Trond Haga, IRIS

Orchestration of networking processes

PhD-thesis

Preface

The dissertation has been written within the PhD-program 'Enterprise development and work life research' EDWOR), operated by The Norwegian University of Science and Technology (NTNU). The program has been fortunate to have the support of a very competent international staff, making the program an adventure for the students that were accepted. The students came from a mix of nationalities that additionally colored the program. Taking in different traditions, approaches and national peculiarities through discussions and visits made the program a success and gave us the students, a colorful introduction to and training in action research. Consequently, I would like to thank a joint staff and my co-students for an enriching learning experience.

However, some are more important than others in the process of writing a PhD and my advisors, Professor Tor Claussen and Professor Richard Ennals, have been especially important. They have been patient conversation partners, critics and encouragers during the process. Without their optimism and support, the process of accomplishing the dissertation would have been a lot harder. Their help has been irreplaceable and it has been highly valued – thank you Tor and Richard.

I have as an action researcher worked closely together with a number of competent and experienced practitioners. They have, through joint work in the enterprises and the networks, and not least through joint reflections, contributed greatly to this dissertation. They are the ones giving this work a solid content within an understandable framework. Since there are so many that generously have spent time with me, it is hard to give recognitions to all of you. However, I will especially draw attention to Bjørn Vivelid and Olaf Hernes in the Hardanger network and Ove Gandrud and Sylvi Røssland Sørfonn in the Sunnhordland Industrial network. They have for many years been my co-practitioners, and we have had many joint experiences from activities in the networks, and not least, I have been fortunate to participate in a number of enriching conversations with them. Thank you.

The dissertation has not been written in a vacuum. Thus, the members of my research group, Regional Innovation and business development, at the International Research Institute of Stavanger have been most important to my work. The knowledge gathered in the group, after doing research in this field for more than a decade, has been most important in the process of writing my dissertation. Thus, to my former Research

Director Tor Tønnessen and the rest of the group – thank you. I have also been fortunate to meet and collaborate with a number of European researchers. This has been most encouraging for my own work. It is hard to mention all of you, but I am most grateful for your generosity.

Writing a PhD takes a lot of time and it influences your family life. When you are spending hours in front of the computer, reading papers or being absent reflecting over whatever problem you are occupied with in your writing, you are 'stealing' family time. I have been fortunate, having a most understanding wife accepting that writing a PhD means a period of "state of emergency". Thank you, Trude.

I have received funding from the Value Creation 2010 research program, and I am most grateful for the support. My research institute has also partly funded my work and it also deserves my gratitude.

Stord, 15. February 2007

Trond Haga

Contents

Summary

Network collaboration between industrial enterprises is the main topic in this dissertation. My aim has been to explore if it is possible to construct a network between industrial enterprises, which for the participating enterprises represents a valuable asset in order to become more innovative, increasing their competitive power. The dissertation contains an overarching umbrella paper and six ordinary papers.

The construction of a network consisting of a set of enterprises, calls for contributions in the field from outsiders, such as researchers. Thus, in my study I have used an action research approach, interpreted as the researcher operating as a 'friendly outsider' in the network. To be able to enter into problem solving together with local practitioners calls for a longitudinal approach, meaning that the researcher collaborates closely with the network and the enterprises for a long period of time.

The research process that I have made use of in my study is divided into two closely linked parts. Firstly, I have been part of a network construction and maintenance process for more than four years, establishing sustainable networking processes. The experiences coming from these processes represent my empirical data. Secondly, I have reflected individually, and participated in joint reflection with actors in the research field over experiences and the results of the actions taken in the network. These reflections have resulted in the writing of six papers that are part of this dissertation. In these papers, I have discussed what I regard as the most important elements to arrange for network collaboration and networking processes.

My ambition with the umbrella paper is to pull the different elements discussed in the different papers together in order to present a dynamic networking model. Thus, the model developed is a result of my research on several networks of industrial enterprises. However, the model is not meant to be a definite recipe for constructing additional networks. I regard networks as socially constructed, and as such, they are the result of processes that involve human participation. The personnel involved have their own mental models that will heavily influence the construction and operation of a network. Thus, the model can be used to merely interpret the importance of the existence of a set of enablers while constructing or operating network processes.

The model consists of a set of enablers identified through the research process in this study, and they are thoroughly discussed in the different papers as well as in the umbrella. These enablers are:

- *Training*. This is an important enabler that may increase knowledge about development work and processes, and the diffusion of such knowledge.

- *Network management.* Taking care of the daily operation, and closely linked to the enterprises, network management is important in initiating and supporting networking processes.

- *Processing roles*. Personnel able to hold such roles are important for initiating and accomplishing networking processes, as well as for the supply of external knowledge, funding, and general support. Introducing this as an enabler implies, most likely, making it easier for external resources to assist in operating the networking processes.

- *Network infrastructure*. The existence of a network structure that makes it possible for the enterprises to discuss experiences and ideas and to develop knowledge is vital. In Paper V, which is a comparison of networks in Sweden and Norway, the management of the network has been analysed and the most striking discovery is the solid structures that are constructed.

- *Leadership.* The management and unions in the participating enterprises need to take leadership to allow for networking processes to occur. The role of unions in legitimating wide employee involvement seems to be especially important.

