tailored mobile TV services were also developed for the pilot, such as special event based TV programs and theme TV channels (Finnish Mobile TV, 2003).

Figure 27. Nokia 7700 and 7710 mobile phones (Source: Nokia website)

The actors involved in mobile TV all viewed the project as an opportunity that expands their business activities, rather than a competition between rivals. According to Informant X28, cooperation has been promoted in Finland to such a degree that all actors see the value in cooperation patterns across industry borders and among direct and indirect competitors. Informant X28 states further that the main aim of the cooperation was to establish a new business area, mobile TV. It is thus in the best interest of every member of the network to cooperate. Cooperation was also a prerequisite for initiating the project. Announcements on the second pilot project were articulated in the following way:

> “*Elisa and Sonera are responsible for customer service, invoicing and connections to the new interactive supplementary services. Digita has designed and built the digital*

> *TV network needed for the distribution of mobile TV services and will manage the network, while Nokia will develop the mobile TV service management and smartphones that can receive mobile TV broadcasts.*" (Nokia, 8.3.2005)

According to Nieminen (2004) roles in the pilot business set-up were determined beforehand. Sonera and Elisa were to care for billing, identification and interactivity; YLE, MTV and Nelonen were responsible for content provision and Digita operated the broadcasting platform as a network and service operator. Nokia was responsible for providing equipment for end-users in this model.

8.3.3 Pilot III: The Finnish Mobile TV project (FiMTV)

The Finnish Mobile TV (FiMTV) project is the third pilot project and organized within Forum Virium since autumn 2006 with a focus on interactive services. According to Informants X38 and S39, the previous pilots and technical projects at RTT gave Nokia confirmation that mobile TV was indeed a lucrative business area. At this stage Nokia's focus became global as pilot studies in various countries all showed the same results. Nokia was not interested in investing in the national cooperation on mobile TV (e.g. Informant X19). Thus, Elisa took the initiative to carry on the project on developing mobile TV business alongside Forum Virium. A reason for Elisa's activity was the fact that since mobile TV would take several years in time to be established as a functioning market, the actors involved in previous pilots could carry on the cooperation and develop the project further until e.g. a commercial market is established, terminal range supporting DVB-H broadened and copyright issues resolved. Elisa is currently investing in research on mobile services. DNA Finland has chosen to focus on other service development projects (Informants X21, X36). Sonera's research currently takes place to a large extent in Sweden, which means that Sonera acts more or less in the role of reseller of TeliaSonera services. However, all mobile operators are involved in such organizations as Dimes and Forum Virium, under which research takes place in cooperation with universities and institutes with the aim of contributing to the Finnish ICT cluster. Several informants further state that Forum Virium basically has taken over the role that Nokia initially had as an initiator and driver in the cooperation net. Forum Virium is currently driving the continuing development of mobile TV. The goal of the project at the moment is to promote the creation of innovative and interactive services for mobile TV in cooperation with both national and international developers. It should also be noted that the mobile TV business net had clear boundaries during the first two pilot phases and the net boundaries are being opened up only in this third pilot, where content providers are invited to contribute to creating the mobile TV service business area. VTT has also found a role in the latest pilot project: a DVB-H test network has been opened at selected locations (three hot spot areas) in Helsinki. The network is coordinated by VTT. One of the reasons why there was a need to open up a new test network is the fact that Digita's DVB-H network is open for commercial use and testing in the network is thus limited. A testing period in VTT's DVB-H network was initiated in April 2007 and carried on until March 2008.

8.4 Business net emergence through pilots

According to Möller and Svahn (2003) networks emerge through three phases, (1) exploring for future business, (2) mobilization for applications and (3) mobilization for dissemination. These phases all have their specific characteristics. The phases are interlocked and

overlapping in nature, which is symbolized by the over-arching ellipses in figure 28. The mobile TV business net has developed and emerged similarly to the stage model developed by Möller and Svahn (2003). However, Möller and Svahn (2003) do not discuss business network dynamics in terms of role and position and how they affect the emergence of business networks. In the early phase the search of new business opportunities led to Nokia's need to link resources, competences and actors to the development of the DVB-H technology (first left-hand box at the bottom of figure 28). A business net was formed in order to develop mobile TV as an application and a mobile service (second box at the bottom of figure 28). On a global level Nokia leads the struggle concerning standardization, while the other net actors are coping with e.g. interactive service development for mobile TV, not to mention unsolved copy rights and license agreements. The business net is about to enter the third stage (third and fourth box at the bottom of figure 28), where markets are developed and a number of separate nets are being created, mostly in connection to research institutes at universities and polytechnics.

Informant X19 explains that mobile TV was initiated at Nokia as a technology venture with the aim of studying technical feasibility and determining whether mobile TV is a concept that actually works. After this first stage, a second stage was introduced, namely whether the concept is financially viable. Pilots were thus initiated. In the third stage both technical and financial functioning was tested. Informant X19 implies that neither technology nor market demand stands in the way of establishing a mobile TV market. Rather, barriers can be found in the regulatory environment, but mostly with content rights organizations.

> *"Now we are in the stage where pilot studies are ready. Now there is no doubt that this would not be a good project but now the regulatory issues are hitting the brakes."* (Informant X19)

8.4.1 First phase: exploring for future business

The emergence and development of the business net took place on the initiative of Nokia. Nokia was the one who started the development of the DVB-H technology. According to Möller and Svahn (2003) it is usually firms that are carrying out their existing businesses through well-established networks that make up the early emergence landscape. Most of these early actors are also engaged in incremental, local technology development activity aimed at improving their products and business processes. In order for Nokia to further develop and test the technology a network of competence had to be built. In terms of recognizing possible partners Nokia did not really have many choices: mobile operators which own their network infrastructure amounted to three in Finland and media companies were fixed in three camps. The selection process was in other words not complex on a national level. Competences in the field of mobile communications were thus found with the mobile network operators Sonera and Elisa. Nokia has cooperated with the mobile operators in Finland since the beginning of mobile communications. DNA Finland was not interested in mobile TV since its parent company Finnet is investing heavily in IPTV for use at home, e.g. via broadband connections. Other actors involved in various pilots, such as VTT played a role as facilitators, as they, for instance, set up a test network and were able to conduct initial consumer tests.

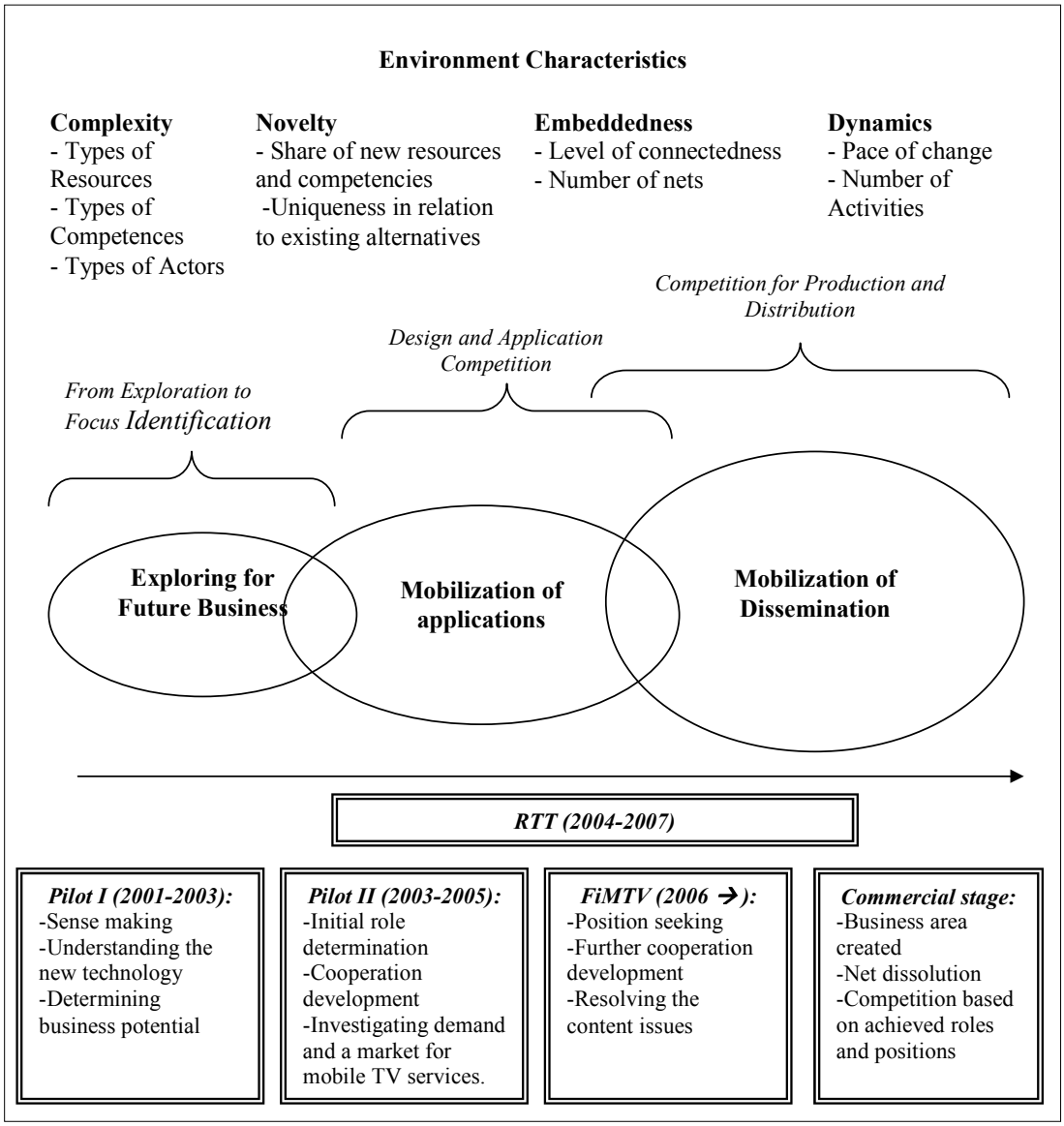

Figure 28. Development of Finnish mobile TV business area

Mobile TV was initiated at Nokia as a technology venture with the aim of studying technical feasibility and determining whether mobile TV is a concept that actually works. The first pilot, Pilot I (2001-2003), was therefore technical in its nature. This pilot served as a sense making process, where the actors involved were trying to form an understanding of mobile TV and the opportunities it offers in terms of business. This process is always influenced by the fact that each actor has a specific view of the emerging opportunities, which are based on their own specialization and technology base and a position in the emerging network (Möller & Svahn, 2003).

In terms of roles of actors in the first pilot, a number of categories can be distinguished from the case. First of all, the initiator and driver of the pilot was VTT. The funding agencies play vital roles, i.e. besides VTT, TEKES funded the pilot and can thus be viewed as enablers. Two participants took the roles of observers, namely Nokia and Digita. Nokia remained an observer due to the fact that it was developing IPDC and DVB-H in-house at roughly the same time, whereas Digita really did not have any role to play in the pilot, since the pilot took place in a WLAN network and not in a broadcasting network. Content was provided by MTV, Nelonen and YLE, even though YLE was not an active participant in the project. Mobile operators Elisa and Sonera provided access to end-users, i.e. a number of both Elisa's and Sonera's customers took part in the trial. Furthermore, from a technological perspective, Compaq acted as an enabler as well since it provided handsets for the trial. Pocket-sized PDAs and A5-sized tablet computers were used (Södergård, 2003a). The University of Tampere acted in a role as a driver of the project as well as an evaluator; the project led to a number of master's thesises, a doctoral thesis (Aaltonen, 2003) as well as a number of reports and one book (Södergård, 2003a). Malibu Telecom was a start-up telecom company, which shortly after the start of the project dissolved its operations. Table 25 summarizes the roles of actors in the first pilot.

Actor (pilot I)	Description	Role
VTT	Research organization	Initiator, driver
Sonera	Mobile operator	Customer access
Elisa	Mobile operator	Customer access
Nokia	Handset and equipment manufacturer	Observer
Digita	Distribution and infrastructure	Observer
MTV3	Media company	Content provider
Nelonen	Media company	Content provider
YLE	Media company	Content provider
Compaq	Equipment manufacturer	Handset supplyer
Tekes	Funding agency	Financial support
University of Tampere	Research and education	Evaluator
Malibu Telecom	Telecom start-up	n.a.

Table 25. Roles in the first phase (pilot I)

8.4.2 Second phase: mobilization of applications

The second pilot, Pilot II (2003-2005), was of non-commercial nature; however, with the aim of investigating whether there is a demand and a market for mobile TV services. According to Möller and Svahn (2003) the core issue in the mid-emergence phase is how to turn a vision of an articulated technological concept into a realized business. The RTT's mobile TV project (2004-2007) shows the continuum of technical investigations and that it is still at this phase in the interest of all actors involved that the technology development functions smoothly. Issues resolved in this stage concerned e.g. sound and picture quality. In the initial stages of business activity it has to be decided how things will be done. Successful mobile TV business requires terminals, network and content, which is vital to function for any service or product. Möller and Svahn (2003, p. 19) state that this demands

> "*[…] several interlinked networking capabilities. Actors who will have important roles in the emerging network must first be identified and then these actors must be*

convinced of the liability and earning potential offered by the new business, and finally, an architecture and organization for network collaboration must be created."

In March 2006, Digita obtained the DVB-H network license from the Finnish Government. Digita therefore became a neutral partner and DVB-H license holder, with whom Nokia now has a buyer-seller relationship in the mobile TV business net. At this time the technical part of the mobile TV business was almost complete. During the same year Forum Virium's Finnish Mobile TV project was started in order to resolve mobile TV content. Content, in the field of media, was found with YLE, MTV and Nelonen. The mobile operators were aware of the fact that without the media companies there would be no mobile TV, since end-users demand the type of content the media companies can provide. As a result from the pilot tests it was found that 58% of the users of mobile TV services in pilot II believe that the service will be popular, and 41% claimed to be willing to purchase the service (Finnish Mobile TV, 2005b). The most popular content was familiar programs available through national TV channels, sports and news. The trial users were also found to watch mobile TV during different times than traditional peak hours; while traveling on public transportation, in order to relax or to keep up to date with news (Carlsson, 2007). Between five and 30 minutes per day were used for watching mobile TV (Finnish Mobile TV, 2005b). Thus, external forces, such as customer demand, determine in a way the composition of the business net: as long as no alternative content providers exist, the current media companies which are net members are vital for the business net and the development of mobile TV service markets.

In the second phase, the roles (see table 26) changed for Nokia and Digita, whereas the roles of the mobile operators and media companies remained roughly the same. Mobile operators Elisa and Sonera were added functions such as billing. Nokia, on the other hand, acted in a role as an initiator of the second pilot as well as a driver of the project, which the quotation below also implies. Nokia also provided mobile handsets for the second trial. Digita took care of the infrastructure, i.e. the DVB-H network and set up test networks at selected locations in Helsinki.

"I have a feeling that Nokia drives the main group. […] It has been in the interest of TEKES. I stick to it that operators on the same level of the value chain cannot be the drivers in this kind of a case. It takes a larger force such as Nokia to drive the value network." (Informant X12)

Actor (pilot II)	Description	Role
Nokia	Handset and equipment manufacturer	Initiator, driver, handset provider
Digita	Distribution and infrastructure	Infrastructure provider
Sonera	Mobile operator	Customer access, billing
Elisa	Mobile operator	Customer access, billing
MTV3	Media company	Content provider
Nelonen	Media company	Content provider
YLE	Media company	Content provider

Table 26. Roles in the second phase (pilot II)

8.4 3 Third phase: mobilization of dissemination

In the third phase (see figure 28) both technical and financial functioning is tested. At this phase, also, the development of the content side continues, i.e. attracting content developers, providers and packagers. According to Möller and Svahn (2003) this phase represents the transition to market competition from a situation of pre-market competition. The emphasis is on the creation of a highly-effective demand-supply value system by exploiting the specialist capabilities of a variety of component and service suppliers and distribution channel members. Since the emphasis has so far been on co-development activities, but assembly and distribution activities require capacity derived from strong coordination capabilities, this may require reorganization of the net.

> "*Commercial roles are being sought now [...] it [mobile TV] is no longer a project. Rather, now we are moving to a commercial stage.*" (Informant Y33)

After Nokia came to the conclusion that the technology functions properly, their focus has been laid on global markets. As it became apparent that the cooperative business net established in Finland was not in the direct interest of Nokia to develop further, Elisa took the initiative to organize further development projects and pilots within the Forum Virium cooperative business network. Elisa will be the driver of the mobile TV as long as the commercial stage has not been fully reached. Nokia is still part of the development, but in a lesser role. The fact that Nokia sees the cooperation around mobile TV in Finland as temporal is worth noting. For instance, Ahola (2005) proposes that temporary inter-organizational networks exist only for the duration of a project at hand and names this a project network. Project networks have been studied by e.g. Eccles (1981) and Hellgren & Stjernberg (1995), showing that project networks are short-termed. The relationships are not completely terminated, but are rather left "dormant" and activated again when needed. Hadjikhani (1996) mentions "sleeping relationships", which are labels for such relationships which suffer from discontinuity in e.g. selling. This is especially true for project marketing or project networks. Dimes as an organization, is also a good example of dormant or sleeping relationships which can be activated when the need for specific resources or competencies arises. Dimes acts in the role of a "competence pool". Various actors are connected to Dimes and when opportunity rises and one needs special resources or competencies, Dimes has the resources to activate relationships or link actors to each other. Similarly, Skaates (2000) discusses discontinuous relationships; in such situations where business activity has been terminated social elements may remain (Havila & Wilkinson, 1997). Structural and economic elements of the relationship are not present in the long-term in such situations.

In terms of roles in the third phase (see table 27), Nokia's role as a driver diminished in favor of Elisa, who leads the developmental work. Elisa still functions in a role as service provider who is responsible for billing, as does Sonera. Nokia provides mobile handsets for end-users and equipment for the DBV-H network, which is operated and maintained by Digita. The media companies still act in roles as content providers. Forum Virium is a new actor to the mobile TV project and collects the focal actors within a business network with the aim of driving the development forward. New and alternative service providers and content creators are sought for the future mobile TV market, which will possibly become new business network members. VTT is responsible for a non-commercial DVB-H test network in Helsinki.

Actor (pilot III)	Description	Role
Elisa	Mobile operator	Driver, customer access, billing
Sonera	Mobile operator	Customer access, billing
MTV3	Media company	Content provider
Nelonen	Media company	Content provider
YLE	Media company	Content provider
Nokia	Handset and equipment manufacturer	Handset supplier
Digita	Distribution and infrastructure	Infrastructure provider
Forum Virium	Business network	Driver
VTT	Research organization	Test network provider

Table 27. Roles in the third phase (pilot III)

8.4.4 Tensions in the mobile TV business nets

There are a number of issues which affect the creation of a mobile TV market, such as what kind of content will be available through the DVB-H network, who owns the rights to the content and will thus be compensated, which type of business model will work in the new market etc.

> "*The technology exists, but the regulatory environment does not yet allow for the possibility to create a mass market. And then there is a horrible fight here and there, 'cause all actors believe that they are defending their territories by resisting change.*" (Informant X19)

The informants who have discussed mobile TV acknowledge the potential barriers to mobile TV and point out that as long as issues concerning content right compensation are not resolved, the mobile TV market will not be created. Also, the roles and positions of other actors in the mobile TV business net are unclear which implies that the business model behind mobile TV is still to be found. Research by, for instance, Karhu (2007) also suggests that the actors involved in mobile TV have been searching for roles since the beginning of the project.

Mobile TV content

A prerequisite for attractive mobile TV services is content and good content providers are hard to find. YLE, MTV and Nelonen are the three Finnish content providers that are considered the most important actors when planning an attractive commercial mobile TV service from the end-user perspective (e.g. Informant Y25), since they are the most popular channels in traditional TV. Media companies thus see themselves as natural members of the mobile TV initiative. For instance, MTV has expressed that in the beginning of mobile TV the company is comfortable with the idea of the mobile operators taking care of billing, interactive services and provides call centre support. In the long run MTV wishes that end-users would feel themselves as customers of MTV and that services and specific channel packages can be e.g. downloaded directly from MTV's home page. MTV stresses that in this model the mobile operators do not alone "own" the end-users (Lehto, 2005). It has frequently been mentioned by informants that the goal of all actors involved in mobile TV is to "own the end-user" and that it is very likely that the media companies, i.e. content providers, will try to circumscribe the mobile operators in order to reach the end-users and establish direct contact. For instance MTV, which is a commercial channel, is currently a pure B2B actor and has little contact with end-users. MTV could take a role as a B2C actor, where it would offer mobile TV content

directly to end-users (e.g. end-users download and/or purchase content from MTV's Internet site) and possibly ignore revenue sharing relationships with mobile operators. However, such a strategy would become expensive if MTV were to bill the end-users directly, since MTV does not have the required billing mechanisms and end-user information. Building such systems is mentioned by most informants as very expensive and time-consuming.

Also other actors such as telecom operators had some attempts to develop content formats for mobile TV, but they gave up after facing problems with television licenses and content rights (e.g. Elisa). At the moment the actors are not themselves announcing any new mobile TV services and content developers are scarce. Rather, Forum Virium has initiated an extended cooperation with research groups and institutes in Finnish universities and universities of applied sciences/polytechnics in order to create innovative ideas and concepts for mobile TV. Informant X14 notes that the current business net setup means that as long as only the big media companies MTV, YLE and Nelonen are taking part in the planning of mobile TV, the customers will have to wait for innovative services. The actors simply do not know who will create new content, such as interactive services:

> "*Now when we are pushing out standard TV programs it means that only the old players have sat around a table and Nokia has driven this and it is in the equipment provider's interest that the terminal sells*" (Informant X14)

Mobile TV business model

Mobile TV is said to offer content producers a "new way of producing content" (Digita, 5.3.2007). According to Digita, the DVB-H technology complements mobile TV services transmitted via 3G. 3G fit transmission of content based on on-demand rather than mass transmission of TV and radio content, which, on the other hand, the DVB-H technology is designed for.

> "*DVB-H broadcasting is a very interesting thing because we sort of have a new type of pattern as it is not broadcasting and it is not this kind of two-way communication, but a clear mix of these. So we do not have a clear business model. Nobody in the world has since it does not function yet. This is an example that you have to be able to cooperate a lot in order for the market to take form.*" (Informant X32)

There are several studies conducted on potential business models for mobile TV (cf. Arjona, 2005; Autio, 2007a; Karhu, 2007; Björk, 2007). Nokia, for instance, perceives three potential business models, namely (1) a wholesaler driven business model, (2) a mobile operator driven business model and (3) a broadcaster driven business model. All business models have the main aim of "owning" the end-user, i.e. establishing direct contact and revenue flow relationship. The informants in this study do not, however, see a clear business model for mobile TV in Finland yet. Potential business models have been discussed and speculated, but how the business model will function in practice is still a mystery to several informants. Jungner (2007) suggests a mobile TV business model based on a value network model (see figure 29).

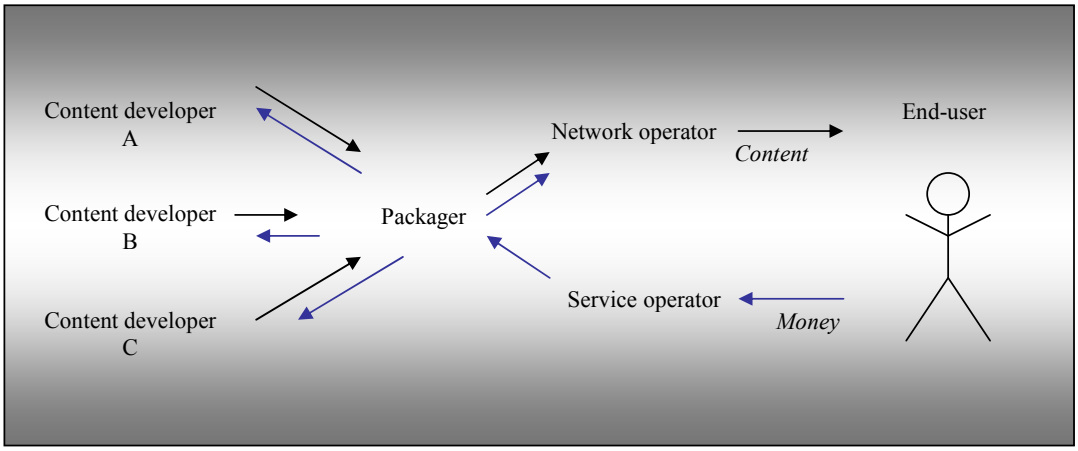

Figure 29. Earning logics and potential business model for mobile TV (modified from Jungner, 2007)

Mobile TV content rights

> "*It might weaken convergence. If you have once paid, then you have paid.*" (Informant X35)

Potential barriers for the commercialization of mobile TV services can be found in the area of copy rights and content rights. McQueen and Reid (2005) assert the importance of content rights and digital rights management as important concepts in the mobile TV service and digital service delivery arena. Content rights may be limited to a geographical area, time (e.g. a specific number of days or a certain duration period), distribution mechanism (e.g. DVB-T, satellite), business model (e.g. free-to-air, pay TV) and terminal (e.g. TV, PC, mobile phone). The owner of content rights is rarely a single party; the owner may be a combination of many parties such as actors, writers, music producers, organizations etc. A number of actors thus become important for mobile TV in Finland and have an influencing factor, namely (1) Gramex, the copyright society which operates as co-operation link between the users of recorded music and performing artist and producers, who make recorded music, (2) Teosto, Finnish composers' copyright society and (3) Kopiosto, an organization monitoring copying, i.e. reproduction rights.

After the DVB-H network was opened for commercial use in December 2006, a feud arose concerning content rights in the mobile TV area, or specifically the DVB-H network. MINTC interpreted the situation in such a way that if broadcasting in the DVB-H network would take place simultaneously with broadcasting in the DVB-T, analogue and cable broadcasting networks and that no additional content rights were to be required from the media companies since they had already compensated for obtaining content rights. DVB-H broadcasting would then be considered the same as the original DVB-T broadcasting. For instance, YLE, Nelonen and MTV could then broadcast the same programs in DVB-T and DVB-H without having to pay an additional content right fee. However, Gramex and Teosto as well as the Ministry of Education opposed this view by stating that the interpretation made by MINTC is incorrect. From a content production and content owner point of view, DVB-H broadcasting is a

separate transmission network from DVB-T, cable and analog broadcasting. Therefore, fees must be charged for the rights to content in the DVB-H network. One of the arguments was that if DVB-H broadcasting is aligned with DVB-T, the DVB-H network operator (Digita) would access content on behalf of players who own content rights.

Gramex has negotiated separately with media companies concerning this issue and for instance, in June 2007 Gramex and YLE agreed upon a contract, according to which YLE is allowed to start simulcast broadcasting in the DVB-H network. The basic point is that additional compensation for content rights will not be required as long as mobile TV does not affect the total amount of TV watchers. In general, the agreement is considered to be pioneering; on one hand Finland is the first country to experience these kinds of problems when establishing a mobile TV business area and on the other hand, YLE is the largest payer of content rights in Finland. YLE has at various points in time commented that if they must compensate content rights also for the DVB-H network, i.e. pay twice for the same content, they will withdraw from the mobile TV project (cf. Sajari, 2007). MTV and Nelonen came to agreements with Gramex earlier in 2007. Gramex, Teosto and Kopiosto are not striving at contracts with content owners based on turnover; if turnover increases so does the compensation for content rights. However, MTV comments that mobile TV based on the DVB-H network is merely "one distribution channel among others and it will hardly increase turnover in many years" (Poutanen, 2007). Teosto has reached an agreement with Nelonen (May 2007) concerning the distribution of content in the DVB-H and UMTS networks. The agreement is based on turnover, not for instance on the length of the broadcasted program, which Teosto initially demanded. At the same time the CEO of Nelonen commented that mobile TV based on DVB-H does not at the time generate any kind of revenues, but the pressure to get mobile TV running was strong from he equipment manufacturers' and mobile operators' sides. During testing periods, neither Digita nor Teosto will charge broadcasting. MTV and YLE are in the moment of writing negotiating with Teosto. Kopiosto acknowledges the challenges new technology brings in terms of licensing agreements and comments mobile TV in its yearbook 2004 in the following way:

> "*Kopiosto collaborated with several partners to develop new licensing systems for distributing television broadcasts. In autumn 2004, Kopiosto, on behalf of both Kopiosto and Teosto, negotiated and granted a test license to Nokia to bring the German VIVA Plus TV channel to mobile devices based on DVB-H (Digital Video Broadcasting - Handheld) standard. This was one of the first mobile TV pilots in the world.*"

8.5 Business net analysis

In the following section the actors involved in mobile TV will be analyzed. Their roles and positions will furthermore be discussed in terms of how the business net is being formed and organized.

Nokia started lobbying for the DVB-H technology during the century shift and managed to get a number of other handset manufacturers and developers behind the technology. After a number of players were involved on a global level Nokia continued the development by initiating tests and trials on national levels. In order to test the technology in its terminals a number of Finnish players were contacted in 2003. These were media and telecommunications

actors. Nokia thus initiated relationships with actors who possessed the technical resources, i.e. telecommunications companies Elisa and Sonera, and actors who possessed content resources, i.e. media companies YLE, MTV and Nelonen. The seventh member of the initiative was Digita, who distributes radio and television services and develops data communications networks and network infrastructure. When asked when other actors started participating in Nokia's mobile TV pilots, Informant X19 answers that they came along when Nokia needed new parties, but stresses that the regulator and MINTC play large roles in defining the environment for acting. Informant X19 does not consider the other actor's roles as "that important", but on the other hand, the fact that Nokia cannot alone and in isolation create a new market is acknowledged:

> "*You see, mobile TV does not take off through regulation; regulation does not come until Nokia has presented such a mobile TV idea and built a certain technology behind the idea. In cooperation with others of course; Nokia does not do this by itself, nobody can do this alone anymore*" (Informant X11)

Informant X27 views mobile TV as a special case where the aim is to create a new business area. It is in the best interest of everybody that one participates in a common project. Mobile TV requires terminals, network and content, referring to the 3Cs: content, connection and consumption device, which is vital for any service or product to function. In the initial stages of business activity it has to be decided how things will be done. Partnerships are thus needed when a new business area is set up (e.g. Informant X27).

> "*Mobile TV it is about trying to launch a new product on the market. And it is efficient to do it together instead of everybody doing it alone [...], then there will be no competition based on the product. Instead the purpose is later on that everybody offers what ever they like and at whatever price they wish*" (Informant R37)

> "*No firm can do this alone. We partnered in the beginning in order to inspire other handset manufacturers, broadcasters and operators. [...] We managed to establish a number of project groups within the operators and in the beginning we got other handset manufacturers excited"* (Informant X28)

Several informants (e.g. X17, X28, and X38) mention the fact that the cooperation will cease after a commercial market has been created. The commercial market had not been established at the end of year 2007, but the third pilot project aimed at attracting new members of the mobile TV project.

> "*We should invent something, when television is with you in your pocket, now there is an opportunity to create interactive camera and build such an element and format that contains something else [...] nobody has thought about this and we don't know who could think about it. Should we go and talk to some creative producer in order to create a micro TV production company or someone else who makes funny sketches or something else. Now when we are pushing out standard TV programs it means that only the old players have sat around a table and Nokia has driven this and it is in the equipment provider's interest that the terminal sells.*" (Informant X14)

"*Now we are in discussion with the city of Helsinki, so the city could be one service operator. Or Kesko*[9]*. They could apply for a Kesko channel. It enables more exactly this type of convergence that you don't have to go under Sonera ['s brand]. If you're making a bank, then would Nordea want to always be a secondary brand? Nordea is not visible in the telecom environment, but in mobile TV they could be if they wanted to.*" (Informant Y33)

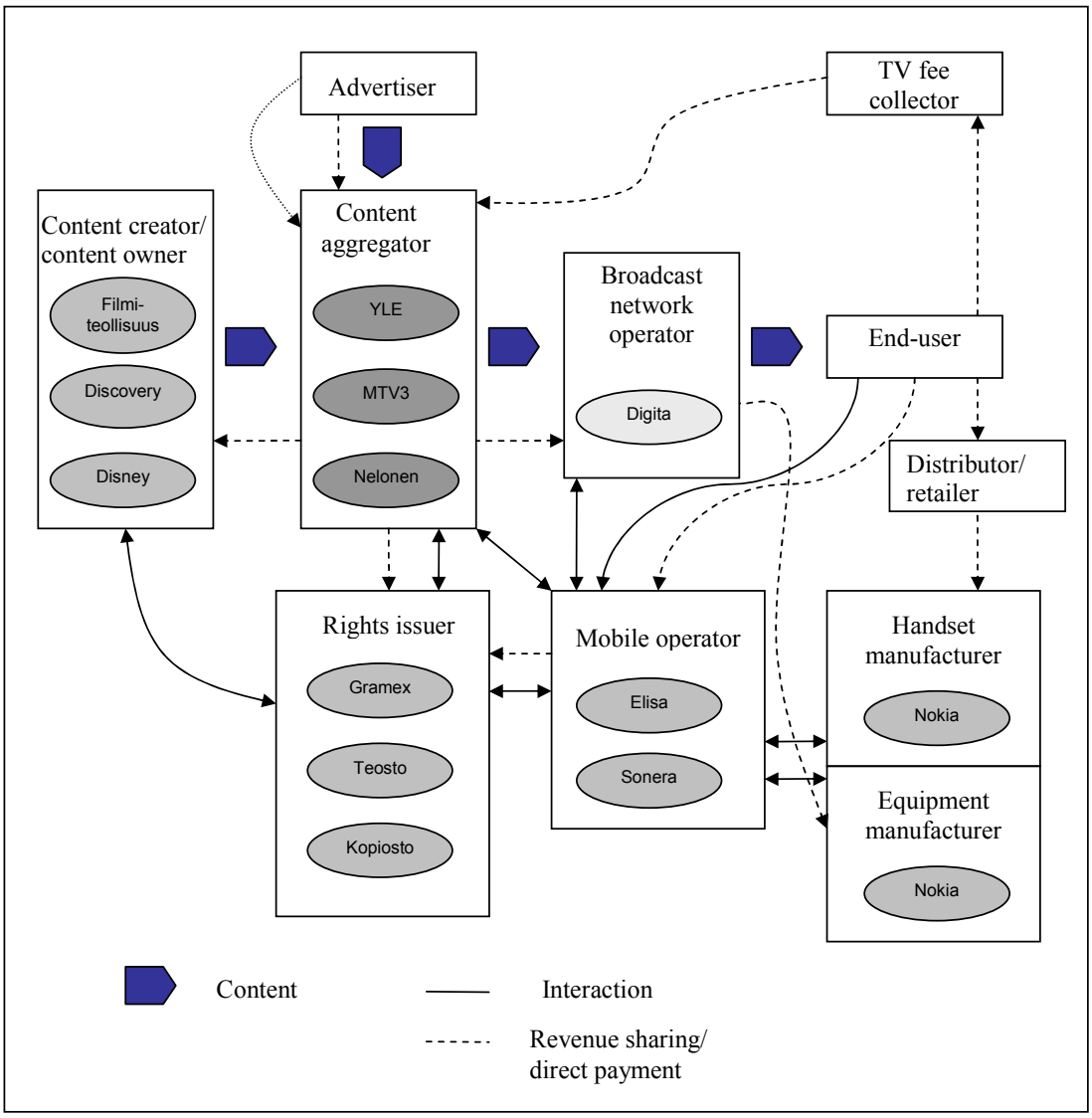

Figure 30. Mobile TV business model (modified from Autio, 2007b)

[9] Kesko is a retailer specialist in the Nordic and Baltic countries, as well as in Russia.

The informants acknowledge the fact that content creators and service providers are needed if mobile TV is to take off as a functioning service market. Therefore, the converged service mobile TV will in the future lead to new actors entering the market and business nets and networks, if the visions of the informants (e.g. Y33) and mobile TV project participants (cf. Seppänen, 2007) come true. Thus, the case actors are (1) focal actors, (2) supporting actors and (3) an idea of future, potential actors in the form of content and service providers for mobile TV specifically. Figure 30 can be viewed as a possible business model or value network picture, indicating which actors are interacting with whom. In the case, the most sough position within the business net is that of possessing contact to end-users, i.e. the right side of figure 30.

8.5.1 Critical events in business net emergence

Mobile TV has a long history, but is yet taking early steps in terms of reaching a market for mobile TV services. Nevertheless, a number of critical events in the development so far and in terms of business net dynamics may be identified. Critical events can be recognized at the (1) technology level, (2) business net level and (3) institutional level.

In terms of technology, a critical event in the development towards mobile TV was the creation of the DVB-H technology. The technology has many advantages concerning frame relay and battery life and makes mobile TV a functioning concept. The fact still remains that Nokia had to engage a number of other actors in order to test the technology further, i.e. whether there is a demand for mobile TV services and how well the technology functions. The fact that the DVB-T network was being digitalized in quite a fast pace in Finland (Finland switched to DVB-T in August 2007) freed a number of multiplexes, which could then be used for mobile TV. This is also an important and critical event, which has affected the deployment of the DVB-H network (Informant X12). Digitization of TV thus led to a faster development of mobile TV based on DVB-H in Finland.

> "*However, it must be kept in mind that Nokia strives for global markets rather than national and local markets. Nokia had to form partnerships with other large equipment and terminal manufacturers concerning the use of DVB-H in order set fire among telecommunications operators and broadcasters*" (Informant X28).

The single most critical event which has occurred in the mobile TV business net is the fact that Nokia has shifted focus from national to global markets and chosen to engage less in the Finnish mobile TV business net. This has led to Elisa taking a leading role together with Forum Virium, in developing mobile TV. The fact that a shift of power in the business net has occurred does not originate from a relationship level, but rather from one single actor, who chose not to keep playing the role of driver. On one side, the event led to power becoming more equally distributed among business net members, but on the other hand, if Elisa would not have stepped up and *taken* a leading role, nobody knows what the mobile TV business net would be today, how strong relationships between parties would be and how much developmental work would be executed by the net members. Research on the emergence of mobile TV from a service innovation perspective (Karhu, 2007) argues that after the second pilot (FinPilot I) the participants agreed that another actor should replace Nokia as the leader and driver of mobile TV. However, at the time there was no single strong mobile operator who

could play that particular role. Karhu does not elaborate further in terms of motivating the argument or referring to any particular informants.

On the institutional level, content right issues have threatened the mobile TV project in terms of media companies becoming tired of negotiating about compensation for content rights, which they already own. The fact that most of the media companies and the rights issuers have reached agreements, signals that the actors believe DVB-H is a viable distribution channel for content in digital form. All copy right and content right issues have not yet been resolved, but it is important to recognize the power of the actors from an institutional level (Gramex, Kopiosto and Teosto); both in terms of the success of mobile TV and the functioning of the mobile TV business net. The threats and reasons for business net dynamics are originated in the external environment rather than from within the business net and the relationship levels.

> "*[…] this is an example that traditional players cooperate as a cluster and all sit at the same table and everybody's role [in mobile TV] is sort of defined. The most important part is perhaps the content which is hard to find. Elisa had some small attempts to do formats, but then these television license things. They have tried to make room for this there [in regulation]*" (Informant X14)

The critical events in the case study can be divided into inhibiting and enabling events as well as internal and external events in the business net (see table 28). Inhibiting events can be found in the dispute over content rights. Enabling events can be found on the technological level, i.e. the development of the DVB-H technology and digitization as a means to transmit content in digital format. These events are external to the business net, while internal events show the dynamics of business nets. The roles of focal actors have shifted, and thus caused change to the focal net; Nokia's role as a driving force diminished, only to be overtaken by Forum Virium and Elisa. Also, the search for content providers and developers implies open business net boundaries – the focal net actors are searching for appropriate resources in order to develop the mobile TV service market idea further.

Level	Critical events	Types of critical events
Technology	Creation of DVB-H technology Digitalization of analog TV	External, enabling External, enabling
Business net	Nokia's shift in focus to global markets Elisa taking a lead role	Internal Internal
Institutional	Content rights issues Rights issuers becoming influencing actors	External, prohibiting External, prohibiting

Table 28. Critical events in the mobile TV case

8.5.2 Role and position

Kivisaari and Luukkainen (2005) reckon that the biggest concern to mobile TV does not lie in the technical solutions but, rather, in the roles of and relationships between the different companies that participate in creating the business ecosystem around mobile TV. Mobile operators' roles in mobile TV are twofold when it comes to providing services. Firstly, there will be free services such as TV transmissions, where the role of the operator is questioned by many parties, as the TV transmissions are accessible without a mobile operator. Secondly, a service developer may offer paid services, such as a package of content, for 4.99€/month,

which the end-user pays via SMS or GPRS transactions. Mobile operators thus cash a percentage of that fee and the content creator receives the rest of the fee. Revenue sharing becomes an issue and gives a role for mobile operators as banks (Informant X28) as the most important revenue from mobile TV is viewers' monthly fees and service fees (Lehto, 2005). Informant X12, on the other hand, notes that the roles of the actors are fixed in the non-commercial stage of the mobile TV project, but not for the commercial stage. In terms of role taking and role giving, Informant Y30 mentions that none of the seven actors involved in mobile TV have deliberately tried to alter the value chain and thus the roles of the actors has not changed dramatically, which also explains why the cooperation runs smoothly. At the same time the actors are seeking roles in the commercial stage of the mobile TV project, which are currently unclear. As long as the role in the commercial stage has not been articulated, all actors are forced to cooperate (Informant Y33). For instance, Digita, who was awarded a license to operate the DVB-H network now sees its commercial role and can act based on that position, e.g. attracting other actors to take new types of roles such as content providers or content packagers (Informant Y33).

> "*As long as the roles are not defined, everybody has to be with everybody because you don't know what their role is. We [Digita] know our role. It is easy for us to talk and search other actors for other roles*"

Digita thus became a network operator responsible for the broadcasting network and administration of channels. According to Digita, their role is "to be the network operator and offer capacity and services of the network to all service providers under equal, fair, and transparent terms" (Nokia, 2006). Digita is responsible for the technical planning and execution, maintenance and operations of the DVB-H network. Telemast Nordic, Sonera and Elisa also applied for the license, which can be seen as competition over power and control. If Sonera or Elisa would have received the license to build and operate the DVB-H network, there would have been a significant risk that any service provider that would want to offer mobile TV services in a mobile operator's DVB-H network would have to do so under e.g. Sonera's brand. Thus the service provider's own brand might be left in the shadow. MINTC chose a neutral actor for deploying the DVB-H network for a reason; it wanted to prevent mobile operators from becoming too powerful actors in the mobile TV business area. Digita offers the network capacity and aims at being a neutral partner attracting a large number of service providers that sell their services under their own brands. Digita has thus taken a risk, since it has to invest millions of euros in building the DVB-H network. Informant X38 speculates that if a mobile operator would have been awarded the license, Digita would still have had some role in building the network due to the fact that Digita possesses the competence, resources and knowledge to do so. However, in such a case Digita would have acted in the role of subcontractor to the mobile operator holding the license. The mobile operator would in this case have shared the risk of investment with Digita. A workgroup appointed by MINTC estimated that the investments required for building the DVB-H network would be between 60 and 70 million euro. Building a GSM network would cost approximately double the amount. In addition, maintenance and management of the DVB-H network was estimated to cost an additional 15-20 million euro (MINTC, 2003). In the first announcements concerning the cooperation agreement for the mobile TV pilot, the "business set-up" for the pilot was referred to as "a world class example of cooperation between telecommunications and media industry" and furthermore articulated as follows (Finnish Mobile TV, 2003):

> *"TeliaSonera Finland and Radiolinja [will provide] access for the protected TV-like services to the end-users. MTV, Nelonen and YLE will produce the content available for the pilot users. Digita will operate the IPDC service system and network. In this role it will manage the services and broadcast them on-air. Nokia will provide the IPDC specific equipment such as the terminals, which enable the devices to receive the broadcast signal."*

In 2005, announcements on the pilot project were articulated in the following way:

> *"Elisa and Sonera are responsible for customer service, invoicing and connections to the new interactive supplementary services. Digita has designed and built the digital TV network needed for the distribution of mobile TV services and will manage the network, while Nokia will develop the mobile TV service management and smartphones that can receive mobile TV broadcasts."*

In a study conducted by Södergård (2003a, p. 88) expert interviews revealed e.g. that all the actors in the business net will try to make "their piece of the cake" bigger compared to their current size and broaden their field of expertise to include non-traditional core functions. Södergård thus draws the conclusion that the actors in the business net might take on other actors' roles. Södergård also found that if there are to be conflicts between the actors in the mobile TV business net, they will most likely concern frequencies and distribution networks.

> "*This [mobile TV] will not create such a situation that someone would go and change the traditional value chain. If someone had found a suitable position - the telecom companies tried but couldn't really find a position - if they had found and it would have changed, it would have led to competition, but now the value chain sustains, we are content and the project carries on.*" (Informant Y30)

In the current business net set-up it is quite evident that Sonera and Elisa are direct competitors on one hand, and the three media companies or content providers MTV, Nelonen and YLE are competing with each other on the other hand. What is interesting in this context is the fact that a struggle for the end-users takes place between the mobile operators and the media companies/content providers. The role of the media companies as content providers has been established through the pilot studies, which show that the end-users want to watch the content provided by exactly these media companies. The mobile operators, on the other hand, are in a position where they control the contact interface to end-users and are equally important for the media companies if they wish to broadcast content through alternative media. The only neutral partner is Digita, with a return on investment in infrastructure in mind. If one takes a look at mobile TV transmitted via the 3G mobile network, the situation is different: mobile operators own the 3G mobile networks and media companies own the content. Mobile operators produce no or little content themselves and are thus dependent on the media companies in order to provide mobile TV services in the 3G mobile network. The media companies need access to the 3G mobile network. This means that mobile operators and media companies have agreed on exchanging resources and establishing a mutually beneficial relationship leading to a win-win situation for both parties. Concerning the DVB-H network the mobile operators and media companies stand in a direct buyer-seller relationship or, possibly, revenue sharing relationship.

Henders (1992) argues that a position cannot exist until it is created through the interaction between actors and their resources in networks. The mobile TV business net in Finland

illustrates the search for roles and positions in order to create a new business area; both the business net and the market are emerging. Through this process the roles and positions are being established. Even though roles were more or less predetermined based on the core competences that each actor possessed, they are far from being fixed. The real competition is still going on, i.e. the competition for the contacts to end-users. According to Bengtsson and Kock (2000), competitive relationships indicate that power and dependence is equally distributed among the competitors (actors) based on their positions in the business network. The goals of the actors are believed to be similar and can only be achieved through business (acquiring resources) with the same buyer. In this case, both mobile operators (if they wish to offer their own mobile TV services) and the media companies have to do business with Digita. The roles might be somewhat clear at this phase in the development process, but the positions in the net are not yet fully established. Positions are viewed as consequences of prior activities (cf. Johanson & Mattsson, 1985). Positions also reflect the cumulative nature of networks (cf. Forsgren et al., 1995) and balance between past and future (Easton, 1992). Future actors, such as new content developers, may change the set-up of the business net and affect the positions of existing business net members.

Figure 31 illustrates the relationships between the actors in the Finnish mobile TV business area. The seven main actors participating in test pilots were also included to the initiators of Forum Virium, which in turn has contacts with partnership organizations VTT, TEKES, SITRA and City of Helsinki. Dimes and RTT are the other two test forums for mobile TV in Finland. Content right organizations are Kopiosto, Teosto and Gramex. The types of relationships are divided into (1) buyer-seller, (2) R&D and development relationships, (3) revenue sharing relationships and (4) relationships based on funding or other interest ties. These were the most important ones according to the informants. The most common roles of the actors in the emergence and development of the mobile TV business area are separated bycolors and patterns. The same actor can possess a number of different roles, but these were the ones recognized as the most common among the main actors from the mobile TV net emergence and development point of view.

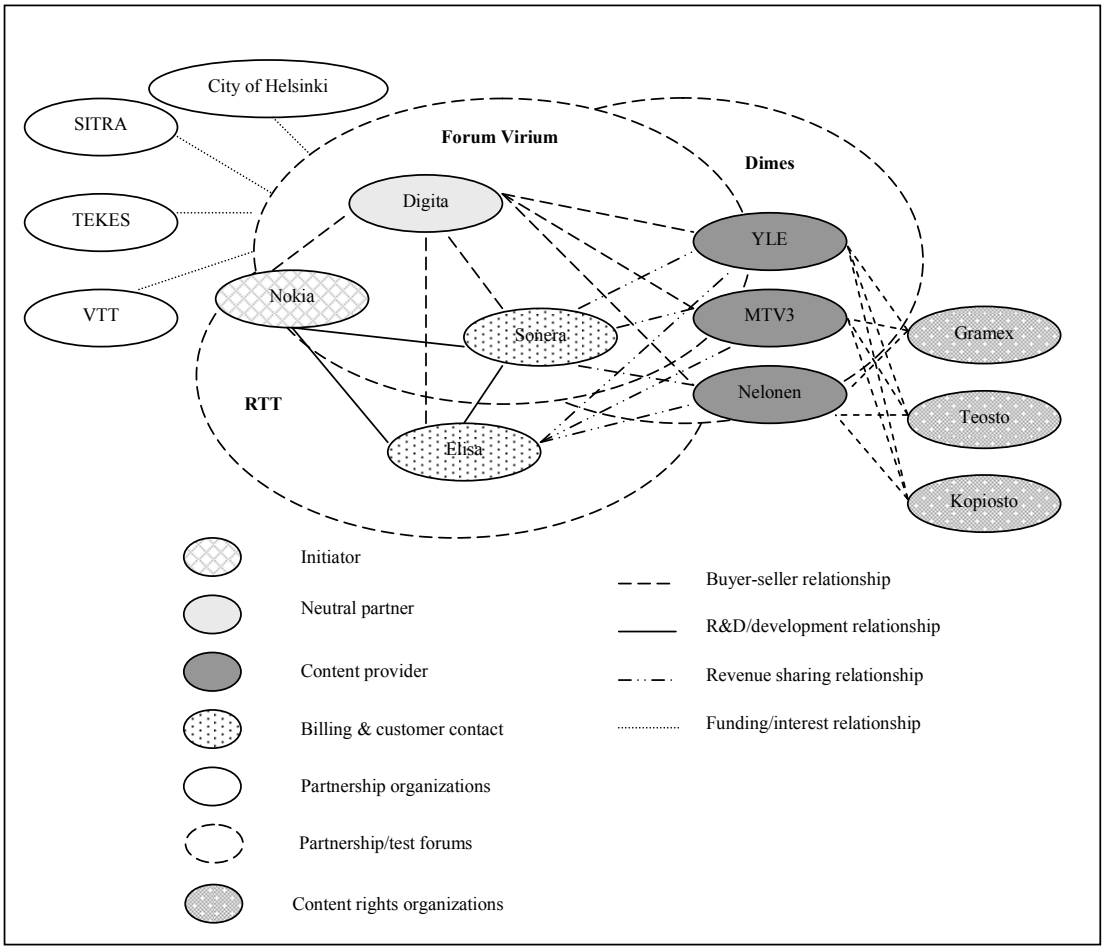

Figure 31. The focal actors' roles in mobile TV

Role as a consequence of position

Turner (1988) implies that actors' perceptions of themselves determine which roles they seek to play and how they will play them. Role-taking begins with the use of shared role-conceptions as the basis for inputting a role and it is only when the gestures of others do not seem to correspond to these more shared and standardized conceptions that actors begin to construct a situationally unique role for others (ibid., p. 86). In simple terms, role helps to describe how cooperating actors are expected to behave depending on their functions and tasks (cf. Jahnke et al., 2005). The structuralist approach implies a certain determinacy and stability in both role and social structure. The approach thus depicts that acted roles are based on position. Position determines which roles an actor is able to play. In terms of roles being based on position in the mobile TV case, it is clear that mobile operators' role is based on a core competence perspective, i.e. the operator's competence in handling end-user contacts, especially billing:

> "*What do we need telecom operators for? If you have a receiver in your terminal and TV comes from the skies, then what do you need the operator for? Only if you need to bill the customer. And then the telecom operator is a natural choice since it has the billing connection, needed information and the mechanism is already built.*" (Informant Y25)

> "*Mobile operators, their role is, like collecting money through the mobile devices. SMS is a secure method. The rest [service offerings] will be such that you pay a monthly fee for some package and if you are a customer of Sonera, Sonera will take a small part and somebody else will have a part and then the content creator."* (Informant X28)

> "*There are three parties. There is the telecom operator who controls the mobile phone side, but DVB-H is pure broadcasting. And the mobile devices as such can function without the telecom operator. And then there is some TV company[…] Digita's model is that they want money and content from the TV companies, but TV companies on the other hand are not keen on paying a lot more for distribution when they are already now paying a lot to Digita*" (Informant Y30)

The informants thus have a fixed picture of mobile operators' role in providing mobile TV services, namely based on the position as having contact to end-users. Mobile operators' roles in the mobile TV business net are thus based on their predetermined position. Elisa has taken a lead role in the mobile TV development, an event which could be labeled role-change according to Herrmann *et al*. (2004). However, Elisa has not given up other roles in order to be the driver of the development, and therefore Elisa has rather experienced role-making, but can also end up in a role-conflict due to its role as contact to end-user and role as a driver of the development within the mobile TV business net. Changing role also alters goals and self-conceptions of an actor. Mobile operators Elisa and Sonera have also launched mobile TV services in their 3G networks, which they own and operate themselves. Whether there exist any inter-role conflicts in this scenario, i.e. between offering mobile TV in both the 3G and the DVB-H network, remains to be seen and depends largely on how end-users will adopt mobile TV services (content preference in the form of simulcast programs or on-demand downloadable content, which can easily be accessed through the 3G network). The issue of capacity still remains – the 3G network has limited capacity, which may push end-users towards the DVB-H network in search of mobile TV services.

Nokia has given up its role as a driver and thus contributed to the dynamics in the mobile TV business net. Nokia's role has been redefined, initiated by the company itself since its focus is on global markets rather than national. Nokia's role as an equipment provider till remains.
Similarly, Digita found its role after it was given a position as the network infrastructure manager. As mentioned earlier, Digita's role became articulated clearly when Digita was awarded the DVB-H network license. Digita became a neutral partner who operates and maintains the infrastructure in the mobile TV business arena. Digita has established buyer-seller relationships with other B2B actors, among others Nokia and service providers from the media sector such as DigiPlus TV and SBS Finland. The media companies (YLE, Nelonen and MTV), however, are not acting based on their positions; they are seeking positions closer to the end-users through acting in roles.

Position as a consequence of role

Media companies have through the DVB-H network found a new platform to transmit content and through that strengthen their competence in a new area (cf. Vesaoja, 2005). They have thus been able to act in new roles and are using role-making as a strategy to create positions in an environment characterized by convergence. Baker and Faulkner (1991) argue that a role actually is a resource and a means to claim, bargain for, and gain membership and acceptance in a social community. The media companies are aware of the fact that they cannot be replaced in the business net and that their positions in mobile TV are strong:

> "*It is a bit hard to imagine the success of mobile TV if there is no YLE or MTV3. Okay, so there is some amount, but if you want it to really succeed […] YLE, MTV3 and, well, Nelonen, the three most important actors.*" (Informant Y25)

Roles under the "role as resource" perspective, are regarded as tools, which are "used in a competitive struggle to control other resources and establish social structures" (Callero, 1994, p. 230). The resource perspective is therefore concerned with *how* roles are used in order to establish structure. Roles are viewed as making action possible, and without the role, certain types of actions may not be possible (see section 4.4.4). It has been argued by many informants that the broadcasting and media industry is different from the telecommunications industry in terms of business models, ways of conduct, cooperation, culture etc. Media companies may not have the necessary competence to position themselves in the telecommunications field. Informant S39 points out that the revenue generating models differ for mobile and the Internet:

> *[…] they [TV companies] count on receiving return on content in mobile devices, which [users] are not ready to do on the Internet. One is used to services being free of charge [on the Internet], but when it comes to services in mobile devices, people are willing to pay. It is a different way of thinking there"*

Also, it is quite clear that the mobile TV project is not generating any revenues for the business net members at the moment, with the exception of Nokia; handsets are increasingly being equipped with DVB-H. Nokia's world market share of sold mobile handsets is increasing year by year.