As I have indicated, the above enablers or instruments, acting differently, are needed to construct sustainable networking processes. Such processes may bring about important innovations or developments for individuals or groups of enterprises, as shown in several of my papers. Individually, the instruments may be good and important, but they may become even better when combined with other instruments. My study indicates that the support given to network processes by combining instruments may increase what the individual instrument can offer. Thus, *orchestration* of instruments appears as

an important and valuable coordination of contributions given to such processes. Thus, I have revealed that the presence of a number of enablers is necessary to establish sustainable networking processes, but these enablers are not sufficient to get these processes going. As I have shown, orchestration is also needed to initiate and continue such processes, and it calls for action researchers who possess skills and knowledge that enable them to serve as orchestrators.

1 An introductory example

It is important to be able to point to a case of success, which speaks for itself. Such a case is when dust was transformed into a source of wealth.

> "*Yesterday was an historical day for Boliden Odda (BO) and Tinfos Titan & Iron (TTI)*[1]*. A newly constructed system for utilisation of waste from TTI as raw material for BO was opened. The delivery of 400 tons of waste from TTI will leave BO with additional 70 tons of pure zinc, their main product."* wrote Hardanger Folkeblad, the local newspaper, enthusiastic at October 14 2005[2].

This report is based on the utilisation of electro filter dust from TTI that consists of approximately 17% zinc, among other metals, as a raw material in the main process of a zinc producer, BO. TTI is a titanium oxide and iron producer and the dust is a waste product resulting from the main process. The dust is classified as toxic and must be stored according to strict governmental regulations. Historically, the dust has mainly been shipped by trailers to a special waste storage area in the eastern part of Southern Norway. Meanwhile, some of the dust has been transported to a neighbouring enterprise, BO, where it was mixed in to their ore as a raw material. How the dust was handled both at TTI and BO constituted a work environmental problem. The dust was handled manually, and the operators came in direct contact with the toxic dust due to the tools that were used in the handling. Thus, it represented both an external environmental problem and a work environmental problem in both enterprises. For BO, which produces nearly 150,000 tons of zinc per year, the profit from the possible additional deliveries of zinc from TTI represented minor economic potential. Economic incentives were not there for BO, and large investments in a new receiving station for dust was out of the question. TTI owned the dust problem, and a solution to this problem had to be initiated by them. In addition, it was costly for TTI to transport and store the dust at special waste storage facilities. For TTI, there was the potential to increase profits by solving the dust problem.

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1 Boliden Odda Ltd. and Tinfos Titan & Iron Ltd. are two industrial enterprises located in Odda, Hardanger.

For a long time, there were discussions between some of the employees in both enterprises, agreeing that the problem needed to be solved permanently. In 2004, a joint development project was established with participants from both enterprises. The aim was to solve these waste problems. The project consisted of different internal groups of personnel from the two enterprises, both blue collar and white collar, which handled the internal issues. In addition, a joint project group was established that consisted of personnel from both enterprises. These project groups successfully designed: (a) new dust handling stations in both enterprises, (b) a new feeder system that carefully feeds dust into the ore at the BO plant, and (c) a new transportation system for transporting the dust from TTI to BO. The technical solution that was chosen solved the work environmental challenges connected to the handling of dust in both enterprises. This was mainly due to suggestions from blue collar workers who participated in the project groups, and their knowledge about how the dust behaved in different settings. Technical solutions were presented for the management at both enterprises, and were accepted. The project group did not only design a new technical system, they also developed cost-benefit analyses for both enterprises. According to the suggestions from the project group, TTI had to finance the new technical systems at the BO plant in addition to their own new technical system, and TTI agreed to do so. The suggested investment will be paid off in a period of less than two years since it was a profitable investment for TTI and BO. This is in addition to solving a major external and work environment problem. The technical systems needed, according to the project group's design, were constructed, the solutions were implemented, and the first shipping of dust from TTI was sent to the newly constructed receiving station at BO on October 14, 2005.

This narrative demonstrates the innovative potential in enterprise collaboration facilitated by action research. Joint development projects, or joint problem-solving between personnel from collaborating enterprises, may not 'just' result in improvement of production processes, the work environment, and market development, but in major innovations as well. However, to establish network collaboration which is able to produce results, as in the narrative above, does not happen accidentally, but results from deliberate actions directed by a particular group of actors, with some supporting coordination and orchestration. Thus, deliberate actions and involvement of certain

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2 Hardanger Folkeblad, 2005/10/12 p.5.

actors are needed to construct networks and establish necessary networking processes. Exploring network design and construction that support networking processes is the topic of my study.

Enterprise interconnectedness is on the contemporary research agenda as a consequence of a possible positive effect on enterprise innovativeness (Porter 1990, Cooke 2002, Brulin 2002). The need for constantly faster processes and product renewal due to rapid market changes calls for attention on the enterprises' innovative ability and the ability of the public policy systems and other systems to support innovation (Porter 1990, Aasheim 2007, Reve and Jacobsen 2001, Cole 2001). Constructing interconnectivity between enterprises has become a widespread strategy, and this is also included in my study (Leydesdorff and Etzkowitz 1996, Gibbon et al 1994, Brulin 2002). In the introduction, I will frame the general and national research field.

1.1 The research field

1.1.1 Generally

In Norway and Europe, a main concern for ensuring sustainable economic growth has been linked to the ability of enterprises to innovate (Reve and Jacobsen 2001, Porter 1990, Gibbons et al 1994, Brulin 2002). A change in understanding regarding what is the main innovative force in economic life has occurred. The large corporations were regarded as main innovators, but their positions have been challenged by a large number of creative and innovative SME's. For many European governments, the main issue has been how to speed the processes of innovation in SME's. Inter-firm and cross-institutional collaboration are frequently mentioned in policy documents as an instrument to speed such processes (EU's Green Paper on Innovation, for example - but note that Green Papers are merely consultative), along with an immense number of publications that in one way or another address innovation and sustainable development. Increasing the number of, and developing, inter-firm relations is frequently put forward as a feasible strategy to ensure enterprise development, industrial growth, and in the end, the national economy (for example Brulin 2002, Cooke 2002, Håkansson and Johansson 1995).