Roles and positions in the mobile TV business net

The mobile TV business net is special in the sense that not all actors have found their roles or positions in the emerging business net. This stage of net formation is therefore characterized by a search for roles and/or positions: in this case certain actors search roles based on their positions whereas other actors search positions through acting in roles. Table 29 summarizes the actors involved in the mobile TV business net, starting with the focal actors but also presenting supporting actors and their roles in the three pilots (stages). A line indicates that the actor has no role at all in the concerned pilot. Compared to Montalvo *et al*. (2004), the content providers (media companies) in this case are focal (structural) actors rather than supporting actors, which can be easily substituted. Without the media companies, mobile TV would risk failure. The mobile TV case implies high interdependence (Ford & Håkansson, 2006); it is only through interaction that the net members are able to transform resources into value and/or capabilities.

Actor	Pilot I	Pilot II	Pilot III
Nokia	Observer	Driver of business net Handset provider	Handset provider (B2C) DVB-H platform provider (B2B)
Digita	Observer	Infrastructure provider	Infrastructure provider Neutral partner
Sonera	Customer access	Customer access Billing	Customer access Billing
Elisa	Customer access	Customer access Billing	Customer access Billing Driver
MTV3	Content provider	Content provider	Content provider
Nelonen	Content provider	Content provider	Content provider
YLE	Content provider	Content provider	Content provider
VTT	Driver	-	Test network provider
RTT	Technology developer	Technology developer	Technology developer
Dimes	-	-	Resource pool
Forum Virium	-	-	Driver
Malibu Telecom	n.a.	-	-
Compaq	Handset provider	-	-
Tekes	Funding	Funding	Funding
Gramex	-	Content right manager	Content right manager Inhibitor
Teosto	-	Content right manager	Content right manager Inhibitor
Kopiosto	-	Content right manager	Content right manager Inhibitor
MINTC	-	-	-
Ficora	-	-	-
Universities, polytechnics	Evaluator Developer	-	Developer Service creator

Table 29. Roles in mobile TV phases

8.6 Convergence process analysis

Convergence has earlier been defined as a process, which starts on a technological or technical level and possibly leads to industry convergence and the merger of markets, creation of sub-markets, entrance of new actors etc. In the mobile TV case, one can in a concrete way see the convergence on a technical level, i.e. the mobile handset has been equipped with the ability to receive digital content in the form of broadcasting. The point of convergence is indeed the mobile phone or mobile handset (see figure 32).

> "*[…] that terminal equipment is converging in that end, that this mobile TV is perhaps the premier example of terminal convergence.*" (Informant Y18)

> "*[…] mobile TV can be offered also based on IP within WLAN areas, so there is kind of all elements of convergence in their places.*" (Informant X11)

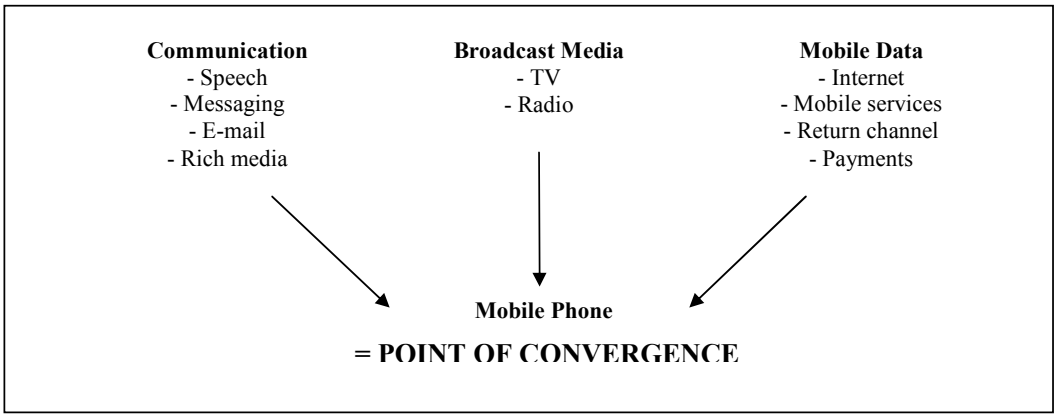

Figure 32. Mobile phone as the point of convergence (modified from Kivisaari & Luukkainen, 2005, p. 1)

The convergence process as such *after* the technical level is in its beginning, but a number of important implications can be derived from this case. The fact that TV and the mobile phone have converged on a technical level has led to the establishment of a new business area or market. Furthermore, new markets lead to the entrance of new actors, possible leading to increased competition. This view also exists in current convergence related theories, e.g. Borés *et al*. (2003) and Stieglitz (2003). However, this can not be achieved by one actor alone – the convergence process requires cooperation between participating actors. The importance of business nets and networks in the Finnish telecommunications sector is thus increasing. The idea of cooperation is quite revolutionary compared to the early days of mobile telecommunications, but most informants acknowledge the fact that an actor cannot survive without good relationships to other actors. The level of cooperation should be increased. The relationships that are being formed are not necessary buyer-seller types of relationships. Rather they are based on reaching a mutual goal, such as technology development or business area/market creation. The relationships may also be more short-termed than long-termed, since they are created for a purpose and when that purpose is reached, there might not be a reason to carry on the relationship. The relationship then dissolves or becomes dormant only to be activated later, when a need to do so arises.

> "*This is what [convergence] means in practice; that we are all soon at the same table, traditional news paper actors, operators and equipment manufacturers, not to mention independent service providers. Or the state, that also plans to get a piece.*" (Informant X19)

> "*And if you think about convergence markets, it is a nice situation where indeed large media houses and the operator field and also a few independent service provides are engaged in these common, these Dimes or mobile TV or whatever. They are all participating.*" (Informant X19)

Informant X19 comments the relation between convergence and mobile TV by stating that the mobile TV project is an example of how telecommunications, media and IT actors will have to cooperate in the future and that it is not sufficient to only monitor other actors (competitors)

within the own industry – competitors and partners are increasingly coming from adjacent industries.

> "*If we look at the whole market, it is exactly convergence which gradually has brought new [actors] all the time. 10 years ago it was indifferent to us [telecom] what mass media was up to. Now we are in the situation where they are our central partners.*" (Informant X19)

> "*You can say that this is for the first time such a business environment where genuinely telcos and media companies are together. It is the first network- and service environment where both are sort of searching for roles.*" (Informant Y33)

One of the issues raised in convergence related theories is the increased number of consolidations, both within industry borders, i.e. mergers of companies with similar core competencies (such as Telia and Sonera), and across industry borders, i.e. mergers of companies with dissimilar core competencies (such as Time Warner and AOL). The informants do not however believe there will be consolidations of the latter type, due to the differences in cultures:

> "*[…] that SanomaWSOY and TeliaSonera would merge. I do not know if there is any use in it. Different management styles, different cultures.*" (Informant Y34)

The convergence process in mobile TV has taken place on a technological level and is now moving along towards the creation of new markets. It is noteworthy that the actors themselves are the ones leading the convergence process at all stages, i.e. convergence was not discovered by mistake by some engineer at Nokia – convergence in the mobile TV case was created through intentional and focused work carried out by a number of people at e.g. Nokia. The convergence process is thus being led by a number of actors, or rather, a business net consisting of actors from two different industries, media and telecommunications. The business net is searching for additional members, who would take on roles as content providers and through these actions new entrants are allowed to take part in (1) the convergence process and (2) the business net development process.

Figure 33 presents the convergence process in the mobile TV case. Firstly, convergence took place on a technological and technical level, enabling features from separate industries to merge into one device, the mobile phone. The technological convergence process started with Nokia's launch of the MediaScreen service. Then the development around IPDC and finally the creation of a separate broadcasting technology specially designed for enabling mobile devices to receive broadcasting signals. As the technological convergence process was reaching its end, the main driver of this particular convergence process, Nokia, activated a number of actors from different industry areas with the aim of forming cooperation around creating a new market area for mobile TV services. A business net was formed consisting of relationships between net members, who were activated through cooperative projects etc. The main point for Nokia was that it could not carry out the developmental work by itself, but had to find partners with specific core competencies, which were needed in order to make the market for mobile TV service function. The needed partners were content developers and owners, network operator for the DVB-H infrastructure as well as actors who have contact with the end-users. Nokia chose partners based on core competences, but did perhaps not take

into account that these actors will eventually try to make the most out of their part in the project, such as media companies thinking about overriding mobile operators in search for a position as a B2C actor. The dynamics in the case business net has much to do with the wish to *own* the end-user or the paying customer. Mobile operators, on the other hand, search for business models where e.g. their investments in the 3G networks would pay themselves back if the 3G network is used for interactive services in combination with mobile TV services. Business net role and position seeking becomes an important strategy in the fight for revenues and return on investments. The convergence process therefore leads to a search for roles and positions as new innovative services and products are likely outcomes of the convergence process on a technological level. In the case, the aim is to create new market areas, a convergence consequence which is supported by previous research (cf. Fai and von Tunzelmann, 2001). The convergence process thus has several dimensions, i.e. (1) a technological, (2) a market oriented one and (3) implications for actors in business nets in terms of role and position seeking. A fourth dimension can be recognized in (4) divergence. By divergence is meant the increasing amount of mobile devices (laptops, PDAs, mobile phones etc.) by which end-users can be reached. Broadcasting programs can now reach end-users via traditional TV (cable, analog, digital), PC (IPTV or TV via broadband) and mobile devices. Mobile operators have a strong position in the IPTV market since the network operators own the infrastructure, whereas media companies' position is fixed in the traditional TV and mobile phone domain. Digita as a distributor plays an important role in both cases and the media companies are important customers of Digita.

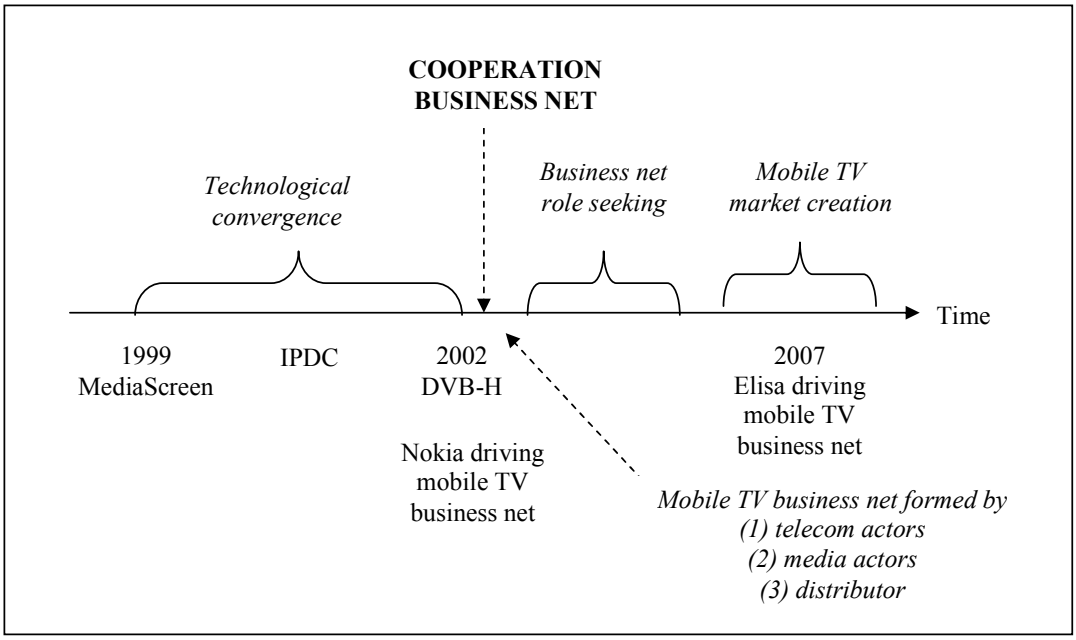

Figure 33. Time continuum of the case convergence process

The mobile TV case is also a unique example of telecommunications and media actors cooperating. However, cooperation between media and telecommunications actor is not without friction:

> *"[…] on the telecom side we have traditionally been taught that Europeans cooperate, but on the broadcasting side this approach does not exist. Depending on country [mobile TV] is regarded as a national project or as a European project."* (Informant X19)

Informants representing the telecommunications industry imply that cooperative patterns are more common in telecommunications than in media. It has also been noted that the two industries are different in terms of structure, ways of conduct, culture and aims, which makes it difficult to cooperate. The fact that technology develops fast and convergence processes occur interlinking the two industries makes actors watch their backs in terms of competitors or new actors taking over important functions of the companies' core business. The telecommunications actors, or rather the mobile operators, were for a short while worried when MTV entered the telecom market in the role as an operator (see section 7.5). In the case of mobile TV, the friction stems from the fact that media companies view telecom actors as distribution channels rather than fully adequate partners. Telecom operators tend to view media companies as content creators even though MTV and Nelonen do not produce much of its content themselves (they acquire the rights to content produced by others). YLE is on the other hand the largest content producer in Finland.

Some other aspects of the convergence process may be identified in the mobile TV case as well. Previous chapters also imply that the brand becomes important in a converged environment:

> "*Why is a telecom operator interested in mobile TV if YLE operates its TV? We are coming to the land of two different operators, a telecom operator that provides calls and Internet connections and this broadcaster who provides video, possibly. Is the telecom operator the one who provides video or is the broadcaster the one who provides also calls? Whose brand will be visible? Such a question is also linked to convergence*". (Informant X17)

Within the case the actors are also trying to reach sufficient visibility of their own brands, i.e. co-branding has not become an alternative for the actors involved in mobile TV. Since no wide range of mobile TV services are available at the moment, it is hard to estimate the effect the convergence process and acting in business net has on branding related issues, such as whose brand will be visible for the end-users; is it the mobile operator's even though the content stems from e.g. the MTV3 national TV channel? The business models from a branding perspective are yet to be solved in mobile TV.

At the moment the convergence process in the mobile TV case is at the market creation stage. Regulatory questions have been posed; should the regulation for telecommunications and media services be amended in order to adapt to current technological and market changes? The mobile TV case may very well lead to a convergence process on a regulatory level, where the aim is to align the regulation for media, telecommunications and IT related issues. Divergence has already been mentioned and is an issue foremost for end-users, but also for actors in the case due to the increasing amount of distribution channels for broadcasting content. The mobile TV case also implies that new positions in the distribution channels are added due to convergence on a technological level, which leads to market creation. Digita is an example of an actor which has conquered a new position in the distribution channels for DVB-H based mobile TV

services. New actors have not appeared in this particular convergence process, but one must keep in mind that the convergence process is not at all over: the third pilot focused on interactive services and would like to see more content and service providers. New actors are sought after in order to create the market for mobile TV services, which *per se* will trigger a convergence process on the level of number of actors and lowering entry barriers, both to business nets and networks as well as distribution channels. New services (and possibly products) will most likely be the outcome of new actors entering the market, but the question remains: will mobile TV services be created independently of other actors or is more integrated cooperation patterns required also in the future of mobile TV? The actors are now convinced that the cooperation between the focal actors will reach an end as soon as the commercial market has been created. Elements of the relationships will remains, such as possible revenue sharing relationships, buyers-seller relationships and technology development relationships.

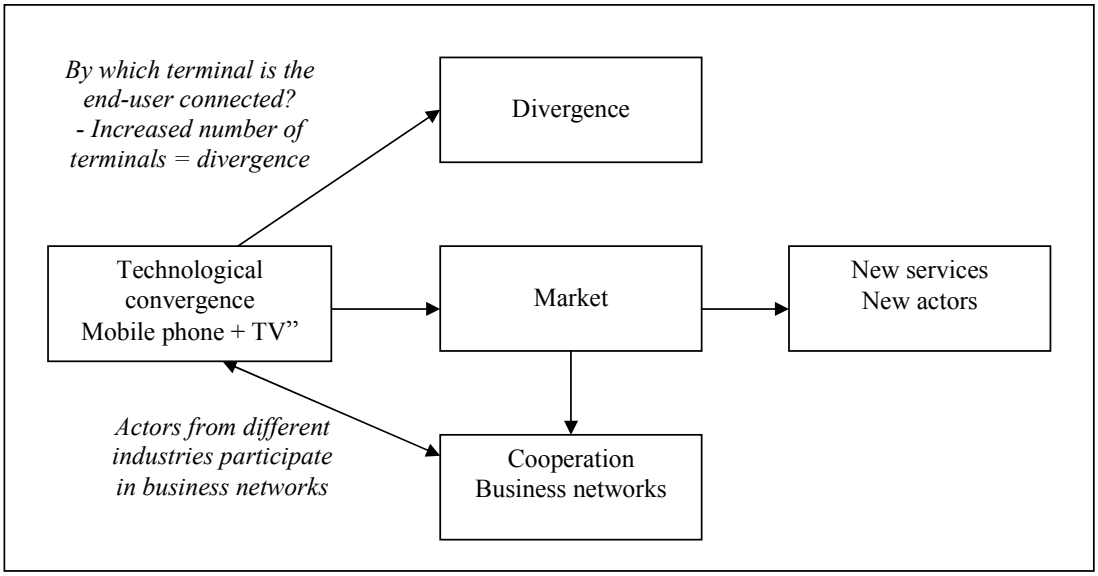

Figure 34. Convergence elements in mobile TV

8.7 Case implications and critical discussion

As the business net emerges, actors in the net are seeking the most lucrative positions and roles to act in when a commercial mobile TV service market is established. The fact that media companies see an opportunity to bypass mobile operators as the contact to end-users indicates a fight over power and control. All the focal net actors have a goal to “own” the end-users in the mobile TV business. The competition is at its most fierce between media companies and mobile operators. Several informants speculate about the fact that since the actors originate from different industry areas, they might have difficulties in finding a common language. They thus also have different views on the future positions within mobile TV business area. The fact that mobile operators are now driving the developmental work on mobile TV under the lead of Forum Virium and are encouraging service and content development may tell us that the mobile operators are establishing their position at the end-user interface further by becoming less dependent on the media companies, which currently

are the only content providers in mobile TV. The power of YLE, Nelonen and MTV will be diminished if alternative content providers appear and manage to offer services that align with the end-users' preferences. The position in the net is thus colored by a struggle over power and control over the actors and their resources. In the words of Skaates (2000, pp. 9-10):

> "*Within a given field there are power struggles, due to actors' desire to create distinction. Actors struggle to possess as large a portion of the qualities that other actors in the field view as desirable as possible*"

However, the struggle is not necessary of evil; Gadde *et al.* (2003) point out that the more the actors try to influence one another, the greater is the potential for development. The fact that actors try to influence and control each other constitutes the driving force for business net development and this may become beneficial for the market/business area creation process in general. Henders (1992) also notes that positions are constantly changing, which indicates that the business net developed around mobile TV is constantly changing and evolving – at least until its dispersion.

Nokia is not the only actor that is deliberately aiming at exiting the cooperative mobile TV business net when a functioning business area is established; also other net members see the net cooperation as temporary or on a project basis, where everybody is on their own as soon as a commercial market is up and running. The pre-commercial stage in the development of mobile TV is characterized by cooperative development projects and net formation whereas the commercial stage involves each actor offering their own services under their own brands. Also, after mobile TV is commercialized each actor may not have the resources to carry on the cooperative development within the net, since it becomes evident that resources need to be reallocated on producing and delivering competitive mobile TV services. Halinen and Tähtinen (1999) mention terminal relationships, where both actors prefer to operate independently or with someone else, but are not able to do so. Thus, dissolution of the relationship is desired and wanted. Duck (1981) (quoted in Halinen and Tähtinen, 1999) establishes the notion of episodic relationships. They are created for a certain purpose and/or time period and thus dissolve when they have served their purpose or the time period has elapsed. The relationships in the case net may be based on previous exchange relationships, but were established with a possibility of dissolution in mind. Only Digita has achieved a clear position where it can establish buyer-seller relationships with net members. However, even though the case has characteristics of project networks and discontinuous relationships, it does not imply that the relationships and links between net members will dissolve after the business area for mobile TV services has been created. The nature of a relationship may change or the relationship might become dormant only to be activated later. It is also possible that the cooperation activity is shifted to another level, but the data does not permit drawing conclusions on what happens after the commercial mobile TV services are launched. The case also shows an inner network horizon in the sense that the mobile TV business net has been a closed net during the first two phases or pilot projects. An exterior, supporting network (external network horizon) has however been present during the whole process, where supporting actors have found their roles, i.e. funding, technology development, user tests, equipment supply etc.

Net emergence is a process and in the case described in this thesis, it has a goal to establish a new business area, mobile TV. Network cooperation is therefore required in order to create

mobile TV business. The fact that mobile operators have taken on the role as drivers of mobile TV development gives them a position from where they are able to determine or at least guide the direction of the business area expansion. In this case, the mobile operators are leading the net towards the birth of new content providers and service developers. This occurs partly because only Elisa is able to invest in research and development of mobile TV at the moment, and partly because of the wish to diminish their dependence of media companies YLE, MTV and Nelonen. Also, change in the business net was initiated by Nokia's change in role and position rather than events taking place in relationships between Nokia and the rest of the net members. Also, external pressure has affected the net composition, e.g. convergence services require cooperation between media and telecom actors, thus predetermining the composition of the business net and required resources. Convergence requires firms to diversify into new markets (cf. Chesbrough & Teece, 1996). The process of convergence thus creates structure for the integrating areas or actors coming with different kinds of resources and capabilities. Giddens (1984) suggests that structures make social action possible. Simultaneously, the same social action creates those very structures.

The INA literature has not traditionally been concerned with establishment of a new business area, but the case indicates that it is possible through acting in and forming cooperative nets. As Möller and Svahn (2003) points out, this is especially true in technology dependent industries, where service development often stems from advances in technology. An actor in the role of an initiator in cooperative relationship and business net formation, as Nokia in the case, is required to determine which competencies, resources and actors are required in order to form an economically lucrative business model and cooperative nets, bearing the business development in mind. This notion is comparable to description of the pre-commercial phase of business net development suggested by Möller and Svahn (2003). Möller and Svahn (2003) point out that each actor has a specific view of the emerging opportunities which is based on his own specialization and technology base and a position in the network. The net position where an actor has control over the contacts to the end-users seems to be the most sought one in providing mobile TV services. For example MTV, as a commercial content provider, would like to secure its revenues with end-user contacts, since the income from advertising in mobile TV is still a question mark. MTV is currently relying heavily on B2B revenues in the form of advertisement. The lack of end-user information and billing addresses and mechanisms, however, makes this goal difficult and expensive to reach for a content provider.

> *"Well, everybody wants to own the end-users. And why have unnecessary middle hands? We have a limited market"* (Informant X38)

Möller and Svahn (2003) do not consider the surrounding context in their model of emerging networks. The mobile TV case shows that external factors influence the formation process and composition of the net. Firstly, issues related to copyright threaten to dissolve the mobile TV business net unless agreements are reached between all parties. Secondly, the net actors have to a large extent been determined by end-user preferences. The popularity of media companies as content providers cannot be neglected by other net members. The roles of media companies as content providers are required in order for the net to exist. For example, if a popular content such as MTV's is not shown in mobile TV, end-users have lower interest in starting to use mobile TV services. Thirdly, the context is determined by the current structure of the mobile communications market in Finland, which is characterized by low investments, a narrow range as well as low usage of existing mobile services and the incapability to carry out R&D in-

house and independently from other actors. Thus, the surrounding context puts pressure on actors to produce innovative services and boost the mobile communications market, but none of the actors are capable of reaching results on their own. Cooperative patterns are therefore required and nets/networks are established on purpose (cf. discussion on strategic nets by Möller and Svahn, 2003). Internal business net dynamics in terms of change in role and position is an influencing factor for net formation. The mobile TV case shows a struggle over roles and positions which link the actors closer to the end-customers. Actors are seeking their roles and position in relation to their existing capabilities as well as future capabilities (such as e.g. MTV being a B2C actor in the future, or mobile operators becoming content producers), a process which is not given deeper thought in the Möller and Svahn (2003) model of emerging networks.

The mobile TV business net in Finland can be characterized as a "project net" (see e.g. Eccles, 1981; Hellgren & Stjernberg, 1995; Ahola, 2005), short-termed and with the purpose of being dissolved, according to the informants, when a commercialized mobile TV business area has been reached. This view is opposite to prevailing research on business nets and networks, which emphasize long-term commitment. Cooperative relationships in project networks are established and maintained as long as the project has not reached a fully commercialized stage, i.e. a market for mobile TV has been established. Dissolution of the business net does not necessary mean termination of a relationship, but the nature of the relationship may change or the relationship might become dormant only to be activated later. Actors do not have resources for research and development, while focusing on production and distribution. As Möller and Svahn (2003) conclude, they have to be able to shift their emphasis from R&D to the creation of an efficient dissemination net. They must, however simultaneously maintain their R&D capability and be prepared to start new research projects. In this case, Forum Virium, Dimes and RTT are interest groups for technology R&D, which can be activated when resources for new research projects are needed. All of the actors in the mobile TV business net are members in these groups and thus pool their R&D resources together. Möller and Svahn (2003) do not take this kind of interest groups and project bound activities in consideration in their study, but the mobile TV case clearly shows that they have a considerable impact on new business net emergence and formation. Thus, the importance of other business nets for a focal net as well as the relation between them should be discussed and included in the network emergence model presented by Möller and Svahn.

8.8 Summary

Mobile TV services forms a new and emerging market. Mobile TV is *per se* an outcome of technological and functional convergence, i.e. TV broadcasting has been enabled in mobile handsets. Thus, a convergence process on a technical level as preceded mobile TV. However, as the case indicates, mobile TV would not be a reality today if it were not for the cooperation between a number of actors from different industries, namely telecommunications and media companies. Nokia acted as an initial driver of forming a business net in order to develop the DVB-H technology and test market demand. Sonera and Elisa became business net members due to them having established contact to end-users and functioning billing systems. The mobile operators' resource was thus their role at the end-user interface. In fact, the end-users represent the one and only sustainable revenue source for all market actors (cf. Pelkonen & Dholakia, 2003). Media companies YLE, MTV and Nelonen provided content, which is their core competence also in the media industry. These actors were thus chosen based on their

roles as content providers. Digita became the network operator through being awarded a license by the regulator. The question is whether entering into a collaborative partnership is the best way to implement the strategies of the organization, as they are currently understood and articulated. Since mobile TV is a converged service, new strategies are needed for operating in a converged environment. Mobile operators chose to act in roles based on their position which links them to end-users, whereas media companies seek to change positions through acting in roles. Their role in mobile TV is for now to provide content, but there is a will from media companies' sides to change position in the value network and take a step closer to the end-user interface. Through such an action, media companies would become less dependent on their B2B revenues and establish themselves as B2C actors as well.

9. FINDING A PLACE IN A CONVERGED ENVIRONMENT THROUGH ACTING IN BUSINESS NETS: CONCLUSIONS

The aim of the study was to explore the effects of convergence processes on business network dynamics in the Finnish telecommunications sector. This has been done by firsly mapping the change which has occurred in the Finnish telecommunications sector during 1985 and 2005, in order to understand how convergence and business nets fit into the picture. Then, convergence was analysed in detail, i.e. what it is and means for telecommunications, how is it perceived, triggered and which kind of influences does it have on industry actors and business nets. The theoretical framework consisted of two parts, namely (1) theories concerning industrial networks, with specific focus on role and position as measures of business net dynamics, and (2) a review of literature explaining and describing convergence. Data was gathered through secondary sources and in-depth interviews, following the principle of systematic combining. This form of abductive research allows for the simultaneous development of the theoretical and empirical parts of the study. After the pilot study, the theoretical framework was revised and the sub-cases were chosen at the end of the data gathering period. The telecommunications sector in Finland was initially chosen as the main case, in which three sub-cases were embedded, i.e. mobile TV, Aina Group and MTV3 Handy. Critical event analysis, historical reconstruction, sensemaking, and a processual view were used as methods in analysing the data, reporting the results and thus creating understanding of the phenomena studied. Content analysis of Finnish telecommunications actors' annual reports was also conducted as a step in revealing perceptions of convergence and its influence on the business environment. The following section summarizes the answers to each research question theme stated in chapter 1.

A. Which critical events can be identified in the industry change process in Finnish telecommunications during 1985-2005?

The Finnish telecommunications industry has gone through a change process from a duopoly situation (the PTT and the local telephone companies) to an actor landscape with three main actors, Sonera, Elisa and Finnet. Critical events in the development process have been identified as concerning (1) the competitor and actor landscape. The establishment of Datatie, Radiolinja, and DNA Finland were critical events in opening up competition and setting the stage for the telecommunications industry to develop. Establishing Datatie shaped the regulatory environment in such a way that Radiolinja was given a change to emerge as a competitor in mobile communications. The termination of cooperative patterns within the Finnet Group led to Elisa becoming an independent actor and the establishment of the third mobile operator, DNA Finland, which eventually triggered a price war. Also, the hype period (1998-2002) colored the industry by justifying investments of money in various projects; money which at the end was lost. Critical events concerning (2) technology were identified as digitization, the emergence of mobile technology and development of mobile device features and the Internet. Digitization allowed for technological breakthroughs such as ISDN, broadband, IP-networks etc. The development of mobile communications meant cannibalization of revenues for many fixed telecom actors. It also meant business opportunities for new actors such as Radiolinja. The emergence of the Internet is a critical event due to the fact that it connects the users and allows for convergence (e.g. VoIP). Critical events in (3) the regulatory environment are liberalization, EU legislation, the service operator model and number portability. Liberalization took place in Finnish telecommunications before

other European countries, which also has implications for the implementation of regulation and legislation derived from a EU level (which sometimes have been considered outdated or misplaced in the Finnish telecommunications setting).

In terms of cooperation between telecommunications actors, the interaction has been oriented towards cooperative relationships already since the NMT period. The actors have traditionally, however, been self-sufficient and carried out cooperation at a low level. The convergence process has on the other hand forced actors to join forces in business nets as it is clear that no actor can single-handedly e.g. create a new market around mobile services. A number of cooperative organizations have been formed mainly during the early 2000s, with the aim of linking resources and making them available to all actors within the ICT-cluster. The formation of such organizations signals that the industry actors, foremost in telecommunications and IT, see a benefit in forming pools of actors with various resources, as the convergence process on a technical/technological level increases in pace. Business networks according to the industrial network approach are hard to find in the telecommunications sector unless one looks at a specific technology development project. Cooperation between actors in the industry still take place mainly on a technological level, even though the mobile TV case is an example of a business net formed in order to create a market and test market demand for a specific service in cooperation with those actors who possess the needed resources and can successfully carry out the roles required to make the business net function.

B. What is the significance of convergence in the development of Finnish telecommunications?

Convergence from a theoretical perspective implies that convergence processes start at a technical/technological level and proceed to the convergence of industries. The convergence of the telecommunications, IT and media sectors has been a widely discussed topic since the late 1990s, but so far the process reaching converged industry areas remains a hypothetical issue. The use of convergence as a concept rarely distinguishes between convergence on a technological level and convergence on an industry level, which poses problems in terms of understanding the phenomenon. The Finnish telecommunications sector offers a suitable setting for studying convergence, its meaning and how it is understood as well as its implications on an industry, actor and business net level. In Finland, convergence is mainly understood as the transition from a PSTN to an IP-based infrastructure, i.e. convergence currently takes place on a technological level. Industry convergence is not believed to exist nor is it believed to be a final outcome of technological convergence. The fact that industry convergence is not perceived as being a likely result of technological convergence colors the perception of convergence today and affects the directions convergence may take in the future, which is part of a sensemaking process taking place within the telecommunications industry. The sensemaking process was initiated when actors started to question their own realities, roles and positions in future convergence colored business areas and markets (cf. the Aina Group case). Process *per se* creates structure (cf. Giddens, 1984), which denotes certain stability. The early days of convergence implied role seeking and role confusion, whereas the perceptions of convergence at the end of 2005 signified both suspense and acceptance of convergence, i.e. certain stability has been reached also in terms of roles of actors in the convergence process. Therefore, convergence in Finnish telecommunications can be defined as *a process by which telecommunications actors are forced to re-evaluate their roles and positions on a market and engage in cooperative business networks in order to access*

resources needed in a converged environment. Convergence means increased activity in forming and acting in business nets, specific consideration of roles and position therein and how changes in an actor's role and/or position affects the overall business net, focus on core competence and increased outsourcing activities, value chains deconstructing into value networks and an attempt to get close to the end-users, focus on brands and brand management as well as internal reorganizations in order to correspond with the end-users' exopectations of functioning products, services and solutions. The study also shows that divergence and convergence co-exist and co-develop. Convergence as such is driven by socio-economic and technical factors as well as organizations' (actors') actions and reactions in the industry. The mini-cases (Aina Group and MTV3 Handy) are examples of how actors in the industry have interpreted convergence and implemented it in their strategies. The mini-cases also show how actors focus on roles and positions, or also, how they might end up in an identity-crisis as a result of convergence thinking. Change in role and position is what initiates change processes in business nets and networks in the study.

C. How do convergence processes affect the roles and positions of actors in a specific business network in the Finnish telecommunications industry?

Role and position in business nets in the converged telecommunications setting are largely dependent on the actors themselves and the positions they possess. Some positions determine the roles an actor can perform, such as mobile operators taking care of billing and end-user contact in the mobile TV case, and some positions can be shaped and changed by acting in roles, such as the media companies in the mobile TV case, who are aiming at a stronger position in the business net. Business net members are chosen based on their resources and the roles they perform in the business network/net. The study also implies that business nets and networks are project-based. Roles and positions of actors may therefore vary according to the type of project and types of resources needed within the net. An actor may also actively seek an altered position in a business net or network through acting in new roles (such as MTV3 in the MTV3 Handy mini-case). Convergence implies that former and old roles as well as position in relation to other actors no longer apply. Due to the fact that actors form cooperative relationships with each other, subsequently roles and positions change as well. Outsourcing activities allow for new roles to be created and performed by actors within or close to the telecommunications industry. Focus on core competence and internal reorganizations allow for the articulation of a narrower role and/or position, thus also being able to communicate which specific resources an actor has that might be usedful to the functioning of a business net. The business net dynamics analysis carried out in the mobile TV case suggests that net members were chosen based on the resources they possess, or in other words the position they have. However, eventually net members seek to change the position they have in a business net by acting in alternative and/or new roles. The media companies in the mobile TV case aim at moving closer to the end-users and therefore cause dynamics in the business net. External factors, such as end-users, content rights actors and regulatory bodies delimit and broaden the actors' frameworks for action. The main external factor to contribute to business net dynamics is, nevertheless, the convergence process taking place on a technical level and how it is perceived by the individuals who make decisions within organizations.

9.1 Key theoretical contributions and findings

Perceptions of convergence by telecommunications practitioners indicate that a sensemaking process of convergence is taking place in the industry, which so far indicates that convergence

takes place on a technical/technological level in Finnish telecommunications. Industry convergence is considered to be less likely to occur. The implications of the convergence process include an increased engagement in business networks and nets by actors from the telecommunications, IT and media sectors. They cannot alone and single-handedly create new and innovative products, services and solutions, which also the mobile TV case stresses. Instead, a focus on core competencies is evident and executed through outsourcing activities, among other things. Internal reorganizations have been identified as a consequence of the changing business environment, both externally and internally, with the aim of being able to produce e.g. converged solutions. The corporate customers are reported to be the driving party of the convergence process on a technical and technological level. The brands are a concern, i.e. which brand will be visible for end-users of actors are forced to cooperate more than before. Furthermore, value chains change in a converged environment as new actors enter the game and old positions vanish due to actors becoming more specialized on their core competences. For instance, equipment manufacturers have taken over the maintenance and operation of mobile networks, allowing mobile operators to focus on their core functions. Value chains have moreover deconstructed into value networks and are complex by nature.

An understanding of the structure of the Finnish telecommunications industry is furthermore a prerequisite for studying convergence processes and business networks. A critical event analysis showed the many phases the industry has gone through and how technological development and the actors in the industry have driven the change forward. The critical events identified were categorized according to technology, the competitive landscape and the regulatory environment. Forming an idea of industry change and convergence processes has set the context in which business networks and the network actors are embedded. Firm behavior is difficult to interpret without taking the surrounding context and business environment into consideration. The fact that the telecommunications sector is characterized by constant change, poses the question whether a dimension of stability in the industry exists at all. In business networks it is assumed that there must be stability in order for change to occur (cf. Håkansson, 1987), whereas the business nets in the case studies show little signs of stability. In the Aina Group and MTV Handy case the only stable dimension is related to the positions the actors hold in their markets, one being a local and regional actor and the other being an established content provider in the media sector. The mobile TV case shows a stability dimension in terms of the business net having fixed boundaries for a certain period of time. Only specific actors were involved and constituted the focal net around the mobile TV development, whereas the net boundaries have been opened up in search of new actors with resources in the content area. A majority of business networks in Finnish telecommunications are intentionally developed (cf. Möller & Svahn, 2003).

A result of the convergence process is that actors have found themselves in an identity crisis, where they have tried to alter their role sets by defining new roles in a converged market place. The reasons for the redefinition of roles can be found in aspects of the convergence process, such as a wish to change positions in the value chain in order to get closer to end-users and thus reach new revenue streams. Roles are either given by the position a firm holds or roles are used as means by which an actor may influence its position in a business network. Roles can thus be seen as resources by which an actor enters a business network and establishes a position in relation to business partners. Studying role and position does therefore not only indicate business net dynamics, it also shows the influence convergence processes has on individual actors. The increasing focus on core competences and outsourcing are elements

of the convergence process, which also allow for refinement of a firm's position and role(s). An actor may activate, reactivate or deactivate roles in order to position itself not only within business nets and networks, but also on the market. The critical events identified in chapter six can also be seen as motives for role seeking. Technology leads to new opportunities and convergence processes. The competitive landscape puts pressure on actors to act and react in relation to competitors as well as find suitable partners. The regulative environment may restrict or encourage actions and role alterations/transitions (cf. MTV3 Handy case). The issue of role giving also becomes a key aspect in the telecommunications sector due to regulation of the industry as well as large firms having power over the market and technology development. Convergence processes thus bring pressure to act and react. Acting in business nets and redefining the organization's role and position thus become a means of coping with convergence processes.

9.2 Managerial implications of the study

The findings indicate that there has been a lack of understanding concerning the emerging converged market for telecommunications and mobile communications services. The convergence process is regarded as taking place on a technical/technological level. Industry convergence is a part of future ideas of convergence, but is not seen as a reality in today's market. This also means that industry convergence is less likely to be a part of any strategy telecom actors may deploy. Aina Group is still the only example of an actor which has deployed an industry convergence thinking in its operations. Convergence on a technological/technical level implies that telecom actors must access required resources in order to develop solutions and outsource as well as focus on core competence in order to be cost-efficient. Engaging in business networks and nets is a prerequisite in current telecommunications. No single actor is able to develop e.g. mobile TV services from scratch, especially since many actors have decreased investments or do not have R&D departments.

The roles and positions of actors in the field have changed, some less and some more. There is an increasing orientation towards core competence focus and outsourcing activities, which allows a firm to concentrate on its core functions. Those core functions then become the core resources that a firm possesses. Under the role as a resource perspective, the role a firm takes (or is given) constitutes a role, with which a firm may enter business networks or nets. Through business networks/nets a firm may engage in product/service development, or become a part of the value chain network or a distribution network. The role becomes the resource by which business networks are entered and orientated. The question becomes, whether an actor has such a position that it can act in roles in order to influence its position in the business network, or whether the position is fixed, allowing the actor to perform only predetermined roles. Every actor in a converged environment should therefore critically evaluate its core competence and position in the market as well as in relation to the business relationships or partnerships it has with other actors. Which roles does the position allow the firm to act in? Are the roles restricted in any way, i.e. is the firm's position prohibiting acting in certain roles? The basic line is that an actor's position constitutes the actor's framework of action. However, even though other actors in the firm's business environment may expect certain behavior from the firm, managers should keep in mind that the other actors too are seeking to strengthen their positions through acting in roles. Their expected behavior may diverge as they too pursue market positions in converged environments, where little might be understood of new technology as well as product and service concepts. Telecommunications

actors should therefore recognize business networking as a strategy to cope with industry and technological change. Business relationships should be viewed as investment and for instance, the possibility of cooperation via co-branding has not been explored by telecommunications actors; a strategy which may attract the loyalty of end-customers and thus build a solid customer base. Firms should also be ready to re-evaluate their roles and positions as well as core compentencies, as outsourcing activities create opportunities to act in new roles. These roles may be used as a means to influence position both in business nets and networks as well as within the market. When a new business net is emerging or being formed, each net member must carefully evaluate which role it wants to perform and how this role may conflict with earlier roles and/or the roles of other net members.

9.3 Critical thoughts of the study

The study is an interpretation by one researcher at a certain point in time, and there is no guarantee that if another researcher attempted to conduct the same study in the same setting, the results would turn out the same. The study has not attempted at generalization. Rather, the aim has been to understand the change taking place within a specific industry based on the prevailing context, and further, to investigate the business net dynamics. The findings of this study may very well be transferred to similar settings, but is not generalizable as such. The concepts used in the study could very well be used in order to understand other empirical contexts, e.g. other industries where convergence plays a role or telecommunications markets in other countries. The study has been carried out actively between 2005 and 2006 and the industry has changed in the few years that have passed since the collection of empirical data. The study therefore offers on one side a snapshot view of the actors and the industry, but on the other side an interpretation of industry evolution and critical events according to people active within the industry. A new round of interviews with the same informants might give different analytical outcomes, which is important to remember. This study offers a snapshot of the state of the telecommunications industry and its perceptions of convergence and business network dynamics during the mid-2000.

9.4 Suggestions for further research

The convergence process poses interesting settings to study in various industries where communication is an important part. It is important to distinguish between convergence processes and to identify their drivers and outcomes in order to understand a certain event or sequence of events. In terms of technological convergence one must remember that it may give rise to, for instance, functional convergence and regulatory convergence, which *per se* are separate processes of change, affecting industry actors in different ways. From a business perspective further research on effects of convergence processes for actors in the business environment is needed. The convergence processes taking place within telecommunications are currently slowly becoming understandable for actors. Research on possible business strategies and business models in a converged environment is therefore justified. Also, comparison of telecommunications markets in different countries allows for further analysis of convergence.

In terms of business networks and the industrial network approach, the concepts of role and position turned out to be trickier than one would image at first sight. The concepts are not

clear when examined in detail and the division between position leading to actors being assigned roles and roles becoming actions by which position is created or modified requires further research, also from other settings than the telecommunications industry (which has its specific characteristics). Change on an industry level and its effects on business network/net dynamics is another area worth further academic research, i.e. research on external factors leading to change in business networks. Also, one theme that turned out to be important but outside the scope of the research concerns learning and adaptation in business networks. Further research on how such processes may benefit or impede actors in business networks is suggested. There is a technical and institutional pressure on actors in the telecommunications industry to adapt to change of various kinds. Could it be that actors are not ready to adapt to the rapid change and thus make hasty decisions, thinking that they will enjoy first-mover advantages? One should keep in mind that even though the early bird catches the worm, the second mouse gets the cheese. Timing thus becomes an important issue; actors must evaluate when to act and find a compromise between *not yet* and *never more*.

The cases in the study imply that actors have not accepted and/or adjusted to their role division, which might be due to convergence processes occurring rapidly. Also, understanding of project-based business networks as well as project-based nets as part of larger networks, and their implications for firms deserve more attention among researchers, especially within the IMP tradition.

The telecommunications sector is further a dynamic industry which has not been studied to a large extent from a business perspective. Research on technical and technological advancements and their effects on the industry have been in focus so far. Further research on the dynamics between actors in telecommunications, IT and media (or in a presumable converging area) should be able to point out how technology-driven firms act in business networks and nets as well as cope in an industry which lacks a stability dimension.

REFERENCES

Aaltonen, J. (2003): *Content Distribution Using Wireless Broadcast and Multicast Communication Networks*, dissertation, publications 430, Tampere University of Technology.
Aastrup, J. (2000): "Change in Networks – A Critical Realist Approach", paper presented at the *16th Annual IMP Conference*, Bath, UK.
Achrol, R.S. & P. Kotler (1999): "Marketing in the Network Economy" in *Journal of Marketing*, Vol. 63 (Special issue), pp. 146-163.
Adler, R.P. (1995): "Introduction" in *Crossroads on the Information Highway. Convergence and Diversity in Communications Technologies*, Institute for Information Studies, U.S.
Adner, R. & D.A. Levinthal (2000): "Technology Speciation and the Path of Emerging Technologies" in G.S. Day, P.J.H. Schoemaker & R.E. Gunther (Eds.): *Wharton on Managing Emerging Technologies*, John Wiley & Sons, New York, pp. 57-74.
Afuah, A.N. & J.M. Utterback (1997): "Responding to Structural Industry Changes: A Technological Evolution Perspective" in *Industrial Corporate Change*, Vol. 6, No. 1, pp. 183-202.
Ahola, T.J. (2005): "Project Networks – A Short Term and a Long Term View", paper presented at the *21st Annual IMP Conference*, Rotterdam, Netherlands.
Aldrich, H.E. & E.R. Auster (1986): "Even Dwarfs Started Small: Liabilities of Age, Size and their Strategic Implications" in B. Schaw & L.I. Cummings (Eds.): *Research Organizational Behavior*, Vol. 8, JAI Press, Greenwich, pp. 165-198.
Allen, V.L. & E. van de Vliert (1984): "A Role Theoretical Perspective on Transitional Processes" in Allen V. L. & E. van de Vliert (Eds.): *Role Transitions: Explorations and Explanations*, Plenum, New York.
Alvesson, M. & K. Sköldberg (1994): *Tolkning och reflexion. Vetenskapsfilosofi och kvalitativ metod* (Interpretation and reflection. Science philosophy and qualitative method), Studentlitteratur, Lund.
Amesse, F, R. Latour, C. Rebolledo & L. Séguin-Dulude (2004): "The Telecommunications Equipment Industry in the 1990s: from Alliances to Mergers and Acquisitions" in *Technovation*, Vol. 24, Issue 11, pp. 885-897.
Andergassen, R., F. Nardini & M. Ricottilli (2003): *Innovation Waves, Self-Organized Critically and Technological Convergence*. Working Papers 469, Universita degli Studi di Bologna, Economia. URL http://ideas.repec.org/e/pna63.html, accessed 15.2.2005.
Anderson, J.C, H. Håkansson & J. Johanson (1994): "Dyadic Business Relationships within a Business Network Context" in *Journal of Marketing*, Vol. 58 (October), pp. 1-15.
Anderson, H. & V. Havila (1993): "Role and Position - Understanding Dynamics in Networks", paper presented at the *9th IMP Annual Conference*, Bath, UK.
Anderson, H., V. Havila, P. Andersen & A. Halinen (1998): "Position and Role-Conceptualizing Dynamics in Business Networks" in *Scandinavian Journal of Management*, Vol. 14, No. 3, pp. 167-186.
Anderson, H., P. Andersson, V. Havila & A. Salmi (2000): "Business Network Dynamics and M&As: Structural and Processual Connectedness", paper presented at the *16th Annual IMP conference*, Bath, UK.
Andersson, P. & B.G. Mölleryd (1997): "Telecommunications Services in Context. Distribution Consequences of Technological Change and Convergence" in *International Journal of Service Industry Management*, Vol. 8, No. 5, pp. 453-473.

Anderson, P. & M. Tushman (1990): "Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change" in *Administrative Science Quarterly*, Vol. 3, No. 4, pp. 604-633.
Angelides, P. (2001): "The Development of an Efficient Technique for Collecting and Analyzing Qualitative Data: the Analysis of Critical Incidents" in *Qualitative Studies in Education*, Vol. 14, No. 3, pp. 429-442.
Arjona, A. (2005): *Internet Protocol Datacasting. Transparent Interactivity Using Different Communication Channels*, Master's thesis, Department of Computer Science and Engineering, Helsinki University of Technology, URL: http://www.ipdc-forum.org/resources/documents/ andres_arjona_thesis_ipdc_dvbh.pdf, accessed 15.3.2007.
Artte, U. (1995): "Puhelinyhtiöt – ryhmä telekilpailussa" (The telephone companies – a group in the telecom competition) in *Televiestintätilasto 1995* (Telecommunications Statistics 1995), Liikenneministeriö, VAPK-Kustannus, Helsinki, pp. 11-12.
Ashforth, B.E. (2000): *Role Transitions in Organizational Life: An Identity-based Perspective*, Lawrence Erlbaum Associates, Mahwah, NJ,
Athreye, S. & D. Keeble (2000): "Technological Convergence, Globalisation and Ownership in the UK Computer Industry" in *Technovation*, Vol. 20, pp. 227-245.
Autio, T. (2007a): *Broadcast Mobile Television Service in Finland: a Techno-Economic Analysis*, Master's thesis, Helsinki University of Technology, Espoo.
Autio, T. (2007b): *Techno-Economic Analysis of DVB-H business models. Case Finland.*, presentation held at the COIN seminar, 27th February, URL http://www.netlab.hut.fi/tutkimus/ coin/COIN_seminar_2007/COIN_Seminar_2007_Autio.pdf, accessed 27.6.2007.
Axelsson, B. & G. Easton (Eds.) (1992): *Industrial Networks: A New View of Reality*, Routledge, London.
Axelsson, B. (1992): "Corporate Strategy Models and Networks – Diverging Perspectives" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. A New View of Reality*, Routledge, London, pp. 184-204.
Baker, W.E. & R.R. Faulkner (1991): "Role as Resource in the Hollywood Film Industry" in Biddle, B.J. & E. J. Thomas (Eds.): *The American Journal of Sociology*, Vol. 97, No. 2 (September), pp. 279-309.
Bales, R.F. (1958): "Task Roles and Social Roles in Problem-Solving Groups" in Maccoby, E., T.N. Newcomb & E.L. Hartley (Eds.): *Readings in Social Psychology*, Holt, Rinehart and Winston, Inc., New York, pp. 437-447.
Bally, N. (2005): *Deriving managerial Implications from Technological Convergence along the Innovation process: A Case Study on the Telecommunications Industry***,** Memo Stencil Working paper No. 223, URL http://web.abo.fi/fak/esf/fei/wrkpaper/ms223/ms223.pdf, Åbo Akademi University, accessed 25. 5.2006.
Barney, J.B. (1991): "Firm Resources and Sustained Competitive Advantage" in *Journal of Management*, Vol. 17, No. 1, March, pp. 99-120.
Baum, J. & C. Oliver (1991): "Institutional Linkages and Organizational Mortality " in *Administrative Science Quarterly*, Vol. 36, pp. 187-218.
Benassi, M. (1995): "Governance Factors in a Network Process Approach" in *Scandinavian Journal of Management*, Vol. 11, No. 3, pp. 269-281.
Bengtsson, M. & S. Kock (2000): ""Coopetition" in Business Networks – to Cooperate and Compete Simultaneously" in *Industrial Marketing Management*, Vol. 29, pp. 411-426.
Biddle, B.J. (1986): "Recent Developments in Role Theory" in *Annual Review of Sociology*, Vol. 12, pp. 67-92.

Biddle, B.J. & E.J. Thomas (1966): *Role Theory: Concepts and Research*, John Wiley, New York.
Björk, J. (2007): *New Business Models The Case of Mobile TV*, Master Thesis and project report as part of research project A Tele-Economic Study of Mobile TV, Stockholm School of Economics.
Blackman, C. (1998): "Convergence between Telecommunications and other Media: How Should Regulation Adapt?", in *Telecommunications Policy*, Vol. 22 , No. 3, pp. 163-170.
Blomberg, E. (2006a): *Finnish Mobile TV-hankkeen tilannekatsaaus*, (Update on the Finnish Mobile TV project) 7.11.2006, URL http://www.professia.fi/@Bin/1542825/esa%20 blomberg%200711%202006.pdf, accessed 15.3.2007.
Blomberg, E. (2006b): Mobiili-tv:n yhteisölliset sovellukset (Societal Applications of Mobile TV), URL www.contentbusiness.fi/attachments/Mobiili-tvn%20yhteisollisyys% 20Blomberg.pdf, accessed 12.2.2007.
Blomberg, E. (2007): *Mobile TV – full speed ahead*, presentation at MobileMonday 2.4.2007, Helsinki.
Blomqvist, K. (2002): *Partnering in the Dynamic Environment: The Role of Trust in Assymetric Technology Partnership Formation*, diss., Lappeenranta University of Technology, Digipaino.
Bohlin, E. (2000): "Convergence in Communications and Beyond: An Introduction" in Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.) (2000): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Borés, C., C. Saurina & R. Torres (2003): "Technological Convergence: A Strategic Perspective" in *Technovation*, No. 23, pp. 1-13.
Botkin J. W. & J.B. Matthews (1992): *Winning Combinations: The New Wave of Entrepreneurial Partnerships between Large and Small Companies*, John Wiley & Sons, New York.
Bovet, D. & J. Martha (2000): *Value Nets – Breaking the Supply Chain to Unlock Hidden Profits*, John Wiley and Sons Inc., New York.
Bower, J.L. (2001): "Not All M&As are Alike – and that Matters" in *Harvard Business Review*, March 2001, pp. 93-101.
Brass, D.J., J. Galaskiewicz, H.R. Greve & W. Tsai (2004): "Taking Stock of Networks and Organizations: A Multilevel Perspective" in *Academy of Management Journal*, Vol. 46, No. 6, pp. 795-817.
Bresnahan, T.F. & M. Trajtenberg (1995): "General Purpose Technologies: Engines of Growth?" in *Journal of Econometrics*, Annals of Econometrics 65, pp. 83-108.
Broderick, A.J. (1999): "Role Theory and the Management of Service Encounters" in *The Service Industries Journal*, Vol. 19, No. 2 (April), pp. 117-131.
Bryman, A. (2002): *Samhällsvetenskapliga metoder* (Social Research Methods), Liber Ekonomi, Trelleborg.
Burns, T. & G.M. Stalker (1961): *The Management of Innovation*, Tavistock, London.
Callero, P.L. (1994): "From Role-Playing to Role-Using: Understanding Role as Resource" in *Social Psychology Quarterly*, Vol. 57, No. 3, pp. 228-243.
Carlsson, B. (2003): "The New Economy: What is New and What is Not?" in Christensen, J.F. & P. Maskell (Eds.): *The Industrial Dynamics of the New Digital Economy*, Edwar Elgar, Cheltenham.