In the current debate on learning societies, the concept of networks has gained huge attention as the answer to contemporary challenges within the industry, as well as

within the public sector. Among others, Powell and Owen-Smith (2004) have suggested that the locus of an innovation is to be found in a network of learning rather than in individual firms. Another response to the challenge of expanding the processes of learning is known under the "Triple Helix" label (Leydesdorff and Etzkowitz 1996), which has been used to label a dynamic interplay between R&D institutions, the public sector, and enterprises. Another comparable approach is found in Gibbons et al (1994), who elaborate on how to produce actionable knowledge by increasing the interconnectivity between R&D, the public sector, and the private sector. The "new production of knowledge" literature emphasizes cross-institutional collaboration and common efforts directed at generating desirable knowledge for social change.

However, a number of concepts have been introduced to describe cross-institutional collaboration. The concept of network, which is the topic of my study, does not unify the debate on cross-institutional collaboration. The existence of a number of concepts more or less covering the same phenomenon, cross-institutional collaboration, makes this research field fragmented. Some concepts displayed in the literature are: industrial districts, clusters, development coalitions, learning regions, and networks. The confusion in the use of concepts in the literature is reflected in governmental initiatives. As an example, several of these concepts are used in Norway in different governmental initiatives and programmes, without any clarification of the content of concepts[3]. Clarification of these key concepts is needed, and this will be addressed in the next section (see 2.4.1).

In spite of the apparent agreement on cross-institutional collaboration as a means of contemporary knowledge production, the various contributions seldom reach beyond analytical and theoretical perspectives, ending in an argument or a demand for a changing role for researcher. In other words, the theoretical and analytical reasoning for the new production of knowledge has a tendency to end where practice begins, namely

3 For example, the VC2010-programme, managed by The Norwegian Research Council (NFR), introduces "network" and "development coalition" without bringing in any clarity of the differences. A new initiative in 2006 is the Norwegian Centre of Expertise, a programme operated and funded by Innovation Norway, NFR, and SIVA. This programme focuses on "clusters" and especially on "cluster development", understood as improving and strengthening the relations between the enterprises in the "cluster". How this "cluster development" is different from, for example, "network development" is rather unclear.

in the processes of constructing the knowledge-producing apparatus. Starting at the other end and moving in the opposite direction, my study is about how definite network experiences and knowledge may constitute a basis for developing transferable knowledge about the creation of sustainable networking processes. However, I first have to sketch the framing of my research, both nationally and regionally.

1.1.2 The national scene

My study is part of a national research programme, Value Creation 2010 (VC2010). The aim of research in VC 2010 is to underpin regional development processes. The VC 2010 programme reflects a multilevel strategy where the role of research is to: (a) support enterprise development projects; (b) engage in the construction, operation, and expansion of industrial networks and support integrated projects; and (c) to support the formation of regional partnerships. The strategy also emphasizes other features, which are especially broad participation among employees and strengthening the role of the labor market parties as the driving force in developmental issues.

The VC2010 programme is divided into a number of main projects. Each of these main projects covers a restricted geographical area. These geographical areas mainly follow the administrative borders of the counties. This is not the case for the south-westernmost main project, which covers two large counties: Hordaland and Rogaland. As a result of the program's multilevel strategy, a "triple helix" partnership has been established, "The development coalition of Hordaland and Rogaland" (UH&R), composed of the most important regional development actors within the two counties: the trade department in the county, Innovation Norway regionally, the labor market parties[4], R&D, and the Universities. This partnership has been given the authority to decide where and how the funding from the Norwegian Research Council will be distributed to support regional development. Some of these actors are themselves

4 I have set a sign of equality between the term "the labor market parties" and the two main labor market organizations: The Norwegian Confederation of Trade Unions (LO) and The Confederation of Norwegian Enterprise (NHO).

funding institutions: counties, Innovation Norway, and the labor market parties in part[5]. This enables the funding institutions to project funding from several sources into activities and projects the partnership decides to give priority to. Since most of the institutions represented in the partnership are regional developers, there might be tension between giving priority to development activities as opposed to research. This tension has not been exposed to any great extent due to the action research approach that is used in the program. By applying this research approach, the researchers can combine development and research.

The partnership's main strategy is to use networks as the main tool to support enterprise development and innovation. Thus, it was the partnership that decided to give priority to the construction of an industrial network in the Hardanger region[6], which is the main case in this study (Haga 2006a, Haga and Claussen 2006). This was done despite major concerns addressed by the researchers regarding having no prior knowledge of the region, economic problems experienced by some of the lager enterprises in the region, and the manifest challenge of the researcher having a long-term perspective on his activities (longitudinal approach see 3.2.2). The construction of the industrial network was, thus, initiated as a strategy to turn the negative trend in the region around.

My research institute, International Research Institute of Stavanger (IRIS), has been preoccupied for a number of years with network collaboration. The institute has collaborated closely with several industrial networks in various R&D programs[7]. The number of collaborating networks has, as a result of the institute's participation in the R&D program VC2010, increased dramatically in the last few years (Tønnessen 2006). Some of this growth in numbers might be ascribable to the introduction of a

5 LO and NHO have established a fund that supports development and innovation projects in single enterprises, collaborative enterprises, and enterprises in networks. The organization that administrates this fund is named "Hovedorganisasjonenes Fellestiltak" (HF). The organization possesses both capital and highly skilled personnel, which are made available for the membership enterprises. This organization constitutes a vigorous tool for enterprises to utilize in internal and network construction processes.