Carlsson, C., Hyvönen, K., Repo, P., & Walden, P. (2005): ”Asynchronous Adoption Patterns of Mobile Services”, in *Proceedings of the 38th Hawaii International Conference on System Sciences*, Waikoloa, USA.
Carlsson, C., Carlsson, J., Puhakainen, J. & Walden, P. (2006): “Nice Mobile Services Do Not Fly. Observations of Mobile Services and the Finnish Consumers”, in *Proceedings of the 19th Bled eCommerce Conference*, Bled, Slovenia.
Carlsson, C. (2007): “Mobile TV. The Consumer View”, presentation at the RTT seminar *Radio- ja televisiotekniikka murroksessa* (Radio and television technology in transition) 17.1.2007, URL http://www.rtt.tv/seminar.shtml, accessed 7.3.2007.
Cawley, R.A. (2000): “The Impact of Internet on Communications Regulatory Models in Europe” in Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Charmaz, K. (1994): “Discovering Chronic Illness: Using Grounded Theory” in *Social Science Medical*, Vol. 30, No. 11, pp. 1161-1172.
Chesbrough, H. W. & D.J. Teece (1996): “When is Virtual Virtuous? Organizing for Innovation” in *Harvard Business Review*, Vol. 74, No. 1 (Jan-Feb), pp. 65-73.
Chetty, S. & A. Patterson (2002): "Developing Internationalization Capability through Industry Groups: the Experience of a Telecommunications Joint Action Group" in *Journal of Strategic Marketing*, Vol. 10, pp. 69-89.
Choi, D. & L. Valikangas (2001): “Patterns of Strategy Innovations” in *European Management Journal*, Vol. 19, pp. 424-429.
Christensen, C.M. & R.S. Rosenbloom (1995): “Explaining the Attacker’s Advantage: Technological Paradigms, Organizational Dynamics, and the Value Network.” in *Research Policy*, Vol. 24, pp. 233-257
Christensen, J.F. (2003): “Innovation, Entrepreneurship and Industrial Dynamics in Internet Services” in Christensen, J.F. & P. Maskell (Eds.): *The Industrial Dynamics of the New Digital Economy*, Edwar Elgar, Cheltenham.
Clements, B (1998): “The Impact of Convergence on Regulatory Policy in Europe” in *Telecommunications Policy*, Vol. 22, No. 3, pp. 197-205.
Coase, R. H. (1937): “The Nature of the Firm” in *Economica*, Vol. 4, pp. 386-405.
Coffey, A. & P. Atkinsson (1996): *Making Sense of Qualitative Data: Complementary Research Strategies*, Sage Publications, Thousand Oaks,.
Collins English Dictionary (1991), 3rd Ed., Harper Collins Publishers, Glasgow.
Concise Oxford English Dictionary (1989), 2nd Ed., Oxford, Clarendon.
Collis, J. & R. Hussey (2003): *Business Research. A Practical Guide for Undergraduate and Postgraduate Students*, 2nd Ed., Palgrave Macmillan, New York.
Cook, K.S. & R.M. Emerson (1978): “Power, Equity and Commitment in Exchange Networks” in *American Sociological Review*, Vol. 43, No. 5 (October), pp. 721-739.
Craig-Lees, M. (2001): “Sense Making: Trojan Horse? Pandora’s Box?” in *Psychology & Marketing*, Vol. 18, No. 5, pp. 513-526.
Cravens, D.W., N.F. Piercy & S.H. Shipp (1996): “New Organizational Forms for Competing in Highly Dynamic Environments: the Network Paradigm” in *British Journal of Management*, Vol. 7, pp. 203-218.
Czarniawska-Joerges, B. (1992): *Exploring Complex Organizations: A Cultural Perspective*, Sage Publications, Newsbury Park, CA.
Davenport, T.H. (1993): *Process Innovation: Reengineering Work through Information Technology*, Harvard Business School Press, Boston, MA,

Day, G.S. & P.J.H. Schoemaker (2000): "A Different Game" in Day, G.S., P.J.H. Schoemaker & R.E. Gunther (Eds.) *Wharton on Managing Emerging Technologies*, John Wiley & Sons, New York.
de Búrca, S. & D. McLoughlin (1998): "Business Network Research: A Grounded Theory Approach" in Naudé, P. & P.W. Thurnbull (Eds.): *Network Dynamics in International Marketing*, Elsevier, Oxford, pp. 88-271.
de Montalvo, U.W., E. van de Kar & C. Maitland (2004): "Resource-based Interdependencies in Value Networks for Mobile Internet Services" in Janssen, M., H.G. Sol & R.W. Wagenaar (Eds.): ICEC'04 Sixth International Conference on Electronic Commerce.
de Ruyter, K., H. Kasper & M. Wetzels (1995): "Internal Service Quality in a Manufacturing Firm: A Review of Critical Encounters" in *New Zealand Journal of Business*, Vol. 17, No. 2, pp. 67-80.
Digita (2007): *Mobiilitv* (Mobile TV), URL http://www.mobiilitv.fi/Yrityksille, accessed 5.3.2007.
DiMaggio, P.J. (1986): "Structural Analysis of Organizational Fields" in Staw, B.M. & L.L. Cummings (Eds.): *Research in Organizational Behavior*, JAI Press, Greenwich, CT, pp. 335-370.
Doeringer, P.B. & D.G. Terkla (1995): "Business Strategy and Cross-Industry Clusters" in *Economic Development Quarterly*, Vol. 9, pp. 225-237.
Domberger, S. (1998): *The Contracting Organization: A Strategic Guide to Outsourcing*, Oxford University Press, Oxford.
Drucker, P.F. (1985a): *Innovation and Entrepreneurship. Practice and Principles*, Heinemann, London.
Drucker, P.F. (1985b): "The Discipline of Innovation" in *Harvard Business Review*, Vol. 63, No. 3 (May-June), pp. 67-72.
Dubois, A. (1998): *Organising Industrial Activities across Firm Boundaries*, Routledge, London.
Dubois, A. & L-E. Gadde (2002): "Systematic Combining: an Abductive Approach to Case Research" in *Journal of Business Research*, Vol. 55, pp. 553-560.
Duck, S. (1981): "Toward a Research Map for the Study of Relationship Breakdown" in Duck, S. & Gilmour, R. (Eds.): *Personal Relationships 4: Dissolving Personal Relationships*, Academic Press, London, pp. 1-30.
Duysters, G. (1995): *The Evolution of Complex Industrial Systems: The Dynamics of Major IT Sector*s, dissertation No. 95-24, Faculty of Economics and Business Administration, University of Limburg, Maastricht.
Duysters, G. & J. Haagedorn (1998): "Technological Convergence in the IT Industry: the Role of Strategic Technology Alliances and Technological Competencies" in *International Journal of the Economics of Business*, Vol. 5, No. 3, pp. 355-368.
Easton, G. (1992): "Industrial Networks: A Review" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. A New View of Reality*, Routledge, London, pp. 1-27.
Easton, E. (1995): "Methodology and Industrial Networks", in Möller, K., Wilson, D.T. (Eds.): *Business Marketing: An Interaction and Network Perspective,* Kluwer Academic Publishers, Boston.
Easton, G. (1997): "Industrial Networks: A Review" in Ford, D. (Ed.): *Understanding Business Markets*, 2nd Ed, London, The Dryden Press.
Easton, G. & A. Lundgren (1992): "Changes in the Industrial Networks as Flow through Nodes" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. A New View of Reality*, Routledge, London, pp. 88-104.

Eccles, R. (1981): "The Quasifirm in the Construction Industry" in *Journal of Economic Behavior and Organization*, Vol. 2, pp. 335-357.
Edwards, J. (1999): "Convergence Reshapes the Networking Industry" in *Computer*, Vol. 32, No. 5, pp. 14-16.
Edvardssson, B. (1992): "Service Breakdowns. A Study of Critical Incidents in an Airline" in *International Journal of Service Industry Management*, Vol. 3, No. 4, pp. 17-29.
Edvardsson, B. & M. Luukkonen (1996): *Kritiska händelser. En studie inom Göteborgsregionens Lokaltrafik AB* (Critical Events. A Study of the Local Traffic in the Gothenburg Region), Forskningsrapport 96:1, Högskolan i Karlstad.
Edvardsson, B. & I. Roos (2001): "Critical Incident Techniques. Towards a Framework for Analysing the Criticality of Critical Incidents" in *International Journal of Service Industry Management*, Vol. 12, No. 3, pp. 251-268.
Edquist, C. (Ed.) (2003): *The Internet and Mobile Telecommunications System of Innovation. Developments in Equipment, Access and Content*, Edward Elgar, Cheltenham, UK.
Eisenhardt, K.M. (1989): "Building Theories from Case Study Research" in *Academy of Management Review*, Vol. 14, No. 4, pp. 532-550.
Eisenhardt, K.M. & J.A. Martin (2000): "Dynamic Capabilities: What are They?" in *Strategic Management Journal*, Vol. 21, No. 10-11, October-November, pp. 1105-1121.
Elsässer, M. (1984): *Marknadsinvesteringar. Två fallstudier av etablering på utländsk marknad*, (Market Investments. Two Case Studies on the Establishment on a Foreign Market), Liber, Stockholm.
Eronen, S. (2004): "Konvergenssia ja hybridiä" (Convergence and hybrid) in *FINTRA*, No. 3, p. 14.
European Commission (1997): *Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for Regulation. Towards an Information Society Approach.*, COM (97) 623, European Commission, Brussels, URL http://europa.eu.int/ISPO/convergencegp/97623.html, accessed 19.1.2005.
Fai, F. & N. von Tunzelmann (2001): "Industry-Specific Competencies and Converging Technological Systems: Evidence from Patents" in *Structural Change and Economic Dynamics*, Vol. 12, pp. 141-170.
Falck, K. (2004): *Mobiili-tv: DVB-H ja interaktiivisuus* (Mobile TV: DVB-H and Interactivity), URL http://gray.tky.fi/ViTi/kalvot/Viestinnan_tuelvaisuus_mobiletv_2004.pdf, accessed 12.2.2007.
Feldmann, V. (2002): "Competitive Strategy for Media Companies in the Mobile Internet", in *Schmalenbach Business Review*, Vol. 54, No. 4 (October), pp. 351-371.
FICORA, "Decisions Concerning Significant Market Power (SMP) at Ficora", URL http://www.ficora.fi/attachments/englanti/1156489126698/Files/CurrentFile/Significant_market_power.pdf, accessed 7.6.2007.
Finnet (2007a): *Telemaisemat syksy 1997 – lokakuu 2007* (The Telecom Landscape Autumn 1997 – October 2007), 24.10.2007, internal material.
Finnet (2007b): *Tietoliikennemarkkinat Suomessa 2007,* Focus Consulting, Helsinki, internal material.
Finnish Mobile TV (2003): *Finnish Companies Join Forces for a Commercial Pilot for Mobile Broadcasting Services*, 15.12.2003, URL http://www.finnishmobiletv.com/node/ 45, accessed 12.2.2007.
Finnish Mobile TV (2005a): *Live Mobile TV Broadcasts for the First Time at an International Sporting Event*, 5.8.2005, URL http://www.finnishmobiletv.com/node/43, accessed 12.2.2007.

Finnish Mobile TV (2005b): Consumers Also Want to Watch TV Programs on their Mobile, URL http://www.finnishmobiletv.com/node/42, accessed 12.2.2007.
Flanagan, J.C. (1954): "The critical incident technique," *Psychological Bulletin* 51, pp. 327-358.
Fombrun, C.J. (1982): "Attributions of Power across a Social Network" in *Human Relations*, Vol. 36, pp. 493-508.
Ford, D. (Ed.) (1998): *Managing Business Relationships*, Wiley, Chichester.
Ford, D., R. McDowell & C. Tomkins (1998): "Exploring Relationship Strategy" in Naudé, P. & P.W. Turnbull (Eds.): *Network Dynamics in International Marketing*, Elsevier, Oxford, pp. 251-271.
Ford, D., H. Håkansson, I. Snehota & L-E. Gadde (2002): "Managing Networks", paper presented at the *18th Annual IMP Conference*, Perth, Australia.
Ford, D. & M. Redwood (2005): "Making Sense of Network Dynamics through Network Pictures: A Longitudinal Case study" in *Industrial Marketing Management*, Vol. 34, pp. 648-657.
Ford, D. & H. Håkansson (2006): "The Idea of Business Interaction" in *The IMP Journal*, Vol. 1, No. 1, pp. 4-27.
Forsgren, M, I. Hägg, H. Håkansson, J. Johanson & L-G. Mattsson (Eds.) (1995): Firms in Network: A New Perspective on Competitive Power, Vol. 38 of ACTA: Studia oeconomiae negotiorum, Almqvist & Wiksell International, Stockholm.
Forsman, M. & N. Solitander (2003): *Network Knowledge versus Cluster Knowledge – The Gordian Knot of Knowledge Transfer Concepts*, Swedish School of Economics and Business Administration Working papers, No. 494.
Fransman, M. (2000): "Convergence, the Internet and Multimedia: Implications for the Evolution of Industries and Technologies" in E. Bohlin, K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Freeman, C., & C. Perez (1988): "Structural Crises of Adjustment, Business Cycles and Investment Behaviour" in Dosi. G., C. Freeman, R. Nelson, G. Silverberg. & L.L.G. Soete (Eds.): *Technical Change and Economic Theory*, Frances Pinter, London.
Freeman, C. & F. Louça (2001): *As Time Goes By: from the Industrial Revolutions to the Information Revolution*, Oxford University Press, Oxford.
Freytag, P.V. & T. Ritter (2005): "Dynamics of Relationships and Networks – Creation, Maintenance and Destruction as Managerial Challenges" in *Industrial Marketing Management*, Vol. 34, pp. 644-647.
Friman, M. (2000): *Effects of Critical Incidents in Consumer Satisfaction*, Dissertation, Göteborg University, Gothenburg,
Gabel, D. (2002): *Interconnection Payments in Telecommunications. A Competitive Market Approach*, URL http://itc.mit.edu/itel/docs/2002/gabel_interconn_pymnt.pdf, accessed 25.10.2007.
Gadde, L-E. & H. Håkansson (1992): "Analysing Change and Stability in Distribution Channels - A Network Approach", in Axelsson, B. & G. Easton (Eds.): I*ndustrial Networks - A New View of Reality*, Routledge, London, pp. 166-183.
Gadde, L-E. & L-G. Mattsson (1987): *Stability and Change in Network Relationships*, Elsevier Science Publisher, Amsterdam.
Gadde, L-E., H. Håkansson & M. Öberg (1989): *Stability and Change in Automobile Distribution*, Research paper, Stockholm School of Economics, Stockholm.
Gadde, L-E., L. Huemer & H. Håkansson (2003): "Strategizing in Industrial Networks" in *Industrial Marketing Management*, Vol. 32, pp. 357-364.

Gaines, B.R. (1998): "The Learning Curves Underlying Convergence" in *Technological Forecasting and Social Change*, Vol. 57, No. 1, pp. 7-34.
Gambardella, A. & S. Torrisi (1998): "Does Technological Convergence Imply Convergence in Markets? Evidence from the Electronics Industry" in *Research Policy*, Vol. 27, pp. 445-463.
García-Murillo, M. (2005): "Regulatory Responses to Convergence: Experiences from Four Countries," in *INFO*, Vol. 7, No. 1, pp. 20-40.
Geersbro, J. (2004): "Sensemaking in Business Networks – Making Sense of Business Networks", paper presented at the *20th Annual IMP Conference*, Copenhagen.
Gerum, E, I. Sjurts & N. Stieglitz (2004): "Industry Convergence and the Transformation of the Mobile Communications System of Innovation" in *Proceedings from the 15th Regional ITS Conference*, September 5-7, Berlin, Germany.
Giddens, A. (1979): *Central Problems in Social Theory,* Macmillan, London.
Giddens, A. (1984): *The Constitution of Society. Outline of the Theory of Structuration*, Polity, Cambridge.
Glaser B.G. & A. Strauss (1967): *Discovery of Grounded Theory. Strategies for Qualitative Research*. Aldine de Gruyter, New York.
Gold, S. (1999): "RSL Com Steps into Cellular World with Sonera Deal" in *Newsbyte*, 19.1.1999, URL http://findarticles.com/p/articles/mi_m0HDN/is_1999_Jan_19/ai_ 53613464, accessed 22.3.2007.
Gomes-Casseres, B. (1996): *The Alliance Revolution*, Harvard University Press, Cambridge, MA.
GoMobile (2007): *Spinbox Oy/Gomobile suomalaisomistukseen (Spinbox Oy/GoMobile to be owned by Finns)*, URL https://www.gomobile.fi/tiedotteet.html, accessed 22.3.2007.
Gong, J. & P. Srinagesh (1996): "Network Competition and Industry Structure" in *Industrial Corporate Change*, Vol. 5, No. 4, pp. 1231-1241.
Grant, R.M. (1995): *Contemporary Strategy Analysis: Concepts, Techniques and Applications*, 2nd Ed., Blackwell Publishing, New York.
Granovetter, M. (1985): "Economic Action and Social Structure: The Problem of Embeddedness" in *American Journal of Sociology*, Vol. 91, No. 3, pp. 481–510.
Greenstein, S.M. & T. Khanna (1997): "What Does Industry Convergence mean?" in Yoffie, D.B. (Ed.): *Competing in the Age of Digital Convergence*, Harvard Business School Press, Boston, MA, pp. 201-226.
Gremler, D. D. (2004): "The Critical Incident Technique in Service Research" in *Journal of Service Research*, Vol. 7, No. 1, August 2004, pp. 65-89.
Griffin, L.J (1993): "Narrative, Event-Structure Analysis, and Causal Interpretation in Historical Sociology" in *American Journal of Sociology*, Vol. 98, pp. 1094-1133.
Grove, S. J & R. P. Fisk (1997): "The Impact of other Customers on Service Experiences. A Critical Incident Examination on 'Getting Along'" in *Journal of Retailing*, Vol. 73 (Spring), pp. 63-85.
Guba, E. & Y.S. Lincoln (1994): "Competing Paradigms in Qualitative Research" in Denzin, N.K. & Y.S. Lincoln (Eds.): *Handbook of Qualitative Research*, Thousand Oaks, California.
Gulati, R., N. Nohria & A. Zaheer (2000): "Strategic Networks" in *Strategic Management Journal*, Vol. 21, pp. 203-215.
Hacklin, F. (2006): *Management of Convergence in Innovation. Strategies and Capabilities for Value Creation Beyond Blurring Industry Boundaries*, Springer, Berlin.

Hacklin, F. & C. Marxt (2003): "Assessing R&D Management Strategies for Wireless Applications in a Converging Environment" in Butler, J. (Ed.) *Proceedings of the R&D Management Conference 2003* (RADMA), Blackwell Publishers, Manchester.
Hadjikhani, A. (1996): "Project Marketing and the Management of Discontinuity" in *International Business Review*, Vol. 5, No. 3, pp. 319-336.
Hägg, I. & J. Johanson (1983): *Firms in networks. A New View of Competitive Power*, Business and Social Research Institute, Stockholm
Häikiö, M. (1998): *Alkuräjähdys. Radiolinjan ja Suomen GSM-matkapuhelintoiminta 1988-1998* (The Big Bang of GSM Mobile Phone Revolution. The Story of Radiolinja, Finland, 1988-1998), Edita, Helsinki.
Håkansson, H. (Ed.) (1982): *International Marketing and Purchasing of Industrial Goods. An Interaction Approach*. Wiley, London.
Håkansson, H. (1986): "Technical Exchange within Industrial Networks" in Turnbull, P., Paliwoda, S., (Eds.): *Research in International Marketing.* Croom Helm, London
Håkansson, H. (ed.) (1987): *Industrial Technological Development. A Network Approach*, Croom Helm, London.
Håkansson, H. (1989): *Corporate Technological Behaviour. Cooperation and Networks*, Routledge, London.
Håkansson, H. (1992): "Evolution Processes in Industrial Networks" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. A New View of Reality*, Routledge, London, pp. 129-143.
Håkansson, H. & Johanson, J. (1984): "Heterogeneity in Industrial Markets and its Implications for Marketing" in Hägg, I. & F. Wiedersheim-Paul (Eds.): *Between Market and Hierarchy*, Department of Business Studies, Uppsala.
Håkansson, H. & J. Johanson (1988): "A Network Model" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. The New Reality***.** Routledge, London.
Håkansson, H. & J. Johanson (1992): "A Model of Industrial Networks" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. A New View of Reality*, Routledge, London, pp. 28-33.
Håkansson, H. & B. Henders (1995): "Network Dynamics: Forces and Processes Underlying Evolution and Revolution in Business Networks" in Möller, K. & D.T. Wilson (Eds.): *Business Marketing: An Interaction and Network Perspective*, Kluwer Academic Publishers, Boston.
Håkansson, H. & A. Lundgren (1995): "Industrial Networks and Technological Innovation" in Möller, K. & D.T. Wilson (Eds.): *Business Marketing: An Interaction and Network Approach*, PWS Kent, Boston.
Håkansson, H. & I. Snehota (1989): "No Business is an Island: the Network Concept of Business Strategy" in *Scandinavian Journal of Management*, Vol. 5, No. 3, pp. 187-200.
Håkansson, H. & I. Snehota (Eds.) (1995): *Developing Relationships in Business Networks*, Routledge, London.
Håkansson, H. & I. Snehota (1995a): "Relationships in Business" in Håkansson, H. & I. Snehota (Eds.), *Developing Relationships in Business Networks*, Routledge, London, pp. 1-23.
Håkansson, H. & I. Snehota (1995b): "Stability and Change in Business Networks" in Håkansson, H.& I. Snehota (Eds.), *Developing Relationships in Business Networks*, Routledge, London, pp. 269-329.
Håkansson, H. & I. Snehota (1998): "The Burden of Relationships or Who's Next" in Naudé, P. & P.W. Turnbull (Eds.): *Network Dynamics in International Marketing*, Elsevier, Oxford, pp. 16-25.
Håkansson, H & D. Ford (2002): "How Should Companies Interact in Business Networks" in *Journal of Business Research*, Vol. 55, pp. 133-139.

Halinen, A. (1994): *Exchange Relationships in Professional Services. A study of Relationship Development in the Advertising Sector*, dissertation, Series A-6, Turku School of Economics and Business Administration, Turku, Finland.
Halinen, A. (1997): "Relationship Marketing in Professional Services" in *A Study of Agency – Client Dynamics in the Advertising Sector*, London.
Halinen, A. (1998): "Time and Temporality in Research Design: A Review of Buyer-Seller Relationships Models" in Naudé, P., P.W. Thurnbull (Eds.): *Network Dynamics in International Marketing*, Elsevier Science, Oxford.
Halinen, A. & J. Tähtinen (1999): "Towards a Process Theory of Relationship Dissolution", Series discussion and working papers 9, Publications of the Turku School of Economics and Business Administration, Turku.
Halinen, A. & J-Å. Törnroos (1998): "The Role of Embeddedness in the Evolution of Business Networks" in *Scandinavian Journal of Management*, Vol. 14, No. 3, pp. 187-205.
Halinen, A. & J-Å. Törnroos (2004): "Using Case Methods in the Study of Contemporary Business Networks" in *Journal of Business Research*, Vol. 58, No. 9, pp. 1285-1297.
Halinen, A., A. Salmi & V. Havila (1999): "From Dyadic Change to Changing Business Networks: An Analytical Framework" in *Journal of Management Studies*, Vol. 36, No. 6 (November), pp. 779-794.
Hall, D.T. (1972): "A Model of Coping with Role Conflict: The Role Behavior of College Educated Women" in *Administrative Science Quarterly*, Vol. 17, No. 4, pp. 471-486.
Hall, B.B (2004): *Innovation and Diffusion,* Working Paper 10212, National Bureau of Economic Research, Cambridge.
Hallén, L., J. Johanson & N. Seyed-Mohamed (1991): "Interfirm Adaptation in Business Relationships" in *Journal of Marketing*, Vol. 55 (April), pp. 29-37.
Hamel, G. (1991): "Competition for Competence and Inter-Partner Learning Within International Strategic Alliances" in *Strategic Management Journal*, Vol. 12 (Summer Special Issue), pp. 83–103.
Hamel, G. & C.K. Prahalad (1994): *Competing for the Future*, Harvard Business School Press, Boston.
Hammersley, M (1997): "Qualitative Data Archiving: Some Reflections on its Prospects and Problems" in *Sociology*, Vol. 31, No. 1, pp. 131-142.
Hatch, M.J. (1997): *Organization Theory. Modern, Symbolic and Postmodern Perspectives*, Oxford University Press, New York.
Havila, V. (1996): *International Business-Relationship Triads*, Department of Business Studies, Uppsala University, Doctoral thesis No. 64.
Havila, V. & I. Wilkinson (1997): "The Principle of the Conservation of Relationship Energy: or Many Kinds of New Beginnings", paper presented at the *13th IMP Annual Conference*, Lyon, France.
Havila, V. & A. Salmi (1999): "Spread of Change in Business Networks: An Empirical Study of Mergers and Acquisitions in the Graphic Industry", paper presented at the *15th Annual IMP Conference*, Dublin, Ireland.
Hedaa, L. & J-Å. Törnroos (1997): "Understanding Event-based Business Networks" MPP Working Paper, no. 10, Copenhagen Business School, Copenhagen.
Heikkinen, M.T., T. Mainela, J. Still & J. Tähtinen (2007): "Roles for Managing in Mobile Service Development Nets" in *Industrial Marketing Management*, Vol. 36, pp. 909-925.
Heinrich, J. (1994): *Medienökonomie*, Westdeutcher Verlag, Opladen.
Heise, D. (1989): "Modelling Event Structures" in *Journal of Mathematical Sociology*, Vol. 14, pp. 139-169

Hellgren, B. & T. Stjernberg (1995): "Design and Implementation in Major Investments – A Project Network Approach" in *Scandinavian Journal of Management*, Vol. 11, No. 4, pp. 377-394.
Hennart, J-F. (1991): "The Transaction Costs Theory of Joint Ventures: An Empirical Study of Japanese Subsidiaries in the United States" in *Management Science*, Vol. 37 (April), pp. 483-497.
Herkman, J. (2002): "Konvergenssi" (Convergence) in *Mediumi*, 1.3.2002, URL http://www.m-cult.net/mediumi/article.html?articleId=65&print=1&lang=fi, accessed 6.3.2007.
Henders, B. (1992): *Positions in Industrial Networks: Marketing Newsprint in the UK*, dissertation, Uppsala University, Department of Business Studies, Uppsala.
Herrmann, T, I. Jahnke & K-U. Loser (2004): "The Role Concept as a Basis for Designing Community Systems", in Darses, F., R. Dieng, C. Simone & M. Zacklad (Eds.): *Cooperative Systems Design, Scenario-Based Design of Collaborative Systems*, pp. 163-178.
Hertz, S. (1992): "Towards more Integrated Industrial Systems" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. A New View of Reality*, Routledge, London, pp. 105-128.
Hertz, S. (1996): "Drifting Closer and Drifting Away in Networks. Gradual Changes in Interdependencies of Networks" in Iacobucci, D. (ed.) *Networks in Marketing*, Sage Publications, Thousand Oaks, pp. 179-204.
Hertz, S. (1998): "Domino Effects in International Networks" in *Journal of Business-to-Business Marketing*, Vol. 5, No. 3, pp. 3-31.
Hertzel, M., J. Kiholm Smith & R.L. Smith (2001): "Competitive Impact of Strategic Restructuring: Evidence from the Telecommunications Industry" in *Industrial and Corporate Change*, Vol. 10, No. 1, pp. 207-246.
Hirsijärvi, S. & H. Hurme (2000): *Tutkimushaastattelu. Teemahaastattelun teoria ja käytäntö* (Research Interviews. Theme Interview Theory and Practice), Helsinki University Press, Helsinki
Holme, I.M. & B. K. Solvang (1997): *Forskningsmetodik. Om kvalitativa och kvantitativa metoder* (Research Methodology. About Qualitative and Quantitative Methods), 2nd Ed., Studentlitteratur, Lund.
Holmlund, M. (1997): *Perceived Quality in Business Relationships*, doctoral dissertation no. 66, Swedish School of Economics and Business Administration, Helsinki.
Holmlund, M. (2004): "Analyzing Business Relationships and Distinguishing Different Interaction Levels" in *Industrial Marketing Management*, Vol. 33, pp. 279-287.
Holmlund, M. & T. Strandvik (1999): *Critical Incidents in Business Relationships*, Working papers no. 396, Swedish School of Economics and Business Administration, Helsinki.
Homans, G. C. (1951): *The Human Group*, Routledge & Kegan Paul, London.
Huurros, M. (2007): *The Emergence and Scope of Complex Systems/Service Innovation. The Case of the Mobile Payment Services Market in Finland*, Diss. Helsinki School of Economics.
Iansiti, M. (1998): *Technology Integration: Making Critical Choices in a Dynamic World*, Harvard Business School Press, Boston.
Jahnke, I., C. Ritterskamp & T. Herrmann (2005): "Sociotechnical Roles for Sociotechnical Systems – A Perspective from Social and Computer Sciences" in *Proceedings from American Association for Artificial Intelligence*, July 9-13, Pittsburg, Pensylvania.
Jarillo, J.C. (1995): *Strategic Networks. Creating the Borderless Organization*, Butterworth-Heinemann, Oxford.

Järvelä, P., M. Lähteenmäki & A. Raijas (2001): *Mobiilipalvelujen kaupallisen kehityksen haasteet ja mahdollisuudet* (The Threats and Opportunities of Mobile Services and their Commercial Development), MINTC, Helsinki, Finland.
Jensen, J.L. & R. Rogers (2001): ”Cumulating the Intellectual Gold of Case Study Research” in *Public Administration Review*, Vol. 61, No. 2 (March/April), pp. 235-246.
Johanson, J. & L-G. Mattsson (1984): ”Marketing Investments and Market Investments in Industrial Networks", paper presented at the International Research Seminar on Industrial Marketing, Stockholm School of Economics, cited in Axelsson, B. (1995): The Development of Network - Research Question of Mobilization and Perseverance, in Möller, K. & D. Wilson (Eds.): *Business Marketing: An Interaction and Network Perspective*, Kluwer Academic Publishers, Boston, MA.
Johanson, J. & L-G. Mattsson (1985): “Marketing Investments and Market Investments in Industrial Networks” in *International Journal of Research in Marketing*, Vol. 2, pp. 185-195.
Johanson, J. & L-G. Mattsson (1987): “Interorganizational Relations in Industrial Systems: a Network Approach Compared with the Transaction-Cost Approach” in *International Studies of Management and Organization,* Vol. 17, pp. 34–48.
Johanson, J. & J-E. Vahlne (1990): "The Mechanism of Internationalisation" in *International Marketing Review",* Vol. 7, No 4, pp. 11-24.
Johanson, J. & L-G. Mattsson (1992): "Network Positions and Strategic Action - An Analytical Framework", in Axelsson, B. & G. Easton (Eds.) *Industrial Networks. A New View of Reality.* Routledge, London.
Johanson, J. & L-G. Mattsson (1997): “Network Positions and Strategic Action – An Analytical Framework” in Ford, D. (Ed.) *Understanding Business Markets*, 2nd Ed. London, The Dryden Press.
Johnson, G. & K. Scholes (1997): *Exploring Corporate Strategy*, Prentice Hall, Englewood Cliffs, NJ.
Jungner, M. (2007): *Tulevaisuuden TV*, presentation at the RTT seminar Radio- ja televisiotekniikka murroksessa 17.1.2007, URL http://www.rtt.tv/seminar.shtml, accessed 7.3.2007.
Juntunen, A. (2005): *The Emergence of a New Business through Collaborative Networks – A Longitudinal Study in the ICT Sector*, Doctoral dissertation, Helsinki School of Economics.
Just, N. & M. Latzer (2000): “EU Competition Policy and Market Power Control in the Mediamatics Era” in *Telecommunications Policy*, Vol. 24, pp. 395-411.
Kaluza, B, T. Blecker & C. Bischof (1999): “Implications of Digital Convergence on Strategic Management” in Dahiya, S.B. (Ed.): *The Current State of Economic Science*, Vol. 4, Spellbound Publications, Rohtak, pp. 2223-2249.
Kahn, R.L., D.M. Wolfe, R.P. Quinn, J.D. Snoek & R.A. Rosenthal (1964): *Organizational Stress: Studies in Role Conflict and Ambiguity*, John Whiley & Sons, New York.
Kalakota, R. & M. Robinson (2002): *M-Business. The Race to Mobility*, McGraw-Hill, New York.
Kamp, B. (2005): “Formation and Evolution of Buyer-Supplier Relationships: Conceiving Dynamism in Actor composition of Business Networks” in *Industrial Marketing Management*, Vol. 34, pp. 658-668.
Karhu, P. (2007): *Emerging Service Innovation Markets: The Case of Finnish Mobile TV Service Market*, Dissertation No. 3297, University of St. Gallen, Switzerland.
Katz, D. & R. Kahn (1966): *The Social Psychology of Organizations*, John Wiley & Sons, New York.

Katz, M.L. (1996): "Remarks on the Economic Implications of Convergence" in *Industrial and Corporate Change*, Vol. 5, No. 4, pp. 1079-1096.
Kavassalis, P & W. Lehr (2000): "The Flexible Specialization Path of the Internet" in Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Kiiski, A.& H. Hämmäinen (2005): "Mobile Virtual Network Operators: Case Finland" in *Proceedings of the 15th Regional ITS Conference*, Berlin, Germany.
Kirkeby, O.F. (1990): "Abduktion" in Andersen, H. (Ed.): *Vetenskapsteori och metodlära. Introduktion* (Science Theory and Methods. Introduction), Studentlitteratur, Lund.
Kivisaari E. & S. Luukkainen (2005): "Markets and Strategies for Mobile Broadcast in Finland" in *Proceedings of the International Symposium on Telecommunications IST*, URL http://www.tml.tkk.fi/~sakaril/, accessed 3.5.2007.
Knight, L. & . Harland (2005): "Managing Supply Networks: Organizational Roles in Network Management" in *European Management Journal*, Vol. 23, No. 3, pp. 281-292.
Kodama, F. (1992): "Technology Fusion and the New R&D" in *Harvard Business Review*, Vol. 70 (July/August).
Koon Huat Low, B. (1997): "Managing Business Relationships and Positions in Industrial Networks" in *Industrial Marketing Management*, Vol. 26, pp. 189-202.
Korpela, J. & K. Saarinen (1990): "Johdanto" (Introduction) in *Televiestintätilasto 1990* (Telecommunications Statistics 1990), Valtion painatuskeskus, Liikenneministeriö, Helsinki, pp. 3-4.
Kothandaraman, P. & D.T. Wilson (2001): "The Future of Competition: Value-Creating Networks" in *Industrial Marketing Management*, Vol. 30, Issue 4, pp. 379-389.
Kotilainen, S. (2005):" Matkapuhelinmarkkinoiden keskittyminen jatkuu. DNA osti Pgfree-kännykkäliittymät" (Concentration of Mobile Phone Markets Continues. DNA Acquired Subscribers of Pgfree) in *Tietokone*, 7.5.2005, URL http://www.tietokone.fi/ uutta/uutinen.asp?news_id=24108&tyyppi=1, accessed 1.3.2007.
Kotilainen, S. (2007): "Nokia hävisi Samsungille kännykkä-tv:ssä" (Nokia Lost to Samsung in Mobile TV) in *Taloussanomat*, 8.3.2007, p. 4.
Kovács, G. & K.M. Spens (2005): "Abductive Reasoning in Logistics Research" in *International Journal of Physical Distribution & Logistics Management*, Vol. 35, No. 2, pp. 132-142.
Laffont, J., P. Rey & J. Tirole (1998): "Network Competition. Overview and Nondiscriminatory Pricing" in *Journal of Economics*, Vol. 29, pp. 1-37.
Lamminaho, S. (2002): "Toimitusjohtajan katsaus" (The CEOs review) in *HPO Annual report*, 2002, p. 27.
Langlois, R.N & P.L. Robertson (1995): *Firms, Markets and Economic Change*, Routledge, London and New York**.**
Lant, T.K & S.J. Mezias (1992): "An Organizational Learning Model of Convergence and Reorientation" in *Organization Science*, Vol. 3, pp. 47-71.
Lee, G. K-F. (2003): *The Competitive Consequences of Technological Convergence in an Era of Innovations – Telephony Communications and Computer Networks, 1989-2001*, University of California, Berkeley.
Lee, G. K-F. (2005): *The Significance of Capability Distribution in the Race to Enter Emerging Markets: Telephony Communications and Computer Networking, 1989-2001*, Haas School of Business, University of California, Berkeley.

Lehto, Tero (2005): *Digita ja MTV3 varoittavat: Kännykkä-TV ei kestäisi tiukkaa toimilupaa* (Digita and MTV3 Pose Warnings: Mobile TV could not Take a Tight License), 31.8.2005, URL http://www.tietokone.fi/uutta/uutinen_asp?news_id=24561, accessed 5.3.2007.
Lei, D (2000): "Industry Evolution and Competence Development. The Imperatives of Technological Convergence" in *International Journal of Technology Management*, Vol. 19, No. 7/8, pp. 699-738.
Levinson, D.J. (1959): "Role, Personality, and Social Structure in the Organizational Setting", in *The Journal of Abnormal and Social Psychology*, Vol. 58, pp. 170-180.
Lewis, J (2003): "Design Issues" in Ritchie, J. & J. Lewis (Eds.): *Qualitative Research Practice. A Guide for Social Science Students and Researchers*, SAGE, London.
Liljegren, G. (1988): *Interdependens och dynamik i långsiktiga kundrelationer. Industriell försäljning i ett nätverksperspektiv* (Interdependence and Dynamics in Long-Term Buyer Relationships. Industrial Selling from a Network Perspective), doctoral dissertation, Stiftelsen för Marknadstekniskt Centrum, Ekonomiska Forksningsinstitutet vid Handelshögskolan i Stockholm, Stockholm School of Economics, Stockholm.
Lincoln, Y.S. & E. Guba (1985): *Naturalistic enquiry*, Beverly Hills, Sage Publications, California.
Lind, J. (2004): "Convergence: History of Term Usage and Lessons for Firm Strategists" in *Proceedings of 15th Regional ITS Conference*, Berlin.
Lind, J. (2005): "Ubiquitous Convergence: Market Redefinitions Generated by Technological Change and the Industry Life Cycle" *in Proceedings from DRUID Academy Winter 2005 Conference*.
Lindgren, M., J. Jedbratt & E. Svensson (2002): *Beyond Mobile. People, Communications and Marketing in a Mobilized World*, Palgrave, New York.
Linton, R. (1936): *The Study of Man*, D. Appleton-Century Company, Inc.
Longman Dictionary of Contemporary English (1978), The Pitman Press, Bath.
Lorenzoni, G. & A. Lipparini (1999): "The Leveraging of Interfirm Relationships as a Distinctive Organizational Capability: A Longitudinal Study" in *Strategic Management Journal*, Vol. 20, pp. 317-338.
Lundgren, A. (1995): *Technological Innovation and Network Evolution*, Routledge**,** London.
Maitland, C.F., J.M. Bauer & R. Westerveld (2002): "The European Market for Mobile Data: Evolving Value Chains and Industry Structures" in *Telecommunications Policy*, Vol. 26, pp. 485-504.
Malerba, F. & S. Torrisi (1992): "Internal Capabilities and External Networks in Innovation Activities - Evidence from the Software Industry" in *Economics of Innovation and New Technology* Vol. 2, pp. 49–71.
Mattsson, L-G. (1984): "Management of Strategic Change in a Market as Networks' Perspective", in Pettigrew, A. (Ed.), *The Management of Strategic Change*, T.J. Press, UK, pp. 286-314.
Mattsson, L-G. (1985): "An Application of a Network Approach to Marketing: Defending and Changing Positions". in Dholakia, N. & J. Arndt (Eds.): *Changing the Course of Marketing: Alternative Paradigms for Widening Marketing Theory.* JAI Press, Greenwich, pp. 263-288.
Mattsson, L-G. (1987): "Managing of Strategic Change in a "Markets-as-Networks" Perspective" in Pettigrew, A. (Ed.), *Management of Strategic Change*, Basil Blackwell, London, pp. 236-255.
Mattsson, L-G. (1997): "The Markets-as-Networks Approach and Economic Sociology", *Proceedings of the 13th IMP Conference*, Vol. 2., pp. 253-268

Mattsson, L-G. & J. Johanson (1992): "Network Position and Strategic Action – an Analytical
Framework" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks. A New View of Reality*, Routledge, London, pp. 205-214.
McIvor, R. (2003): "Outsourcing: Insights from the Telecommunications Industry" in *Supply Chain Management*, Vol. 8, No. 4, pp. 380-394.
McCarthy, H. & I. Tétrault (2000): *Telecommunications Regulation Handbook*, The World Bank, Washington.
McQueen, D. & R. Reid (2005): *Mobile TV: Broadcast and Mobile Multimedia. Worldwide Market Analysis and Strategic Outlook 2005-2010*, Strategic report, Informa Telecoms & Media, London.
Mead, G.H. (1932): *The Philosophy of the Present*, University of Chicago Press, Chicago.
Medlin, C. (2004): "Interaction in Business Relationships: A Time Perspective" in *Industrial Marketing Management*, Vol. 33, Issue 3 (April), pp. 185-193.
Melin, U. (2002): *Koordination och informationssystem i företag och nätverk*, (Coordination and Information Systems in Firms and Networks), Institutionen för datavetenskap, University of Linköping, Linköping, Sweden,
Melody, W.H. (1997): "Telecom Reform: Principles, Policies, and Regulatory Practices" in W.H. Melody (Ed.): *Den private Ingenjorfond*, Technical University of Denmark, Lyngby.
Melody, W. (2006): "Political Economy of ICT", lecture in Ph.D. course *Political Economy of Information and Communication Technologies – New Mobile and Wireless Communications: Technology and Market Construction*, CICT, Technical University of Denmark, 27.8.2006.
Mendonça, S. (2003): "News out of the Old: The Evolving Technological Incoherence of the World's largest Companies" in Christensen, J.F. & P. Maskell (Eds.): *The Industrial Dynamics of the New Digital Economy*, Edwar Elgar, Cheltenham.
Merriam, S.B. (1988): *Case Study Research in Education. A Qualitative Approach*, Jossey-Bass, San Francisco.
Merriam-Webster Dictionary, URL http://www.m-w.com , accessed 20.3.2005.
Merton, R.K. (1957): "The Role-Set: Problems in Sociological Theory" in *The British Journal of Sociology*, Vol. VIII, No. 2, pp. 61-65.
Miettinen, J. (2006): *Havaintoja digitv:n ensimmäiseltä 10-vuotiskaudelta Suomessa* (Observations of the first 10 years of digital TV), Department of Communication, Report No. 1/2006, Helsinki University, Helsinki.
Miettinen, R., J. Lehenkari, M. Hasu & J. Hyvönen (1999): *Osaaminen ja uuden luominen innovaatioverkostoissa* (Know-How and Creating New in Innovation Networks), Taloustieto Oy, Helsinki.
Miles, M.B. & A.M. Hubermann (1994): *Qualitative Data Analysis. An Expanded Sourcebook*, 2nd Ed., Sage Publications, California.
Miles, G., S.B. Preece & M.C. Baetz (1999): "Dangers of Dependence: the Impact of Strategic Alliance Use by Small Technology-Based Firms" in *Journal of Small Business Management*, Vol. 37, No. 2, pp. 20-29.
Mills, J.H. (2003): *Making Sense of Organizational Change*, Routledge, London, UK.
MINTC (2003): *Neljäs digitaalinen lähetysverkko. Matkaviestimillä vastaanotettavien joukkoviestintäpalveluiden markkinoiden luominen Suomeen* (The Fourth Digital Transmission Network: Creating a Market for Mass Communication Services Received by Mobile Devices in Finland), MINTC 25/2003, Helsinki.

MINTC (2004): *Telepalveluyritysten rakenne ja toimintamahdollisuudet. Kansainvälinen vertailu* (The Structure of Telecommunications Services Companies and Opportunities for Operations. An International Comparison) Report No. 16, Helsinki.
Mintzberg, H. (1990): "The Design School: Reconsidering the Basic Premises of Strategic Management" in *Strategic Management Journal*, Vol. 11, No. 3, pp. 171-195.
Möller, K. (1994): "Interorganisational Marketing Exchange: Metatheoretical Analysis of Current Research Approaches" in Laurent, G., G.L. Lilien & B. Pras (Eds.) *Research Traditions in Marketing*, Kluwer Academic Publishing, Boston, pp. 347-372.
Möller, K., & D. Wilson (Eds.) (1995): *Business Marketing: An Interaction and Network Perspective,* Boston/Dordrecht/London: Kluwer Academic Publisher.
Möller, K. & A. Halinen (1999): "Business Relationships and Networks: Managerial Challenge of Network Era" in *Industrial Marketing Management*, Vol. 28, pp. 413-427.
Möller, K. & S. Svahn (2003): "Managing Strategic Nets. A Capability Perspective" in *Marketing Theory*, Vol. 3, No. 2, pp. 209-234.
Möller, K., A. Rajala & S. Svahn (2004): *Tulevaisuutena liiketoimintaverkot. Johtaminen ja arvonluonti* (Business Networks as the Future. Management and Value-Creation), Publication of Teknologiateollisuus 11/2004, Teknova, Helsinki.
Möller, K. & A. Rajala (2007): "Rise of Strategic Nets – New Modes of Value Creation" in *Industrial Marketing Management*, Vol. 36, pp. 895-908.
Morgan, G (1979): "Response to Mintzberg" in *Administrative Science Quarterly*, Vol. 24, No.1, pp. 137-139.
Morrison, D.S. (2004): "Finland: Small Market but Perfectly Formed" in *NMA/Wireless*, 26.8.2004, pp. 10-11.
Mueller, M.L. (1999): *Digital Convergence and its Consequences* , URL http://dcc.syr.edu/miscarticles/rp1.pdf, accessed 22.10.2003.
Nadel, S.F. (1957): *The Theory of Social Structure*, The Free Press, Glencoe, Illinois.
Nagarajan, A. & W. Mitchell (1998): "Evolutionary Diffusion: Internal and External Methods Used to Acquire Encompassing, Complementary and Incremental Technological Changes in the Lithitripsy Industry" in *Strategic Management Journal*, Vol. 19, pp. 1063-1077.
Nelson, R.R. & S.G. Winter (1982): *An Evolutionary Theory of Economic Change*, Belknap Press, Cambridge, MA.
Nieminen, S. (2004): *Finnish Mobile TV. Mobile Phone TV over DVB-H network*, presentation at Tietoliikenteen maailma-foorumi, HETKY 6.5.2004, URL http://www.hetky.fi/tietoliiktoim.html, accessed 5.3.2007.
Nikkanen, M. (2006): *Essays on Interorganisational Convergence and Divergence. Case of Logistics Nets and Networks*, Laurea Publications 57, Edita Prima Oy, Helsinki.
Noam, E.M. (1987): "The Public Telecommunications Network. A Concept in Transition" in *Journal of Communication*, Vol. 37, pp. 20-48.
Noam, E.M. (1989): "International Telecommunications in Transition" in Crandall, R.W. & K. Flamm (Eds.): *Changing the Rules: Technological Change, International Competition, and Regulation in Communications*, Brookings, Washington, D.C.
Noam, E.M. (2000): "Four Convergences and a Trade Funeral?" in Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Nokia (1999): *Nokia Introduces a Combination of TV, Internet and Mobile Phone Technology*, 27.8.1999, URL http://press.nokia.com/PR/199908/776321_5.html, accessed 27.10.2007.

Nokia (2005): *Mobile TV Pilot Begins in Finland*, 8.3.2005, URL http://press.nokia.com/PR/200503/983665_5.html, accessed 12.2.2007
Nokia (2006): *Digita and Nokia Signed World's First Commercial DVB-H Mobile TV Platform Supply Contract*, 12.5.2006, URL http://www.mobiletv.nokia.com/news/showNews/?id=77, accessed 12.2.2007.
Nora, S. & A. Minc (1980): *The Computerization of Society: A Report to the President of France*, (Original: *L'Informatisation de la société*, 1978) MIT Press, Cambridge, MA.
Nordic Adviser Group (2005): *Matkaviestinverkkojen tulevaisuus* (The Future of Mobile Telecommunications Networks), Ministry of Transport and Communications 40/2005, Edita Publishing Ltd, Helsinki.
OECD (1992): *Telecommunications and Broadcasting: Convergence or Collision?*, Committee on Information Computer Communications Policy, Report No. 29, Organization for Economic Development, Paris.
OECD (2004): *Access Pricing in Telecommunications*, Paris, URL http://www.oecd.org/dataoecd/26/6/27767944.pdf, accessed 7.6.2007.
Oettinger, A. G. (1971): "Compunications in the National Decision-Making Process" in Greenberger, M. (Ed.): *Computers, Communications and the Public Interest*, Johns Hopkins Press, Baltimore, MD.
Ojala, K.T. (2004): *Telepalveluyritysten rakenne ja toimintamahdollisuudet. Kansainvälinen vertailu* (International Study of Telecommunication Service Operators), Ministry of Transport and Communications Publications 16/2004, Helsinki, 2004.
Oliver, C. (1990): "Determinants on Interorganizational Relationships: Integration and Future Directions" in *Academy of Management Review*, Vol. 15, No. 2, pp. 241-265.
Olla, P & N.V. Patel (2002): "A Value Chain Model for Mobile Data Service Providers" in *Telecommunications Policy* , Vol. 26, pp. 551–571.
Olsen, M. (1992): *Kvalitet i banktjänster* (Quality in Bank Services), Research Report 93:3, CTF, University of Karlstad.
Olsen, M.J.S. & B. Thomasson (1992): "Studies in Service Quality with the Aid of Critical Incidents and Phenomenography" in Scheuing, E.E., B. Edvardsson, D. Lascelles & C.H. Little (Eds.): *QUIS 3: Quality in Service Conference*, Jamaica, International Service Quality Association, New York, pp. 481-505.
Ono, R. (2000): "Regulatory Challenges in Convergence: Beyond Internet Telephony" in Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Örtqvist, D. (2007): *On Entrepreneur Role Stress*, doctoral dissertation, Luleå University of Technology, Luleå, Sweden.
Örtqvist, D., M. Drnovsek & J. Wincent (2007): "Entrereneurs' Coping with Challenging Role Expectations" in Örtqvist, D.: *On Entrepreneur Role Stress*, doctoral dissertation, Luleå University of Technology, Luleå, Sweden.
Paija, L. (1998): "Verkostoitumisen muodot ja riskit – taloustieteen näkökulma" (The Modes and Risks of Networking – An Economics Perspective) in Ollus, M., J. Ranta & P. Ylä-Anttila (Eds.): *Verkostojen vallankumous – Miten johtaa verkostoyritystä?* (The Revolution of Networks – How to Manage a Networked Firm), SITRA 202, Taloustieto, Vantaa, pp. 9-62.
Paija, L. (Ed.) (2001): *Finnish ICT Cluster in the Digital Economy*, ETLA, B176 series, Taloustieto Oy, Helsinki.
Parsons, T. & E.A. Shils (1951): *Toward a General Theory of Action*, Harvard University Press, Cambridge, MA.

Pelkonen, T. & N. Dholakia (2003): "Understanding Emergent M-Commerce Services by using Business Network Analysis: the Case of Finland" in Shi, N.S. (Ed.): *Wireless Communications and Mobile Commerce*, IGI Global, pp. 105-131.
Penrose, E. T. (1959): *The Theory of the Growth of the Firm*, John Wiley, New York.
Perry, C. (1998): "Processes of a Case Study Methodology for Postgraduate Research in Marketing" in *European Journal of Marketing*, Vol. 32, No. 9/10, pp. 785-802.
Palmberg, C. (2002): "Technological Systems and Competent Producers – The Transformation of Nokia and the Finnish Telecom Industry revisited?" in *Telecommunications Policy*, Vol. 26, pp. 129-148.
Palmberg, C. & O. Martikainen (2003): *Overcoming a Technological Discontinuity – The Case of the Finnish Telecom Industry and the GSM*, Discussion papers No. 855, ETLA – The Research Institute of the Finnish Economy, Helsinki.
Pennings, J.M. & P. Puranam (2001): "Market Convergence & Firm Strategy: New Directions for Theory and Research" in *Proceedings of the ECIS Conference*, Eindhoven, Netherlands.
Penrose, E. (1959): *The Theory of the Growth of the Firm*, Blackwell, Oxford.
Pfeffer, J. (1978): O*rganizational Design*, AHM Publishing company, Alington Heights.
Pettigrew, A.M. (1990): "Longitudinal Research on Change: Theory and Practice" in *Organizational Science*, Vol. 1, No. 3, pp. 267-292.
Pettigrew, A.M. (1992): "The Character and Significance of Strategy Process Research" in *Strategic Management Journal*, Vol. 13, pp. 5–16.
Pettigrew, A.M. (1997): "What is a Processual Analysis" in *Scandinavian Journal of Management*, Vol. 13, pp. 337-348.
Pisano, G. & D. Teece (1989): "Collaborative Arrangements and Global Technology Strategy: Some Evidence from the Telecommunications Equipment Industry" in *Research on Technological Innovation, Management and Policy,* Vol. 4, pp. 227-256.
Poropudas, T. (2004a): "MVNO's Taking too Many Subscribers. TeliaSonera Finland Launches its own Cut Rate Service Provider" in *Mobile Monday*, 23.5.2004, URL http://www.mobilemonday.net/mm/story.php?story_id=3631, accessed 21.3.2007.
Poropudas, T. (2004b); "ACN haukkaa leijonanosan uusista puhelinliittymistä" (ACN Conquers a Large Part of Mobile Subscriptions) in *Digitoday*, URL http://www.digitoday.fi/page.php?page_id=12&news_id=20046949, accessed 21.3.2007.
Porter, M.E. (1980): *Competitive Strategy. Techniques for Analyzing Industries and Competitors*, Free Press, New York.
Porter, M.E. (1985): *Competitive Advantage. Creating and Sustaining Superior Performance*, Free Press, New York.
Porter, M.E. (2001): "Strategy and the Internet" in *Harvard Business Review*, Vol. 79, No. 3 (March) pp. 63-78.
Puotanen, P. (2007): "Miksi mobiili-televisiosta kohistiin? (Why the noise about mobile TV?) in *Taloussanomat*, 16.5.2007, p. 3.
Powell, W.W. (1990): "Neither Market nor Hierarchy: Network Forms of Organization" in *Research in Organizational Behavior*, Vol. 12, pp. 295–336.
Powell, W.W., K.W. Koput, L. Smith-Doerr & J. Owen-Smith (1999): "Network Position and Firm Performance: Organizational Returns to Collaboration", in *Research in the Sociology of Organizations*, Vol. 16, pp. 129–59.
Potter, J. (1996): *Representing Reality: Discourse, Rhetoric and Social Construction*, Sage Publications, London.