6 The region is presented in several of my papers (Haga I, Haga II).

7 This is particularly true for these two programs: Enterprise Development 2000 (ED2000) and Value Creation 2010 (VC2010).

development coalition[8] in the Hordaland and Rogaland Counties. This "Triple Helix" composed development coalition brought the regional public support system, the labor market parties, and R&D from two countries together to improve cross institutional collaboration. The network was a key instrument in achieving results.

Over time, the collaboration with networks and their membership enterprises has resulted in the development of certain approaches and methods, or transferable knowledge, useable in industrial networks that focus on: enterprise development, enterprise collaboration, improvement and innovation based on broad participation, and collaboration between the labor market parties.

I have been preoccupied by network collaboration for a period of time as part of my institute's strategic priority, and I am currently participating as a researcher in the ongoing VC2010 program. Additionally, I have been fortunate to have participated in international projects, both Nordic and European, addressing similar questions. This participation has enabled joint reflections with a number of researchers across Europe. Thus, the content of my thesis is a result of a wide process where ideas and suggestions regarding my research have been presented from a number of sources, both nationally and internationally. Thus, addressing network collaboration in my thesis fit well with my interests and previous research.

1.2 Thesis statement

The literature that is preoccupied by industrial networks describes different aspects connected to networks, and presents different assumptions about what must be present in the network to achieve the desired results. The narrative introduced in the beginning of the introduction clearly demonstrates that networking may give definite results. The aspects under study in the literature are often investigated separately, singled out by the writer to be the most important aspect to investigate. To make networks an important feature in regional economic development, there is, however, a need to focus on how to operate the networks and imply a dynamic dimension of the network in order to achieve

8 The concept 'development coalition' was introduced by Ennals and Gustavsen (1999), who state: "In a development coalition the point is not to become alike but to pool resources, supplement each other, provide complementary resources."

their aims. The focus in the literature is, however, less occupied by the dynamic "networking concept", and even less by networking processes. Thus, there is a need to investigate the prerequisites for establishing and maintaining sustainable networking processes to create actionable knowledge. *I will argue that networking processes are what constitute a network. Constructing networks and establishing sustainable networking processes within networks are dependent on the presence of certain enablers: heterogeneous associated network constructors, coordination mechanisms, diffusion mechanisms, and mechanisms for inciting interorganizational collaboration. Most importantly, there must be a well-orchestrated interplay between these enablers to activate networking processes. The different enablers are not able to support such processes individually. By taking part in the orchestration of the interplay between the enablers, research is able to influence the outcome and study the networking process. There is no one best way, and orchestrators can learn from differences in their practices by engaging in mutual reflection.*

1.3 Research question

Networking processes are rarely a result of a single cause, and are more often a result of a number of multifaceted causes that influence each other (Ebers and Grandori 1997). To deliberately construct networking processes, there is a need for knowledge about what affects these processes. To capture and understand the underlying causes of sustainable networking processes and their interactions appears to be a necessity as a point of departure for the deliberate construction of such processes. Thus, the research questions have to be directed toward the creation and growth of networks and accompanying networking processes. The main research question in my thesis is:

Is it possible to construct and maintain complex networking processes as 'extra'-market collaborative structures?

Presumably, we will find out by trying. This a simple approach to action research.

From this main question, several other supporting questions have to be posted. These concern features that influence networking processes and conditions related to the following features:

Which features are particularly important when preparing networking processes?

Why do these particular features seem important?

Can these features be created and applied?

How are these features utilized through orchestration?

Can these features be shaped to support the construction and maintenance of networking processes?

What is needed for these features to support, rather than counteract, one other?

Several of these questions are about how to construct a knowledge-producing apparatus. Consequently, I aim to develop a dynamic networking model where important enablers for creating dynamics in a network are included.

However, to create an efficient apparatus design calls for the presence of research. This can hardly be done at a distance from the field, but rather calls for proximity. This places research in the field of action, which makes demands on the research approach.

1.4 Action research approach

This is not a study where a phenomenon is viewed from outside. I take part as an actor within the field, and am not just taking part, but have been a major actor in the field over a long period of time. I have participated in the construction and operation of the network shaping the backcloth in this study, as well as the networking processes, from the very beginning, where there was a struggle to get the network established at all. Thus, I have been part of the discussions within the field, and have been able to influence the construction processes and interactions. I have been a part of the failures, the reshaping of approaches, and so on. The implications of the research design will be discussed within the methods chapter. More recently, I have taken the opportunity to reflect on my own experiences by working in collaborative dialogue with colleagues at local, regional, national, Nordic, and European levels, within the shared perspective of action research. This has provided a valuable set of arenas for reflection, which has enriched local practice.

To understand how networks and network processes are constructed, as well as how they function as knowledge-producing knots in the inter-organizational sphere, research has to participate in the construction and knowledge-producing process. By focusing on

the practical situations that I have encountered while participating in the construction of an industrial network, I will argue that the role of research must be formed in relation to the participants' needs, which vary. Hence, general responses to questions addressing the role of research are pointless, simply because in one way or another, the answers will reflect the individual researchers' abilities to enroll and integrate divergent interests and numerous of perspectives in joint work. This is simply because neither the formation of inter-firm networks nor the creation of applicable knowledge can become accomplished unless different actors, belonging to different working communities with different perceptions of a current situation, establish a common ground for joint work. Subsequently, the role of research is open-ended, and it is inevitably the researcher's task to create situations that enable access to arenas where he or she is put into a position in order to act on the phenomenon under study.