Prahalad, C.K. & Hamel, G. (1990): "The Core Competence of the Corporation" in *Harvard Business Review*, Vol. 3, May-June, pp. 79-91.
PTS (2006): *Competition and Regulation in the Nordic Mobile Markets*, Report No. 40, PTS, URL http://www.ficora.fi/englanti/document/Competition_and_Regulation_in_the_NordicMobileMarkets.pdf , accessed 11.10.2006.
Pursiainen, H. (1992): "Katsastus telepolitiikkaan 1991-1992" (Overview of telecommunications politics 1991-1992) in *Televiestintätilasto 1992 (Telecommunications Statistics 1992)*, Liikenneministeriö, Painatuskeskus Oy, Helsinki, pp. 8-11.
Pursiainen, H. (1995): "Katsastus telepolitiikkaan 1994-1995" (Overview of telecommunications politics 1994-1995) in *Televiestintätilasto 1995 (Telecommunications Statistics 1995)*, Liikenneministeriö, VAPK-Kustannus, Helsinki, pp. 6-8.
Pursiainen, H. (1996): "Katsastus telepolitiikkaan 1995-1996" (Overview of telecommunications politics 1995-1996) in *Televiestintätilasto 1996 (Telecommunications Statistics 1996)*, Liikenneministeriö, Oy Edita Ab, Helsinki, pp. 7-10.
Ramström, J. (2005): *West Meets East. A Study of Cross-Institutional Business Relationships between Finnish/Swedish and Overseas Chinese Firms*, diss. Åbo Akademi University Press, Turku.
Reding, V. (2006): "Foreword" in Richards, E., R. Foster and T. Kiedrowski (Eds.): *Communications - The Next Decade*, Ofcom, London, UK.
Richards E., R. Foster and T. Kiedrowski (Eds.) (2006): *Communications - The Next Decade*, Ofcom, London, UK.
Riihimäki, J. (1989): "Teletekniikan kehitys" (The Development of Telecom Technology) in *Televiestintätilasto 1989 (Telecommunications Statistics 1989)*, Liikenneministeriö, Valtion Painatuskeskus, Helsinki, pp. 27-34.
Ring, P.S. & A.H. Van de Ven (1992): "Structuring Co-Operative Relationships between Organisations" in *Strategic Management Journal,*, Vol. 13, No. 1, pp. 483-498.
Ring, P.S. & A.H. Van de Ven (1994): "Developmental Processes of Co-Operative Inter-Organisational Relationships" in *Academy of Management Review*, Vol. 19, No. 1, pp. 90-118.
Ritchie, J. & J. Lewis (Eds.) (2003): *Qualitative Research Practice. A Guide for Social Science Students and Researchers*, Sage Publications, London.
Ritter, T., I. Wilkinson & W. Johnston (2002): "Firms' Ability to Manage in Business Networks: A Review of concepts", paper presented at the *18th Annual IMP Conference*, Perth, Australia.
Ritter, T. & H. Gemünden (2003): "Network Competence: Its Impact on Innovation Success and its Antecedents" in *Journal of Business Research*, Vol. 56, No. 9, pp. 745-755.
Rizzo J.R., R.J. House and S.I. Lirtzmann (1970): "Role Conflict and Ambiguity in Complex Organizations" in *Administrative Science Quarterly*, Vol. 15, No. 2, pp. 150-163.
Rockenhäuser, J. (1999): *Digitale Konvergenz und Kompetenzenmanagement*, Deutscher Unviersitäts Verlag.
Roos, I. (1998): *Customer Switching Behavior in Retailing,* Research reports No. 41, Swedish School of Economics and Business Administration, Helsinki.
Roos, I. (1999): *Switching Paths in Customer Relationships*, Doctoral dissertation No. 78, Swedish School of Economics and Business Administration, Helsinki.
Roos, I. & T. Strandvik (1996): *Diagnosing the Termination of Relationships*, Working papers No. 335, Swedish School of Economics and Business Administration, Helsinki.
Rosenfeld, S.A. (1997): "Bringing Business Clusters into the Mainstream of Economic Development" in *European Planning Studies*, Vol. 5, No. 1, pp. 3-23.

Rosenberg, N. (1963): "Technological Change in the Machine Tool Industry, 1840 – 1910" in*Journal of Economic History*, Vol. 23, No. 4, pp. 414-443.
Rumyantseva, M. & O. Tretyak (2003): "What is a Network: An Overview of Theoretical Explanations of Inter-Firm Cooperation", paper presented at the *19th Annual IMP Conference*, University of Lugano, Switzerland.
Sajari, P. (2007): "Nokia ja Yle moittivat tekijänoikeusjärjestöjä" (Nokia and YLE Reproach Content Rights Organizations) in *Taloussanomat*, 31.3.2007, p. 6.
Salmi, A. (1996): "Russian Networks in Transition. Implications for Managers" in *Industrial Marketing Management*, Vol. 25, No. 1, pp. 37-45.
Schauman, B. (2003): *Från Venus och från Mars – om jämställdhet som organisatorisk fars* (From Venus and from Mars – Equality as an Organizational Farce), Dissertation, Åbo Akademis Förlag, Åbo/Turku, Finland.
Schenker, J. (1997): "New Ways, Old Laws: It's Time for Some New Definition" in *Convergence*, Vol. 3, Autumn, p. 8.
Seppänen, K. (2007): *Nelonen Media & Mobile TV*, presentation at MobileMonday, 2.4.2007.
Selznick, P. (1957): *Leadership in Administration*, Harper and Row, New York.
Shan, W. (1990): "An Empirical Analysis of Organizational Strategies by Entrepreneurial High-Technology Firms" in *Strategic Management Journal,* Vol. 11, pp. 129-139.
Shepard, S. (2000): *Telecommunications Convergence. How to Profit From the Convergence of Technologies, Services, and Companies*, McGraw-Hill.
Schumpeter, J.A. (1934): *Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, Harvard University Press, Cambridge.
Silvermann, B.S. (1999): "Technological Resources and the Direction of Corporate Diversification: Toward an Integration of Resource-Based View and Transaction Cost Economics" in *Management Science*, Vol. 45, No. 8, pp. 1109-1124.
Skaates, M.A. (2000): "Actor Bonds in Situations of Discontinuous Business Activities", paper presented at the *16th Annual IMP Conference*, Bath, UK.
Smith, P.C. & J. Laage-Hellman (1992): "Small Group Analysis in Industrial Networks" in Axelsson, B. & G. Easton (Eds.): *Industrial Networks – A New View of Reality*, Routledge, London.
Snape, D & L. Spencer (2003): "The Foundation of Qualitative Research" in Ritchie, J & J. Lewis (Eds.): *Qualitative Research practice. A Guide for Social Science Students and Researchers*, Sage Publications, London.
Snehota, I (1990): *Notes on a Theory of Business Enterprise*, Dissertation, Uppsala University, Department of Business Studies, Uppsala.
SOU (1999): *Konvergens och förändring. Samordning av lagstiftningen för medie- och telesektorerna* (Convergence and Change. Coordination of Legislation in the Media and Telecom Sectors), No. 55, Stockholm.
Södergård, C. (Ed.) (2003a): *Mobile Television – Technology and User Experiences. Report on the Mobile-TV project*, VTT Publications 506, Edita
Södergård, C. (2003b): *Mobile Television in a Multinetwork Environment*, presentation held at VTT Information Technology, 4.11.2003.
Solomon, M. R., C. Surprenant, J.A. Czepiel, & E.G. Gutman (1985): "A Role Theory Perspective on Dyadic Interaction: The Service Encounter" in *Journal of Marketing*, Vol. 49, pp. 99-111.
Stake, R.E. (2000): "Case Studies" in Denzin, N.K. & Y.S Lincoln (Eds.): *Handbook of Qualitative Research,* 2nd Ed., Sage Publications, Thousand Oaks.

Starring, B. & P-G. Svensson (Eds.) (1994): *Kvalitativ metod och vetenskapsteori* (Qualitative Method and Science Theory), Studentlitteratur, Lund.
Steinbock, D. (2000): *Finland's Wireless Valley. From Industrial Policies Toward Cluster Strategies*, Ministry of Transport and Communications, Publication No. 36, Edita, Helsinki.
Steinbock, D. (2001a): "Assessing Finland's Wireless Valley: Can the Pioneering Continue?" in *Telecommunications Policy*, Vol. 25, pp. 71-100.
Steinbock, D. (2001b): *Finland's Wireless Valley. Pioneering, Regulation and Competition Policy*, Ministry of Transport and Communications, publication No. 13, Edita, Helsinki.
Steinmueller, W.E. (2000): "Paths to Convergence: The Roles of Popularisation, Virtualisation
and Intermediation" in Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Stevenson, W., H. Zinzow & S. Sridharan (2001): "Using Event Structure Analysis to Understand Planned Social Change" in *International Journal of Qualitative Methods*, Vol. 2, No. 2, pp. 1-17.
Stieglitz, N. (2003): "Digital Dynamics and Types of Industry Convergence: The Evolution of the Handheld Computers Market in the 1990s and Beyond" in Christensen, J.F. & P. Maskell (Eds.): *The Industrial Dynamics of the New Digital Economy*, Edwar Elgar, Cheltenham.
Stieglitz, N. (2004): *Strategie und Wettbewerb in konvergierenden Märkten*, Deutscher Universitäts-Verlag.
Stryker, S. & A. Statham (1985): "Symbolic Interaction in Role Theory" in Lindzey, G. & E. Aronson (Eds.): *The Handbook of Social Psychology*, Random House, New York, pp. 311-378.
Sztompka, P. (1991): *Society in Action: The Theory of Social Becoming*, University of Chicago Press, Chicago.
Taivala, P. (1989): "Suomen teletoimen organisaation kehittyminen" (The Development of Finnish Telecom Organization) in *Televiestintätilasto 1989 (Telecommunications Statistics 1989)*, Liikenneministeriö, Valtion Painatuskeskus, Helsinki, pp. 11-26.
Taloussanomat (2007): *It-talo palvelee isoja* (IT company serves the big), URL: http://www.taloussanomat.fi, 5.10.2007.
Tarjanne, P. (2000): "Convergence and Implications for Users, Market Players and Regulators" in Bohlin, E., K. Brodin, A. Lundgren & B. Thorngren (Eds.): *Convergence in Communications and Beyond*, North Holland, Amsterdam.
Taylor, J.R. & E.J. Van Every (2000): *The Emergent Organization: Communication as Its Site and Surface*, Erlbaum, Mahwah, NJ.
Taylor, S.S., D. Fisher & R.L. Dufresne (2002): "The Aesthetics of Management Storytelling: a Key to Organizational Learning" in *Management Learning*, Vol. 33, No. 3, pp. 313-330.
Teece, D.J (1986): "Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy" in *Research Policy*, Vol. 15, No. 6, pp. 285-305.
Teece, D.J. (1988): "Technological Change and the Nature of the Firm" in Dosi, G., C. Freeman, R. Nelson, G. Silverberg & L. Soete (Eds.): *Technical Change and Economic Theory*, Pinter, London, pp. 256 - 281.
Teece, D.J. (1996): "Firm Organization, Industrial Structure, and Technological Innovation," in*Journal of Economic Behavior & Organization*, Vol. 31, pp. 193-224
Teece, D.J., G. Pisano & A. Shuen (1997): "Dynamic Capabilities and Strategic Management" in *Strategic Management Journal*, Vol. 18, No. 7, pp. 509-533.

Televiestintätilasto 1994, 1998, 1999, (Telecommunications Statistics) Liikenneministeriö, Oy Edita Ab, Helsinki.
Televiestintätilasto 2002, (Telecommunications Statistics), Liikenneministeriö,Forssan Kirjapaino, Forssa.
The Economist (2000): *The Great Convergence Gamble*, URL http://www.economist.com/, accessed 21.10.2007.
The Economist (2006): *Your Television is Ringing*, URL: http://www.theeconomist.com, 12.10.2006, accessed 17.10.2007.
Theilen, F. (2004): ”Geschäftsmodellbasiertes Konvergenzmanagement auf dem Markt fûr mobile Financial Services”, Vol. 36 of Diskussionsreihe Bank & Börse, Springer, Bank 43 Verlag, Wien.
Thorelli, H.B. (1986): “Networks: Between Markets and Hierarchies” in *Strategic Management*
Journal, Vol. 7, No. 1, pp. 37-51.
Thorelli, H.B. (1990): "Networks: the Gay Nineties in Industrial Marketing", in Thorelli, H.B. & S.T. Cavusgil (Eds.): *International Marketing Strategy*, Pergamon, Oxford.
Turnbull, **P.W. & J.-P. Valla (Eds.) (1986)**: *Strategies for International Industrial Marketing: The Management of Customer Relationships in European Industrial Markets*, Croom Helm, London.
Tikkanen, J. & P. Tuominen (2000): “Studying Change and Dynamics in Business Relationships – The Processual Case Study Approach”, paper presented at the *16th Annual IMP Conference,* Bath, UK.
Tossavainen, S. (1996): ”Telivo OY” (in Finnish) in *Televiestintätilasto 1996*, Liikenneministeriö, Oy Edita Ab, Helsinki, pp. 22-23.
Tripp, D. (1993): *Critical Incidents in Teaching. Developing Professional Judgment*. Routledge, London.
Tripp, D. (1994): “Teachers’ Lives, Critical Incidents and Professional Practice” in *Qualitative Studies in Education,* Vol. 7, No. 1, pp. 65-76.
Turner, J.H. (1988): *A Theory of Social Interaction*, Stanford University Press, Stanford, California.
Turpeinen, O. (1997): *Telecommunications since 1796. Telecom Finland Ltd.*”, Edita, Helsinki.
Tunzelmann, N. von (1988): *Convergence of Firms in Information and Communication: A Test using Patents Data*, mimeo, Science Policy Research Unit, Brighton.
Tunzelmann, N. von (1995): *Technology and Industrial Progress*, Edward Elgar Publishing, Cheltenham.
Törnroos, J-Å. (1997): “Networks, NetWorks, NETWorks, NETWORKS” in Mazet F, Salle R & Valla J-P (Eds.): *Proceedings of the 13th Annual IMP Conference,* Lyon, 4-6 September, pp. 615-631.
Utterback, J.M. & F.F. Suárez (1993): “Innovation Competition and Industry Structure” in *Research Policy*, Vol. 22, pp. 1-21.
Van de Ven, A.H. & G. Walker (1984): “The Dynamics of Interorganizational Coordination” in *Administrative Science Quarterly,* Vol. 29, pp. 598 - 621.
Van de Ven, A.H. (1992): “Suggestions for Studying Strategy Process: A Research Note” in *Strategic Management Journal*, Vol. 13, pp. 169-188.
Van de Ven, A.H., S. Venkataraman, D. Polley, & R. Garud (1989): "Processes of New Business Creation in Different Organizational Settings," in Van de Ven A. H., H. L. Angle &

M. S. Poole (Eds.): *Research on the Management of Innovation*, Harper Collins Ballinger Division, New York.
Vesa, J. (2005): ”Regulatory Framework and Industry Clockspeed: Lessons from Finland” in *Intermedia*, Vol. 33, No. 2, pp. 10-17.
Vesaoja, J. (2005): “Mobiili-tv-pilottihanke Helsingissä” in *Tekniikan Tiedotuslehti*, No. 5, November 2005, URL http://www.yle.fi/tekniikka/tklehti?mag=6&ID=3, accessed 8.3.2007.
Voima P. (2001): *Critical incidents in internal relationships*, Dissertation, Swedish School of Economics and Business Administration, Helsinki.
Weick, K.E. (1979): *The Social Psychology of Organisation*, 2nd Ed., Random House, New York.
Weick, K.E. (1995): *Sensemaking in Organizations,* Sage Publications, Thousand Oaks, CA.
Weick, K.E. & K.M. Sutcliffe (2005): ”Organizing and the Process of Sensemaking” in *Organization Science*, Vol. 16, No. 4, July-August, pp. 409-421.
Welch, **L.S. (1999)**: “Reflections on Internationalisation Research and the Way Ahead?” in Lehtinen, U. & H. Seristö (Eds.): *Perspectives on Internationalisation*, Helsinki School of Economics and Business Administration, Helsinki.
Welch C. & I. Wilkinson (2002): “The Political Embeddedness of International Business Networks”, paper presented at the *18th Annual IMP Conference,* Dijon, France.
Wegberg, M. van (1995): *Mergers and Alliances in the Multimedia Market*, Discussion Paper, Rijksuniversiteit Limburg, Maastricht.
Wensley, R. (1995): “Critical Review of Research in Marketing” in *British Journal of Management*, Vol. 6 (December), pp. 63-82.
Wernerfelt, B. (1984): “A Resource-Based View of the Firm” in *Strategic Management Journal*, Vol. 5, No. 2 (Apr.-Jun.), pp. 171-180.
Whyte, W.F. (1982): “Interviewing in Field Research” in Burgess, R.G. (Ed.): *Field Research: A Source Book and Field Manual*, Allen & Unwin, London.
Wilkinson, I. & L. Young (2002): “On Cooperating: Firms, Relations, Networks” in *Journal of Business Research*, Vol. 55, pp. 123-132.
Williamson, O.E. (1975): *Markets and Hierarchies*, Free Press, New York.
Wilson, D. (1994): “Commentary” in Laurent, G., G.L. Lilien & B. Pras (Eds.) *Research Traditions in Marketing*, Kluwer Academic Publishing, Boston, pp. 343-346.
Wirtz, B.W (2001): “Reconfiguration of Value Chains in Converging Media and Communications Markets” in *Long Range Planning*, Vol. 32, pp. 489-506.
Wirzenius, A. (2003): *Finnish Telecom Policy 2002*, Ministry of Transport and Communications Finland, Programmes and Strategies 1/2003, Helsinki.
Yanovsky, G.G. (2002): *Evolution and Convergence in Telecommunications*, URL http://www.ssgrr.it/en/ssgrr2002/papers/262.pdf , accessed 25.4.2003.
Yin, R.K. (1984): *Case study research: Design and methods*, 1st Ed., Sage Publishing, Beverly Hills, CA.
Yin, R.K. (1989): *Case Study Research. Design and Methods*, Applied Social Research Methods Series, Vol. 5, Sage Publications, London.
Yin, R.K. (1994): *Case study research: Design and methods*, 2nd Ed.. Sage Publishing, Beverly Hills.
YLE (1999): “YLE myy kolmanneksen Digitasta Soneralle” (Yle Sells a Third of Digita to Sonera), 8.11.1999, URL http://www.yle.fi/yleista/tiedotteet1999_0811.shtml, accessed 12.7.2007.

YLE (2000):"Yle jatkaa neuvotteluja Digitan myynnistä" (Yle Continues Negotiations on Selling Digita) 8.8.2000, URL http://www.yle.fi/yleista/tiedotteet2000_0808.shtml, accessed 12.7.2007.
Yoffie, D.B. (1996): "Competing in the Age of Digital Convergence" in *California Management Review*, Vol. 38, No. 4, pp. 31-53.
Yoffie, D.B. (1997): "Introduction. CHESS and Competing in the Age of Digital Convergence" in Yoffie, D.B. (Ed.): *Competing in the Age of Digital Convergence*, Harvard Business School Press, Boston, pp. 1-35.
Zerillo, P. C. Sr. & R. Raina (1996): "Marketing Networks. A New Entrant's Approach to Network Equity" in Iacobucci, D. (Ed.): *Networks in Marketing*, Sage Publications, Thousand Oaks.

Internet sites:
Cubio Communications, URL http://www.cubio.fi, accessed 14.7.2007.
Digita, URL http://www.digita.fi, accessed 5.3.2007.
Dimes, URL http://www.dimes.fi, accessed 10.11.2007.
Elisa, URL http://www.elisa.fi, accessed 12.2.2007.
ETSI, URL http://www.etsi.org, accessed 25.10.2007.
Ficora, URL http://www.ficora.fi, accessed 7.6.2007 and 25.10.2007
Finnish Mobile TV, URL http://www.finnishmobiletv.fi, accessed 25.10.2006 and 12.2.2007.
Forum Virium, URL http://www.forumvirium.fi, accessed 22.11.2007.
GoMobile, URL http://www.gomobile.fi, accessed 10.6.2007.
Kopiosto, URL http://www.kopiosto.fi, accessed 10.10.2007.
Laajakaistainfo, URL http://www.laajakaistainfo.fi, accessed 22.11.2007.
MTV, URL http://www.mtv3.fi, accessed 12.2.2007.
Nelonen, URL http://www.nelonen.fi, accessed 12.2.2007.
Nokia, URL http://www.nokia.fi, accessed 12.2.2007.
RTT, URL, http://www.rtt.tv, accessed 22.3.2007.
SearchTelecom, URL http://searchtelecom.techtarget.com/, accessed 21.5.2006.
Spinbox/GoMobile, URL http://www.go.fi, accessed 22.3.2007.
Sonera, URL http://www.sonera.fi, accessed 24.10.2007.
Statistics Finland, URL http://www.tilastokeskus.fi/index_en.html, accessed 10.10.2007
TeliaSonera, URL http://www.teliasonera.com, accessed 24.10.2007.
Tekes, URL http://www.tekes.fi, accessed 10.11.2007.
YLE, URL http://www.yle.fi, accessed 12.2.2007.

Annual reports:
AlmaMedia, annual report 2002
DNA Finland, year 2006, URL http://www.dnafinland.fi, accessed 13.6.2007.
Elisa, annual report 1998, 1999, 2005
Ericsson, annual report 1994, 1996, 1999
Finnet Information Booklet 1998
HPY Offering Circulation 1997
Kopiosto, yearbook 2004, URL http://www.kopiosto.fi, accessed 25.10.2007.
Nokia, annual reports 1996, 1998, 1999, 2000, 2004
SanomaWSOY, annual report 2005
Sonera, annual report 1998, 2005
Telecom Finland, annual report 1994, 1995, 1996, 1998

Telia, annual report 2001, URL http://www.telia.se, accessed 14.6.2007.
TeliaSonera, annual report 2004, annual review 2005
Tele2, annual Review 2005, URL http://www.tele2.com, accessed 3.2.2007.
YLE, annual report 2005

APPENDIX 1
Interview guide

I. Change in (mobile) telecommunications

1. How has the industry changed and developed during 1985-2005?
   Has the structure of the industry changed?
   Which critical events have led to change?
   How have actors adapted to change?
2. How has regulation/legislation affected the business environment in telecommunications?
3. Who were the central actors in 1985, 1990, 1995, 2000 and 2005?
   Have new actors entered the market? Which ones and how have they positioned themselves? How have new actors affected the business processes of actor X?
4. Has the core competence of telecom actors changed? How?
5. Has the position of telecom actors in the value chain changed? How?
6. Other comments or opinions on industry change 1985-2005

II. Actors in (mobile) telecommunications

1. How would you describe cooperation between mobile communications actors?
   At which level is cooperation and partnerships done?
2. How would you describe the relationships between telecom actors?
   Describe the relationships to your most important partners.
   Describe the relationships your partners have to third parties. Do they affect company X? How and why?
   Draw a network picture.
3. Do actors engage in business networks in telecommunications?
   Which kind of business networks?
   Which actors participate in forming business network(s)?
4. Which kind of roles do business network members have?
5. Have the position of actors in business networks changed? How?
   Has the position of company X changed? How and why?

III. Convergence

1. How would you define convergence?
2. How have the actors in the telecommunications field perceived convergence?
   Were/are the perceptions different at different points in time?
3. Which are the drivers of convergence?
4. Which are the outcomes of convergence?
5. Does convergence influence the telecommunications field?
   Does it show in business operations? How?
6. Have new markets, industry sectors, sub-industries or equivalent emerged in Finland?
7. Does convergence affect roles and positions of telecom actors? How and why?
8. Can an actor benefit from convergence? How?

Other possible comments or opinions?

APPENDIX 2
Actor landscape in Finnish mobile telecommunications

RSL Com
RSL Com entered the Finnish telecommunications market in 1999 through a deal with Sonera. RSL Com has made its mark in the telecommunications world during the late 1990s by offering long distance and international phone calls to businesses, as well as consumers (Gold, 1999). RSL Com has concentrated on offering mobile services mostly to small and medium sized companies as well as corporate customers. RSL Com merged with Finnet in 2003, but operated in the Sonera network still in 2004 (TeliaSonera AR 2004). RSL Com still operates in Sonera's network even though Finnet owns the company.

Telia Mobile
Telia's presence in the Finnish mobile communications market started around 1997 when Telivo was sold to Telia. Telia later on established Telia Finland, focusing on offering fixed voice services and in 1998 Telia Finland started offering mobile communications services. In 1998 Telia Finland had 8 000 customers compared to 239 000 in 2001 (Telia AR 2001, p. 73). In 2001 Telia AB sold Telia Finland Oy to Song Networks. The reason was the company's wish to concentrate on mobile communications. Telia Mobile Finland continued its operations. Telia Mobile's early strategy was to cover only the largest cities in Finland but it did not suffice to keep the business running. Telia only acquired between 300 000 and 400 000 subscriptions based on this strategy (Informant X36). The country manager was replaced and Telia Finland went in for building full national GSM coverage. In 2002 Telia Mobile rationalized the retail outlet business, merging the two store chains Viestituote and Telia Vaihtoehtoliike. In 2002 Telia owned own stores in about 50 cities and towns in Finland. In 2004 mobile telephony sales for Telia Mobile Finland increased by 44% (300 000 customers primarily in the prepaid segment) (TeliaSonera AR 2001). However, on May 12, 2003 DNA Finland reached an agreement with TeliaSonera about the acquisition of Telia Mobile Finland's operations. Telia and Sonera were planning a merger and the disposal of Telia Mobile Finland had been required by the EU for approval of the merger between Telia and Sonera.

Saunalahti
The expansion of Saunalahti into an MVNO has a long history (MINTC, 2004). In 1998 twelve Internet service providers (ISPs) consolidated into Sauanlahden Serveri and the same year (as well as during 1999) portal and mobile portal operations started. An expansion to the network business followed in 2000 through company acquisitions and virtual mobile network operations took place in Sonera's network between 2001 and 2004. Elisa purchased Saunalahti in autumn 2005. Since 2004 Saunalahti has operated in Elisa's network. Between 2003 and 2006 Saunalahti also resold network capacity to Hesburger, which functioned as a sub-MVNO, reselling Saunalahti services under the Hese-subscription. In relation to service operators an MVNO controls a larger entity of the value chain. Players with MVNO status in Finland are Saunalahti and Aina Group. For instance, becoming an MVNO allowed Saunalahti to access termination and interconnection costs as incomes. Termination costs form around one third of a network operator's incomes. Saunalahti can also route traffic between different networks and its own. This fact increases Saunalahti's cost efficiency and market power in

relation to the other players. Traffic can be routed through the most cost effective route. This increases the negotiation power with other network operators as Saunalahti is in the position to move their traffic to competing networks (Informant X29). Earlier, in its role as a service provider, Saunalahti's traffic was owned by Sonera, in whose network Saunalahti operated at the time. In the MVNO model Saunalahti owns its own traffic and routes it to other networks. Informant X22 comments that Sonera and Saunalahti had together built Sonera's business and when Saunalahti grew in size it also started to look for alternative partners and made them compete against each other. Saunalahti ended up in Elisa's network, which meant that half a million customers' traffic disappeared from Sonera's network. The size and increased power of Saunalahti had large consequence for Sonera.

Tele2

Tele2 is a virtual operator, which originally was established in Sweden as Netcom. In 1999 Tele2 (at that time named NetCom) acquired 20% of the shares and votes in Suomen 3G Oy[10], owned by the Finnet companies and specialized on network capacity. Through the ownership Tele2 was authorized to act as a service provider in Finland and officially activated operations in 2000 by offering pre-paid cards for international and domestic fixed calls as well as fixed telephony. Internet services were introduced in 2002. The strategy was to compete on low prices for mobile telephony. In February 2004, Tele2 launched mobile telephony under an MVNO agreement with Elisa (Radiolinja at that time). Through the ownership in Suomen 3G, Tele2 also had access to a UMTS license. Tele2 was run cost-efficiently with only four employees, but still, operations discontinued in 2005 "as a result of poor regulation and the competitive situation in general" (Tele2 Annual Review 2005, p. 4). Tele2 offered the cheapest subscriptions on the market but once the price war started Tele2 had to give up its operations on the Finnish market.