1.5 The structure of the dissertation

The thesis consists of four chapters in addition to this introduction, and the next four sections along with the introduction make up the umbrella paper. The last section is an overview of the papers and findings within each individual paper. The actual papers will accompany the thesis as attachments.

In the next section, I will discuss whether it is possible to construct networks and networking processes. My main argument is that to enter into network collaboration is a strategic decision, which is a deliberate action based on some considerations. Consequently, it is possible to construct a network if a number of enterprises decide to do so. However, to take strategic decisions means taking a number of issues into consideration. This will be addressed in the next section, along with an introduction and thorough discussion on a dynamic networking model that consists of several elements that I have elaborated from my findings. In the third section, I display my methodological approach, which is clearly founded in action research, and also discuss the reasoning for utilizing such an approach. The fourth section is the conclusion.

My arguments are mainly collected from the six papers that are part of the dissertation. They are marked as Haga I to VI. Abstracts of the papers are gathered in Section 5. The actual papers are gathered in Section 6 as attachments.

2 Network as a means for enterprises to increase innovativeness

One of the several aims of network collaboration is to increase innovativeness, and with that, competitiveness among the membership enterprises. The narrative presented in the introduction represents an outcome of such networking processes. This project demonstrates that major challenges may be solved by a common effort from a set of enterprises, by utilizing the skills and knowledge possessed by employees. The results achieved in network projects, as in the narrative, do not appear to be accidental. I will argue that they are a result of thoroughly prepared network collaboration, followed by creative improvisation in real time in the field. Based on this assumption, I will further argue that it is possible to deliberately construct and operate an industrial network aimed at developing and improving processes, products, and markets. How such network collaboration may be constructed and operated to achieve the desired results is what I am going to explore.

I have picked the network and networking to be the phenomena under study. However, the literature on the network is closely connected to the literature covering interorganizational collaboration. This means that I must relate to the literature covering other collaborative phenomena, because this literature also investigates aspects that may be relevant for my study on networks. However, most literature on interorganizational collaboration is preoccupied by passive observation of the different phenomena studied under the umbrella of interorganizational collaboration: industrial clusters, industrial districts, industrial networks, and learning regions (Porter 1992, Brusco 1990, Ebers and Grandori 1997, Asheim 2007). The researcher's intention seems to be to describe aspects connected to the phenomenon, its premises and functions (Håkansson and Johanson 1995, Ebers and Grandori 1997). This might be done at a safe distance from the phenomenon itself, and requires no actual intervention with the field under study. These researchers show less interest in the actual process of constructing interorganizational collaboration and the operation of such entities to the benefit of the participating enterprises. Thus, my point of departure in this paper is slightly different from the more traditional approaches. I will explore what enterprises can benefit from an intentional entrance into interorganizational collaboration and how such networks can be constructed and operated to fulfill the enterprises' intentions behind entering into

such an entity. My specific task is to show how researchers, through the development of a close relationship to the field and in collaboration with the involved actors, shape a network. This process and the operation of the network is included in the networking concept (this is further developed in Section 2.4.2)

I will argue that the operation and development of an enterprise calls for continuous attention toward a set of important strategic issues. As part of such strategy processes, the enterprises need to explore what possible effect interorganizational collaboration, in general, might have for their operations in the future, and specifically consider it connected to the most important issues at stake. Additionally, the enterprises need to decide what kind of interorganizational collaboration will best benefit their operation and market access. Thus, interorganizational collaboration is of strategic importance for the enterprises, and not something they are only briefly a part of. This means that the enterprises make strategic choices about interorganizational collaboration, and such collaboration does not appear to be accidental. I have displayed the importance of these deliberate, strategic choices in Haga I. This is also illustrated in Figure 1:

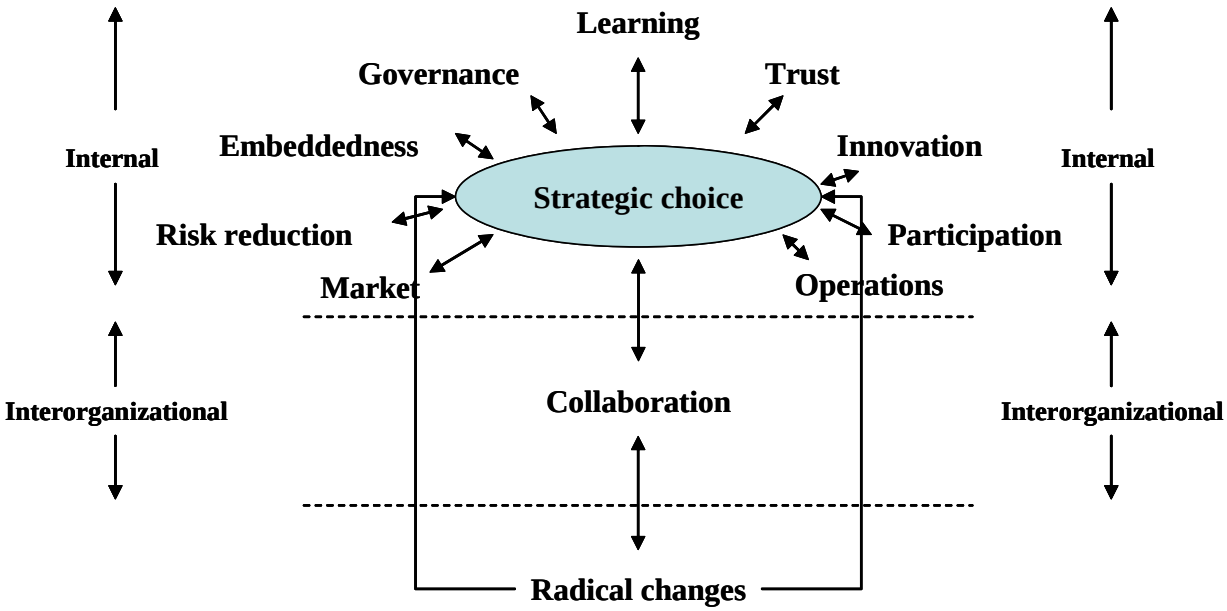

Figure 1: Strategic choices

However, my point of departure regarding interorganizational collaboration has, not surprisingly, been contradicted, as other researchers have a conflicting view on the construction process of organizational interconnectedness. The Swedish-based

economic researchers of the Uppsala School have developed their own approach, network-as-market, that treats networks as explanatory factors in how markets operate (Levin and Knutstad 2003). They have also decided to focus on the network concept as the interorganizational entity. Economic transactions are framed by network relationships. They are, for instance, occupied by the question: "Why are doing things right and doing the right things in the relationship perspective?" This perspective directs attention to a somewhat different aspect of activities carried out in enterprises: the interdependency of activities between enterprises (Håkansson and Snehoda 1995). This involves two major features: activity links and interdependencies. Where there are dependencies between enterprises regarding activities, there are networks. Thus, they frame the network as a phenomenon around activity links between enterprises. With such a framing, there is no surprise that these researchers do not conceptualize the construction process as a planned and intentional activity (Levin and Knutstad 2003). Networks cannot be constructed based on some actor's intentional initiatives; they have to emerge from spontaneous and natural causes. The network has to come into being by some kind of organic growth, where actors can achieve goals through engaging in co-operative activities.

> "*The network structure is a result of history*" (Håkansson and Johanson 1993:42).

The interconnectedness may very well be nurtured and developed over time, where the aim is to keep the relationships alive and vivid. This means that the need for closer collaboration between the enterprises will appear as a necessity or be inevitable, and will grow from this position.

Thus, neither of the researchers of the Uppsala School pays significant attention to the construction process of interconnectedness, particularly not to the possibility of this being an intentional process. Thus, interconnectedness becomes the result of a planned structuring rather than a given structure to investigate. Such processes are not the main focus in the research performed by the researchers using the market-as-network perspective.

One principal question has been raised by several researchers: "Why do enterprises engage in network collaboration?" This is a question of little interest for researchers applying the market-as-network perspective. According to this approach, the enterprises constitute a part of a network as a result of the established business relations with other

enterprises. It is less likely for these researchers to participate in network construction processes, because these relations are more or less self-regulating, and there is no need for help to construct them. If the network concept is used differently than what is the case in the market-as-network tradition, this question is vital. The question has led to several academic discourses.

On the other hand, the network-as-market approach introduces interesting perspectives on networking. Thus, in the following I will explore and discuss the perspectives in the network-as-market that I find relevant regarding the construction and operation of interorganizational collaboration.

2.1 The "network-as-market" approach

This perspective is preoccupied by describing the customer-supplier relationships (Håkansson and Johanson 1993). Some describe processes that are present in a business relationship between customer and suppliers (Anderson and Dahlquist 2001) or to single specific counterparts (Håkansson and Snehota 1995). The preoccupation of the market-as-network perspective with customer-supplier relations is not unique: other perspectives are also preoccupied by studying this relationship, including "customer perspectives" (Kaplan and Norton 2004) and "benchmarking" (Andersen and Pettersen 1995).

One of the most salient results of empirical research carried out from the market-as-network perspective is that enterprise exchange on industrial markets is conducted in a network of long-lasting relationships. The explanation given for why business is conducted within long-lasting relationships is that, in situations characterized by changing and strong interdependencies between enterprises, the business relationship is a more effective device for the coordination of resources than is the market mechanism (Håkansson and Johanson 1993). Enterprises need to be exchange-effective as well as production-effective. Thus, if exchange interdependencies take precedence over the management of internal production processes, closer contact between supplier and customer will result. The perspective is that enterprise exchange should be conceptualized as an organizational process, where knowledge about customers needs and knowledge about production capabilities are molded into new business opportunities (Anderson and Dahlquist 2001). Customers' needs are to be found in the market, whereas the production capabilities are located within the enterprise itself.

There is, thus, a need for a simultaneous management of the knowledge of the customers' needs, and knowledge about the internal production capabilities. There has to be some kind of knowledge mediator present to mold knowledge about the customers and production capabilities into new business opportunities. Anderson and Dahlquist illustrate this by introducing the following figure (Anderson and Dahlquist 2001):

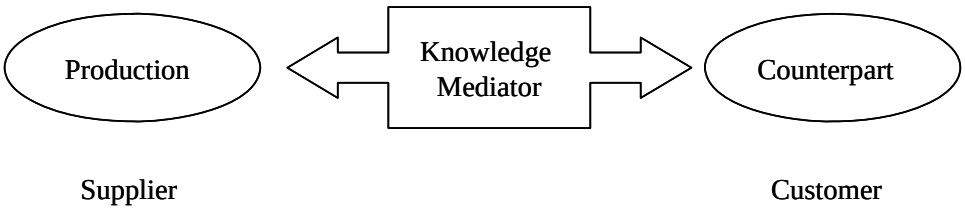

Figure 2: Knowledge mediating

The market-as-network perspective will argue that, during this process, the supplier will develop new knowledge concerning how to produce products which are useful for potential customers, while the customers develop new knowledge concerning how to use products supplied to the market. The main feature here is the simultaneity: If new knowledge is developed simultaneously by the supplier and the customer, the business actors are enabled to sense new business opportunities individually. The knowledge generated in this way is not confined to knowledge attached to the technical performance of production technology and products. Equally important is the ability of actors to utilize or apply the knowledge in new products and new technology.