Aina Group

Aina Group is based on three industry sectors, namely media, information technology and telecommunications. The company started operations based on this structure under the HPO-Yhtymä Oyj name in 2001 when locality was termed the core of the company's competition strategy. HPO-Yhtymä consisted of Hämeen Puhelin Oy (local telecom company), Hämeen Sanomat Oy (local news paper) and Hämeen Tietotekniikkakeskus Oy (local IT company). These areas were merged in order to form a local service solution. The local news paper company Hämeen Sanomat Oy had the role of content provider and developer. In the early days HPO-Yhtymä represented DNA Finland and sold their mobile subscriptions, but in 2003 the cooperation with Finnet ended and HPO-Yhtymä sold shares in Finnet-companies and chose Sonera as their main cooperation partner. In 2004 the company changed name to Aina Group and it also stated that it aims at becoming both a national and international player at some point. In 2004 a mobile subscription Armas was launched, which was the product of the local approach that Aina Group had developed based on its unique organizational structure as well as business goal. Armas is marketed as the only "global village subscription" and is offered in cooperation with news papers and local entrepreneurs, offering the subscriber benefits in forms of local news, discounts etc. At the end of 2006 there were around 30 000 subscribers of the service. In terms of serving business customers Aina Group expanded to the Helsinki area in 2005 and thus left its strategy of being a local player behind.

[10] Suomen 3G Oy was a greenfield operator who owned a 3G license.

ACN

ACN Communications, a network marketing company, was a virtual operator. In Finland its operations was run through Sonera's network. The company entered the Finnish market in November 2003 and managed to attract quite a large number of subscribers by offering free mobile phone calls among ACN customers. ACN had a market share around 3% by the end of 2004. However, ACN ran into problems with the Finnish regulatory body, as the customers were not satisfied with the service. Eventually ACN withdrew from the Finnish market due to that the market situation had changed so much during the year and the Finnish market was now less attractive for the company. At its peak, ACN had between 250 000 and 300 000 subscriptions (PTS, 2006). ACN customers were transferred to Tele Finland in 2004. In practice this means that the network capacity provider of ACN bought ACN's customers. ACN has mainly been thought of as a cream skimming actor.

Fujitsu Services

Fujitsu Services Oy is an IT service provider or a service operator competing directly with telecommunications companies. The company entered the fixed communications market in 1999 and acts as a mobile operator since 2003 and has 30 000 mobile customers (Taloussanomat 5.10.2007). The focus is on large companies and complete ICT solutions. Fujitsu services started developing mobile services already during the 1990s. According to Kiiski and Hämmäinen (2005) Fujitsu Services use the MVNO strategy of service differentiation: they integrate GSM subscriptions to a complete, customized IT offering targeted mostly at large enterprises.

Kolumbus

Kolumbus is a virtual operator owned and operated by Elisa, similarly to the case of Tele Finland for Sonera. For instance, Informant X2 questions whether Kolumbus can be regarded as a pure mobile service provider and argues that Kolumbus is merely a product or a brand.

MTV

MTV Oy is a part of the Alma Media Corporation and manages commercial television and radio broadcasting. MTV is responsible for the national channels MTV3 and Subtv. MTV reaches around three million Finnish viewers every day (MTV3, 12.2.2007). During 2004 MTV acted as a service operator, offering mobile subscriptions under the brand name "MTV3 Handy". The WAP-service, also named MTV3 Handy was launched during the very last days of the year 2003 in order to prepare for the launch of mobile subscription services in Elisa's network. The service did not succeed and MTV3 managed to attract only a few thousand customers. For more details on MTV and its endeavors in the telecommunications industry, see chapter 7.

Pgfree

Pgfree is owned by Portuguese-based Valuengine Telecommunicacoes e Servicos Limitada. The Swedish network marketing company Seven Oy distributed subscriptions in Finland. Pgfree operated as a virtual operator in Suomen 2G's network (today DNA). In early 2004 Pgfree had attracted 20 000 mobile customers based on network marketing (Poropudas, 2004b). DNA bought Pgfree's mobile customers in June 2005 and 3 000 customers were transferred to DNA (Kotilainen, 2005). Pgfree operated barely two years on the Finnish mobile communications market.

Cubio Communications
Cubio Communications is mainly concentrated on providing Internet and telephony solutions to its customers, but the business portfolio also contains mobile subscriptions. Cubio Communications offer mobile services by Elisa via Elisa's network (Cubio Communications). The company is registered in Luxembourg and owned by Russian Complus Holding. Cubio Communication serves mainly the people originating from Russia.

Spinbox/GoMobile
Spinbox is originally a Swedish company with the aim of giving organizations an opportunity to offer mobile services under their own brand without having to own or operate networks or back office functions. Spinbox was the very first to launch a mobile virtual network enabler (MVNE) (Gomobile, 2007) and started operations in Finland in 2004. In January 2005 Spinbox became 100% GoMobile and had, at this time, around 80 000 active mobile subscribers, of which the majority possessed a pre-paid card (Spinbox, 22.3.2007). Spinbox offers Go Mobile-subscriptions especially to consumers aged 15-24, and operates in DNA Finland's network. Aina Group acquired GoMobile in June 2007 and 50 000 prepaid customers were transferred to Aina Group. Subscriptions are sold via 700 kiosks around the country (R-kioski).

Tele Finland
Tele Finland is a virtual operator owned and operated by Sonera. The establishment of Tele Finland in 2004 is generally seen as an answer to a tough price war. Tele Finland has operational independence in order to maximize its agility. The company operates under its own management and own brand, as its service concept differs from Sonera's service concept. The development of offerings, sales and marketing is handled outside the Sonera organization. According to Poropudas (2004a), the company's aim is "to offer competitively priced basic mobile subscriptions by minimizing its administrative, marketing and delivery costs. The main idea was to offer Sonera's services via Tele Finland, but to a lower price by keeping the expenses down." Kiiski and Hämmäinen (2005) point out that this brand operator strategy allows incumbent operators to try out new marketing concepts and low prices without losing their credibility in 'premium' user segments. Customers in this segment are still ready to pay the premium prices and create the main income of Sonera.

Brand operators in mobile communications
A brand operator exploits its strong brand in seeking new business opportunities. Virgin is an example of a strong brand that has carried out successful brand extension strategies into fields, such as mobile communications, airlines, music etc. An operator may choose to rely on its brand in order to gain customers and is thus referred to as a *brand operator* (cf. Kiiski & Hämmäinen, 2005).

Stockmann Dial
Stockmann is a large department store with seven stores in Finland and a few in Estonia and Russia. The key that Stockmann sees in offering mobile services is the customizable features of a mobile phone. In December 2001, Stockmann and Elisa introduced to the Finnish public the concept of Stockmann Dial. This product is offered to Stockmann's loyal customer cardholders and is a part of Stockmann's overall Loyal Customer campaign. Loyal customers can thus avail of a mobile phone with the full range of Elisa's mobile telecommunication services. The offer is packaged with a ready service and maintenance guarantee. The service is

available primarily to loyal customer cardholders, whose billings will be received via their Stockmann account and may also be debited to the same account. The service package includes sending information about new offers every month to the subscription holder. During the past few years, Stockmann has only marketed Stockmann Dial in its monthly loyal customer programme, where a booklet of special offers is sent via post. Stockmann thus offers mobile services as a value added service to its loyal customers and more or less as a brand extension.

Markantalo/Choice
Markantalo is a Finnish home electronics department store chain. Markantalo launched a mobile subscription service concept named Choice in cooperation with Elisa. The service was available between July 2003 and July 2004. Choice was offered in conjunction with the Elisa Tandem Aina subscription and included extra services and features.

Hesburger
Hesburger is a national fast food chain, which in 2003 started offering mobile subscriptions under the "Heseliittymä" (Eng. Hese subscription) brand name to both residential and corporate customers. Hesburger offered the service in cooperation with Saunalahti in Sonera's network. There are around 200 Hesburger restaurants in Finland and the Baltic states. The service was terminated in 2005 due to falling prices of mobile calls. Hesburger has since experimented with offering WLAN and hotel rooms to its restaurant customers. The latest innovative service which Hesburger is pursuing is VoIP, due to the fact that Suomen Puhelin (a company which develops VoIP solutions) is Hesburger's subsidiary.

Passeli
Passeli is an accounting management software producing company that acted as a virtual operator in cooperation with Saunalahti in 2004. Further details of the subscription are not available.

SK Mobile
Sedu Koskinen is a business man that has created a chain of restaurants around Finland. A loyalty card or bonus card is available for customers of these restaurants. Regular customers may choose the SK Mobile subscription since the year 2004. SK Mobile functions in Sonera's network. Customer benefits include reduced prices for drinks, invitations to special events, free entrance to SK restaurants etc.

SVENSK SAMMANFATTNING

I dag har vi som användare av telekommunikation ett stort urval tjänster; vi kan prata gratis via Internet (t.ex. Skype), vi kan betala för tjänster och produkter via SMS, vi kan läsa nyheter och e-post på mobilen, vi kan surfa på Internet med hastigheter som ingen kunde drömma om för tio år sedan - vi kan t.o.m. titta på TV med mobila terminaler (DVB-H, 3G). Sedan NMT-perioden då de nordiska telekomoperatörerna samarbetade kring uppbyggandet av trådlös telefoni, har aktörer inom branschen aktivt skapat och format marknaden för telefonitjänster som i dag konsumeras av gemene man i de västerländska länderna. Med tanke på dagens teknologiinriktade samhälle är det dock svårt att se telekommunikationsbranschen som enbart tillhörande och bestående av telekomoperatörer. I dag agerar företag specialiserade på informationsteknologiska lösningar, innehållsproducenter för olika medier och andra teknologifokuserande företag på samma marknad som telekomoperatörerna. Den teknologiska utvecklingen har medfört att företag med annan kärnkompetens än telefonitjänster har kunnat ta sig in på marknaden. Exempelvis, IT-företaget TietoEnator samlar ihop mobiltjänster för att erbjuda dem till mobiloperatörer, mobiltelefonstillverkare övergår till att även upprätthålla mobiloperatörernas infrastruktur, från att tidigare enbart ha sålt utrustning och teknik. På samma sätt har telekombolag expanderat sin repertoar genom att erbjuda t.ex. IT-lösningar och innehållstjänster, endera ur sitt eget sortiment och/eller i samarbete med media- och/eller IT-företag.

Gränserna mellan olika industrier håller därmed på att suddas ut – ett fenomen som allmänt benämns som *teknologisk konvergens*. Konvergens innebär att någonting integreras; det kan handla om t.ex. teknologier (telefoni och Internet), företag (AOL och Time Warner), industrier (telekom, media och IT-branscherna), tjänster (mobilt TV), produkter (PDA) osv. Konvergens som sådan kan sägas vara en del av telekommunikationsbranschen och dess kontext, och formar därmed den affärsomgivning som företagen befinner sig i. Konvergens har studerats främst ur ett teknologiskt perspektiv (se t.ex. Teece, 1986; Anderson & Tushman, 1990; Stieglitz, 2003; Hacklin, 2006), medan denna avhandling ämnar förstå konvergens ur ett företagsekonomiskt perspektiv, dvs. vilken betydelse har konvergens för telekommunikationsindustrin i Finland och företag som är aktiva däri. Förändring är ett viktigt ord i detta sammanhang, då själva begreppet konvergens antyder dynamik, dvs. konvergens i form av processer leder till förändring i olika sammanhang och på olika nivåer. Teknologisk utveckling inom telekom gör branschen utmanande i det avseende att företag konstant måste vara aktiva. Slutanvändarnas preferenser förändras snabbt och konkurrenternas innovativa lösningar utgör både hot och möjligheter för telekomföretag i dag. Hur kan då ett företag aktivt inom telekombranschen förstå och tolka utvecklingen och de krav som ställs för att företaget ska (för)bli framgångsrikt? Hur påverkar förändringsprocesser affärsomgivningen och industrikontexten som dessa företag befinner sig i? Hur tolkar företaget förändringsprocesser och kan förståelsen för förändring omvandlas till slagkraftiga strategier? Studien har vägletts av ett antal tillsvidare obesvarade frågor som tangerar den externa affärsomgivningens roll i utveckling och förändring av företagens roller på marknaden.

En närmare granskning av den finska telekomindustrins utveckling visar att 1980-talets aktörer agerade självständigt medan dagens telekomföretag eftersträvar samarbete, främst genom utlokalisering och projektbaserade relationer till konkurrenter, leverantörer och företag ur närliggande branscher. Avhandlingen har specifikt undersökt samarbetsmönster mellan

telekomföretag genom att anamma ett närverksperspektiv. Marknaden ses då som bestående av ett nätverk av aktörer (företag) som är bundna till varandra genom olika typer av relationer (konkurrent, köpare-säljare, kund, strategisk partner etc.). Konvergenstänkandet bidrar till att affärsnätverken får ytterligare en dimension av dynamisk natur.

Avhandlingens syfte och forskningsfrågor

Avhandlingens syfte är därmed att studera förändringsprocesser och deras inverkan på affärsnätens[11] dynamik. Den finska telekomsektorn, som i sig karakteriseras av konvergens, används som exempel. Från ett teoretiskt perspektiv är målet att bidra med kunskap om hur konvergens uppfattas och definieras inom telekombranschen samt att utvärdera vilket inflytande konvergens har på aktöernas affärsomgivning och samarbetsmönster (interaktion mellan aktörer i affärsnätverk). Den finska telekomindustrin analyseras under tidsperioden 1985-2005 i syfte att förstå orsakerna till den rådande industristrukturen och –karaktären. Konvergens å sin sida definierar och inbegriper industridynamik. Den empiriska analysen avser utveckla existerande teorier on nätverksdynamik och konvergens. Följande övergripande forskningsfrågor har formulerats

- Vilka kritiska händelser har lett industriförändringsprocessen i den finska telekommunikationssektorn under åren 1985-2005?
- Vilken betydelse har konvergens för utvecklingen av den finska telekommunikationsmarknaden?
- Hur påverkar konvergensprocesser aktörernas roller och positioner i specifika affärsnätverk i den finska telekommunikationssektorn?

Studien är därmed geografiskt avgränsad till aktörer inom den finska telekommarknaden och tidsmässigt till perioden mellan 1985 och 2005. Stora teknologiska framsteg togs i medlet och slutet av 1980-talet (automatisering, digitalisering, mobiltelefoni etc.) och avreglering av marknaden inleddes, vilket gör 1985 till en motiverad start för analysen. Analysen avslutas med år 2005 för att undgå accessproblem. Därmed avspeglar avhandlingen läget som det var år 2005.

Den teoretiska referensramen

Den teoretiska referensramen i avhandlingen består av ett industriellt nätverksperspektiv som i huvudsak baserar sig på IMP-gruppens[12] forskning inom området och utgår ifrån att aktörer (företag) är inbäddade i affärsnätverk. Detta nätverksperspektiv lägger stor vikt vid olika former av långsiktiga förbindelser mellan företag. I avhandlingen har begreppen roll och position samt nätverksförändring lyfts fram som centrala begrepp, med vilka den finska telekombranschen har studerats i detalj. Nätverksdynamik har undersökts inom IMP-traditionen av bl.a. Henders (1992), Håkansson och Snehota (1995b) samt Halinen m.fl. (1999). Anderson m.fl. (1998) kopplar ihop nätverksdynamik med begreppen *roll* och *position*, vilka utgör måttstockar på förändring i nätverk (t.ex. genom att jämföra en aktörs roll och/eller position vid olika tidpunkter, t_0 och t_1). En position i ett nätverk definierar ett företags ageringsmöjligheter och beskriver hur företaget förhåller sig till andra aktörer inom nätverket. Enligt Henders (1992) påvisar position hur ett företag passar in i ett industriellt

[11] Affärsnät definieras som lokala koncentrationer inom nätverk (Easton, 1992). Detta innebär att man fokuserar analysen på en mindre och avgränsad del av ett affärsnätverk.

[12] Industrial Marketing and Purchasing

system. En aktörs roll i nätverket, å andra sidan, indikerar vilka intentioner ett företag har och hur företaget skapar mening av sin position, dvs. hur uppfattar företaget sin position på marknaden och i relation till andra aktörer i företagets omedelbara omgivning. Ett företags roll beskriver därmed den dynamiska aspekten av företagets position.

Konvergensrelaterad forskning har sammanfattats och utvärderats för att slutligen placeras in i telekombranschens kontext. Konvergensrelaterade teorier hittas främst i forskning kring teknologisk utveckling, innovationer, industriförändring och –dynamik samt frågor som berör lagstiftning och reglering inom branschen. Konvergensprocesser drivs av företag, teknologiska faktorer (teknologisk förändring, digitalisering, Internet och IP-teknologi) och socioekonomiska faktorer (liberalisering, lagstiftning och globalisering). Två större kategorier av konvergens kan identifieras i litteraturen, nämligen *teknologisk konvergens* och *industrikonvergens*. En övergripande definition av konvergens är dock svår att hitta i litteraturen och det är oklart vad konvergens innebär specifikt för telekommunikation. För att förstå industriförändring och -kontext är det därmed av yttersta vikt att även förstå vad konvergens betyder och medför för företag. Utgående från en teoretisk genomgång av konvergensrelaterad forskning har följande allmänna definition av konvergens formulerats: *konvergens är en förändringsprocess som startas av teknologiska, socioekonomiska och organisatoriska krafter och leder till avlägsning eller förändring av traditionella industrigränser. Processen strukturerar och möjliggör nya resurskonstellationer och leder slutligen till konvergens av industrier i form av underkategorier till industrier, nya affärsekosystem och nya marknader.* Denna definition jämförs senare med uppfattningar om konvergens inom den finska telekombranschen mellan 1985 och 2005.

Vilken metod har använts?
Den teoretiska referensramen användes som bas vid uppgörandet av en intervjuguide. Avhandlingen baserar sig på 39 intervjuer med representanter för telekom-, IT- och mediabolag samt institutioner ansvariga för telekomrelaterad lagstiftning i Finland. Industriexperter har även intervjuats. Intervjuerna ägde rum mellan oktober 2005 och april 2007 och fokuserade sig på olika aspekter av (1) företagsnätverk, roll och position, (2) telekomindustrins utveckling och (3) konvergens. Utöver intervjumaterial har årsrapporter och dylika publikationer analyserats. I och med att avhandlingens syfte är att besvara frågor av typen *hur* och *varför* används metoder som fokuserar på att analysera snarare än att mäta förändring. Avsikten är att beskriva förändring och anpassa den till en större kontext genom att ta fasta på faktorer som deltagarna i denna studie anser bidra till förändring eller konsekvenserna av förändring. I avhandlingen tillämpas kritisk händelse-analys (Edvardsson & Roos, 2001), historisk rekonstruktion och ett sensemaking-perspektiv (Weick, 1995), vilket innebär att man skapar mening. Verkligheten anses vara en social konstruktion (cf. Glaser & Strauss, 1967), vilket betyder att forskaren i intervjusituationen tillsammans med informanterna skapar verkligheten.

En pilotstudie med åtta informanter genomfördes i oktober-december 2005, vilket möjliggjorde en omarbetning av den teoretiska referensramen och intervjuguiden. Pilotstudien påvisade att aktörer inom branschen genomgår en förändringsprocess där roller och positioner inom såväl affärsnätverk som på marknaden håller på att formas och skapas. Fokuseringen på roll och position har därmed tagits med i avhandlingen efter pilotstudien och ingick som fokus i intervjuguiden för de efterkommande intervjuerna. Detta återspeglar även studiens abduktiva forskningsprocess, som möjliggjort att de teoretiska och empiriska delarna av avhandlingen

har uppkommit parallellt. I takt med intervjuerna klarnade även fallstudierna, dvs. två mindre fallstudier används i avhandlingen som exempel på förändringar i roll och position till följd av konvergens (MTV3 Handy) och hur konvergenstänkande rättfärdigar strategier där företag träder över industrigränser för att söka nya affärsmöjligheter (Aina Group). En större fallstudie har gjorts om mobilt TV, där affärsnätverket bakom en konvergerande tjänst analyserats i detalj och där avsikten är att påvisa att samarbete är en viktig del av dagens telekomindustri, i motsats till hur läget såg ut under det sena 1980-talet och tidiga 1990-talet. Samarbetet har en projektartad natur, som inte tidigare studerats i hög grad inom IMP-traditionen. Konvergenstänkandet har i mobil-TV-fallet lett till att ett antal aktörer ser det som nödvändigt att samarbeta, men tillika uppstår friktion beträffande vilken position ett företag har i förhållande till andra aktörer. Ett företag befinner sig inte alltid i den position det önskar och kan därmed ha begränsat handlingsutrymme. Å andra sidan möjliggör konvergensprocesser nya roller för företaget, vilket fallet med MTV3 Handy påvisar: MTV, ett traditionellt mediebolag skapade en ny roll som tjänsteoperatör inom telekombranshen i syfte att komma närmare slutanvändaren och få en del av den lukrativa mobil- och bredbandsmarknaden.

Avhandlingens resultat och svar på forskningsfrågorna

De kritiska händelserna som skett i den finska telekomindustrins utveckling kan sammanfattas i kategorier baserade på (1) aktörs- och konkurrentomgivningen, (2) teknologi och (3) lagstiftning. Från att ha utgått från en duopolsituation (Post och Telestyrelsen samt de lokala telefonbolagen) fanns det i slutet av år 2005 tre starka aktörer på marknaden, TeliaSonera, Elisa och Finnet (DNA Finland). Avregleringen av marknaden är till en stor del ett resultat av etableringen av Datatie och Radiolinja, som därmed ses som kritiska händelser i utvecklingen av industrin. Upprättandet av DNA Finland som landets tredje mobiloperatör är vidare en kritisk händelse i och med att många anser detta vara starten på priskriget mellan mobiloperatörerna (som ytterligare fick fart tack vare införandet av nummerportabilitet 2003). Hype-perioden 1998-2002 birdrog till förvirrning av roller och motiverade tillsammans med konvergenstänkande stora investeringar. Denna tidsperiod färgar även förståelsen av konvergens. Beträffande den teknologiska dimensionen är utvecklingen av mobil teknologi, mobila terminaler och Internet avgörande processer som format industrin. Digitalisering i sig är en kritisk händelse som resulterat i konvergens, främst på en teknologisk nivå. Lagstiftning å sin sida har lett till liberalisering av telekommarknaden redan före andra europeiska länder, vilket även lett till problem då EU-lagstiftning ska implementeras, i och med att den sällan tar i beaktande den finska telekommarknadens unika historia, struktur och särdrag. Införandet av tjänsteoperatörsmodellen och nummerportabilitet är resultat av EU-lagstiftningen och har haft stor betydelse för mobiloperatörernas strategier och relationer till varandra. Aktörer inom branschen har traditionellt arbetat självständigt, vilket i dag är närapå omöjligt; ett antal samarbetsprojekt och –organisationer har uppstått under 2000-talet i syfte att samla resurser under ett och samma tak, vilket i sin tur sänker på tröskeln att samarbeta för att åstadkomma innovativa produkter, tjänster och lösningar. Affärsnätverk inom den finska telekommarknaden hittas närmast inom teknologi- och produktutveckling, medan t.ex. mobilt TV är ett exempel på samarbete där syftet är att skapa en ny marknad och en ny tjänst som gagnar alla deltagare i nätverket, allt från mobiltelefontillverkare och innehållsproducent till slutkunder och användare av tjänsten. Nätverket i sin tur består av aktörer som besitter de nödvändiga resurserna för att slutföra projektet.

Konvergens från ett teoretiskt perspektiv indikerar att processen startar på en teknisk/teknologisk nivå för att slutligen uppnå integration av hela industrier. Konvergens

mellan telekom-, media- och IT-sektorena har diskuterats sedan tidigt 1980-tal, men bevis därpå låter vänta på sig. Uppfattningar om konvergens bland aktiva inom industrin påvisar dock att industrikonvergens inte har ägt rum, fastän industrigränserna har suddats ut i en viss mån. Den rådande uppfattningen av konvergens är att den innebär en övergång från traditionell infrastruktur (PSTN) till IP-baserad infrastruktur, vilket i sin tur innebär att konvergens är enbart en teknisk process. Det faktum att intervjuobjekten inte tror att industrikonvergens äger rum skvallrar även om tolkningen av konvergens som fenomen och process; under 1990-talet innebar konvergens en allvarlig identitetskris med rollsökande och rollkonflikter, medan uppfattningar om konvergens år 2005 indikerar acceptans av konvergens som påverkande faktor. Själva processen hur individer förstår och skapar mening av sin omgivning har studerats genom intervjuerna och påvisar att uppfattningen av konvergens är beroende av tolkning av det förflutna, nuet och framtiden. Förståelse för konvergens under 1980- och 1990-talen formar därmed den nuvarande uppfattningen om konvergens, liksom framtida förväntningar på konvergensprocesser. Baserat på avhandlingens empiriska analys har definitionen av konvergens omarbetats. Konvergens definieras som *en process som tvingar telekomaktörer att utvärdera sina roller och positioner på en marknad och samverka i affärsnätverk i syfte att få tillgång till de resurser som krävs i en konvergenskarakteriserad affärsomgivning*.

Företag inom branschen har svårt att i dag självständigt stå för nya produkt- och tjänstelanseringar. Detta beror delvis på en låg lönsamhet inom sektorn och stark konkurrens, men också på låg innovativitet och mindre flexibla organisationsstrukturer. Företag har de senaste åren gått igenom ”identitetskriser” där roller och positioner definieras om utgående från konvergenstrycket. Detta kan bero på en önskan att komma närmare slutkunden eller en önskan att nå alternativa inkomstkällor (t.ex. mediebolag som traditionellt inte haft kontakt med slutkunden men som trots det har stark varumärkesmedvetenhet bland slutkunderna). I ett affärsnätverk kan ett företag ha flera roller utgående från företagets position. Å andra sidan kan agerande i en alternativ roll leda till förändringar i företagets underliggande position, vilket gör rollförändring till en metod att navigera i den alltmera konvergensbaserade telekomvärlden. Roller kan även användas för att hantera affärsnätverk och etablera position inom närverkets ramar. Roller är långt bundna vid företagets resurser och utgör därmed även ett visitkort för vad företaget kan bidra med inom nätverket.

Avhandlingen påvisar att externa händelser och industrikontexten påverkar dynamiken i ett affärsnät. Konvergens kan ses som en specifik typ av förändringsprocess inom nätet på samma sätt som det kan ses som ett karaktärsdrag inom telekomindustrin i Finland. Tidigare forskning poängterar förändringar i relationer mellan nätaktörer som den huvudsakliga orsaken till nätverksdynamik, medan denna studie inte hittar bevis för att relationerna i sig förorsakar förändring. Snarare möjliggör konvergensprocesser och industrins utveckling processer, där aktörerna medvetet skapar sin omgivning genom att agera i olika roller, t.ex. över industrigränser. Samtidigt kan ytterst få telekomaktörer ensamma vidareutveckla marknaden och tekniska lösningar – samarbete mellan aktörer krävs, vilket också innebär att företag satsar på utbyte av information och resurser i relationen för att uppnå resultat.

Before the information revolution of the late 20th century, the sectors for telecommunications, IT and media were considered to deploy different technologies, produce different kinds of services and products, and studied as different academic fields. Convergence, on the other hand, refers to the growing interdependency among these industries; convergence implies that actors are dependent on each other's resources, also those active outside traditional telecommunications industry borders. Actors in the industry are forced to re-evaluate their roles and positions as the development continues and the technological bases of companies in the sectors of telecommunications, media, broadcasting and IT increasingly start to resemble and substitute each other. Today it is possible to view TV in mobile devices, make calls over the Internet and use a mobile terminal as a camera. Technological development clearly forces actors in telecommunications to act and react. One way of coping with convergence is through business networks, which form a pool of resources and assets for its members. A network consists of invisible relationships. A historical review of the Finnish telecommunications sector reveals that contrary to the 1980s and 1990s, actors in the field are increasingly acting as members of business networks in order to develop core competencies, business, innovative services and products etc. The study focuses on investigating dynamics within business nets as a result of convergence processes and suggests that role confusion and identity crisis are a likely result of convergence in telecommunications.

Åbo Akademi University Press
ISBN 978-951-765-435-7

978951765435-7
9789517 654357