Knowledge development is, to a large extent, a social activity. The problems and possibilities never exist per se, but rather come into existence during operations and in relations with targets aimed by the actors. Socially constructed knowledge developed through enterprise relationships, how-to-use and how-to-produce, tends to stick to the social system in which it is constructed. The possibility of de-contextualizing the knowledge and transferring it to other settings is limited. Contextualized knowledge has, according to Blackler, four characteristics (Blackler 1995, Anderson and Dahlquist 2001). First, the knowledge developed is often too specialized and heavily connected to a specific situation to be relevant in other contexts. Second, the knowledge is pragmatic in the sense that the knowledge is not only a result of changing mental models, but also a result of physical, interactional actions. Third, the knowledge is provincial, which means that the knowledge is continuously evolving, and thus is only valid for a limited period of time and in a specific setting. Fourth, such knowledge is mediated, not

transmitted, which means that the knowledge is carried and manipulated by the actors engaged in the interactions, as well as by the artifacts (Latour 1987). Blackler argues that these characteristics imply that knowledge should be analyzed as an active process, as knowing, where the focus should be on the activity system through which people achieve their knowing. This may be illustrated by an example used in two of my papers (Haga IV and Haga VI). The example is about the development of a new foundry station in one of the enterprises in the Hardanger network. However, in this setting, the development project and the result are not the core issues, but rather the knowledge basis for the development project. Knowledge developed on how zinc behaves in different stages of the foundry process has been developed by the personnel in the foundry. This has resulted in the development of mental models regarding how to achieve best possible results of the foundry process. However, these models are not static, but develop according to the improvements of the process. Thus, to get access to the knowledge and mental models developed by the employees in the foundry as an activity system become urgent in radical changes of the process.

Accepting that most knowledge developed in a customer-supplier relationship is situated, pragmatic, provincial, and mediated, managing the knowledge necessary for product development at a distance seems limited. Accepting the fact that most knowledge is contextualized is not the same as denying that any knowledge created within such a system may be de-contextualized and transferred to other settings. In product development, processes demand not only proximity of a market, but also counterpart vicinity within activity systems (Blackler 1995). Activity systems, according to Blackler, are constituted of individuals with diverging interests and priorities. Tensions within activity systems are thus inevitable, but treated correctly, they could provide a potential driving force for change.

Anderson and Dahlquist argue that, as a tool, the business relationship is exchange effective in knowledge-intensive business situations that are characterized by many changing interdependencies. The reason for the effectiveness is that the relationship gives good access to the production system in which the counterpart operates and the cognitive model held by the counterpart. This system can be said to connect different resources and activity structures on subjective and cognitive levels, and thus facilitate mutual learning concerning the interdependencies between customers and suppliers. Three interrelated processes impact the supplier’s ability to learn about the customer

and to develop new and commercially viable products. This is illustrated in the figure below:

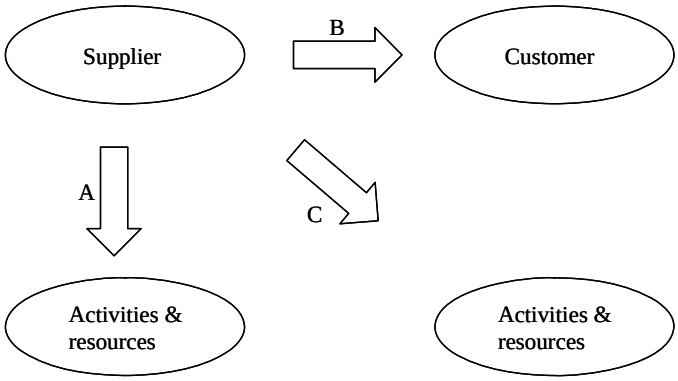

Figure 3: Business relationship

The three processes are: (A) an internal evaluation of the suppliers' how-to-produce knowledge; (B) an evaluation of the customers' how-to-use knowledge; and (C) an evaluation through the examination of problems and possibilities faced by the customer, according to the supplier.

Most enterprises have a number of suppliers, and thus have established network relations to set of suppliers. With a market-as-network approach, the enterprises' many relationships may be presented as the figure below:

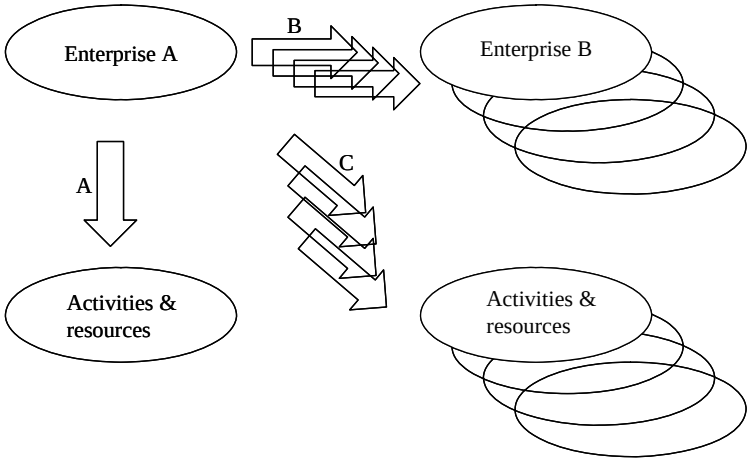

Figure 4: Multiple business relationships

Anderson and Dahlquist ask: "What kind of characteristics of the business relationship could be expected to impact on product development?" They highlight three characteristics that constitute an activity system: interaction intensity, easily managed

adaptations, and relationship duration. They make three propositions about these characteristics: (I) the higher the intensity of the interaction in a business relationship, the higher the probability of successful product development; (II) the existence of easily managed adaptations between actors in a relationship will increase the probability of successful product development; and (III) the longer the duration of a business relationship, the greater the probability of successful product development.

When the authors discuss implications for practice, they emphasize several features: the establishment of effective task organizations rather than trying to distribute knowledge, the involvement of people from different knowledge areas within the firm, and the use of workshop techniques to bring mental models held by different actors to the surface.

The network-as-market perspective emphasizes a number of features that I view as vital in constructing and maintaining sustainable networking processes within networks: (a) an emphasis on long lasting relationships; (b) the presence of some sort of knowledge mediator; (c) the importance of parallel processes in several organizations to launch new innovative activities and projects; (d) the challenge of coping with the barrier that the contextualization of knowledge represents; (e) the interpretation that knowledge should be regarded as an active process, as knowing; (f) the presence of a system that prepares for innovative activities, an activity system; (g) the possible broad involvement of personnel; (h) the utilization of interorganizational relations to activate improvement and innovation; and (i) a focus on the utilization of knowledge created as a result of a meeting between "how-to-use" knowledge and "how-to-produce" knowledge. Still, I find the network-as-market perspective to be insufficient, based on differences in ontology, to explain how to construct and maintain sustainable networking processes within networks.

My critique of the network-as-market approach will be elaborated in the next section.

2.2 Is the 'network-as-market" approach missing vital perspectives?

Firstly, in the market-as-network perspective, the network concept is perceived as a relationship between enterprises that arise naturally without any interruption from external resources (Håkansson and Johansson 1995). I will not deny the presence of such relationships between enterprises, which exist. Rather, I will argue that the market-

as-network perspective is about developing enterprise relationships, and not about developing network collaboration. The analysis in the market-as-network perspective is about the individual relationship between a supplier and a customer. This means that the market relations the customer has with the suppliers are analysed as a set of networks, not as a network consisting of a group of suppliers and a customer. As long as the customer needs suppliers, some kind of relationship between the two groups has to be established, and it is possible to argue that such relationships arise naturally.

To me, the network concept consists of more than

> '*sets of connected exchange relations among actors performing industrial activities'* (Håkansson and Johanson 1993).

This is due to different points of departure. Where the network-as-market perspective has efficiency improvement in economic transactions as the focal point, regional development is mine. In a specific region, a number of industrial enterprises will operate. Some of these will be involved in business with each other, with exchange relations, according to Håkansson and Johansen (1993), and some will not. They may operate in different markets, use different technology, and organize their operations differently. To create a network of industrial enterprises within such a region enlarges the network concept beyond the limit of just exchange relations. In my first paper, I describe the construction process of a network that consists of a heterogeneous group of enterprises: two medium-sized or large process industry enterprises, some small suppliers that partly complement each other and partly compete with each other, and some 'free riders' operating partly as suppliers and partly in other markets (Haga I). In a network initiation and construction process, as presented in Haga I, much focus is given to the positive effects a network can have on the enterprise's ability to improve and innovate. The membership enterprises have different points of departure regarding these issues, and a wide approach to the field must be used, ranging *from* bringing in training programs for personnel in the enterprise to train them to become development agents in their own organizations (Haga III) *to* initiating and preparing for larger innovation projects, like the foundry station development project presented in Haga IV and VI that involves network enterprises, external enterprises, and R&D. Thus, the construction of an industrial network is not only about improving established business relations, but is also about creating new relations that may lead to closer enterprise collaboration, enterprise development, establishing joint services, participating in joint projects, and so

on. The construction of an industrial network can be viewed as the construction of a network system (Haga VI). Since there is limited presence of former close relationships between the enterprises, there is a need for an instrument that connects and challenges the enterprises regarding improvement and innovation. This network system may consist of the enterprises and a network "hub" that co-ordinates much of the activities in the network system, but several other elements may also be incorporated.

This may wrongly be considered as a "learning network", understood as a network solely preoccupied by how enterprises can learn from each other. I will argue that strategic and economic interests and benefits must be equally central in order to engage actors in constructing networks (Levin and Knutstad 2003).To take part in a network where the enterprises may be in a customer-supplier relationship but this is not a necessity, the enterprises will have to take a deliberate stand on the issue of participation. Thus, network participation is a result of a deliberate choice of strategy in the participating enterprises. Consequently, networks do not arise as an evolutionary process: The construction of a network is based on strategic choices made by the participating enterprises.

Thus, I have tried to argue in this article in a way that supports a specific understanding of the network concept: a network consists of several enterprises that, based on strategic decisions, collaborate with the purpose of becoming more competitive and innovative (Haga I). This means that business networks consist not only of enterprises that have a customer–supplier relationship or have established "exchange relations". The enterprises in networks may be multifaceted, as they operate in different markets, have different skills and knowledge, and so on. They participate in the network by strategic choice to utilize available resources and to take part in projects and learning activities within the network to strengthen their position. Consequently, my picture of a network will be different from what it looks like in the market-as-network perspective.

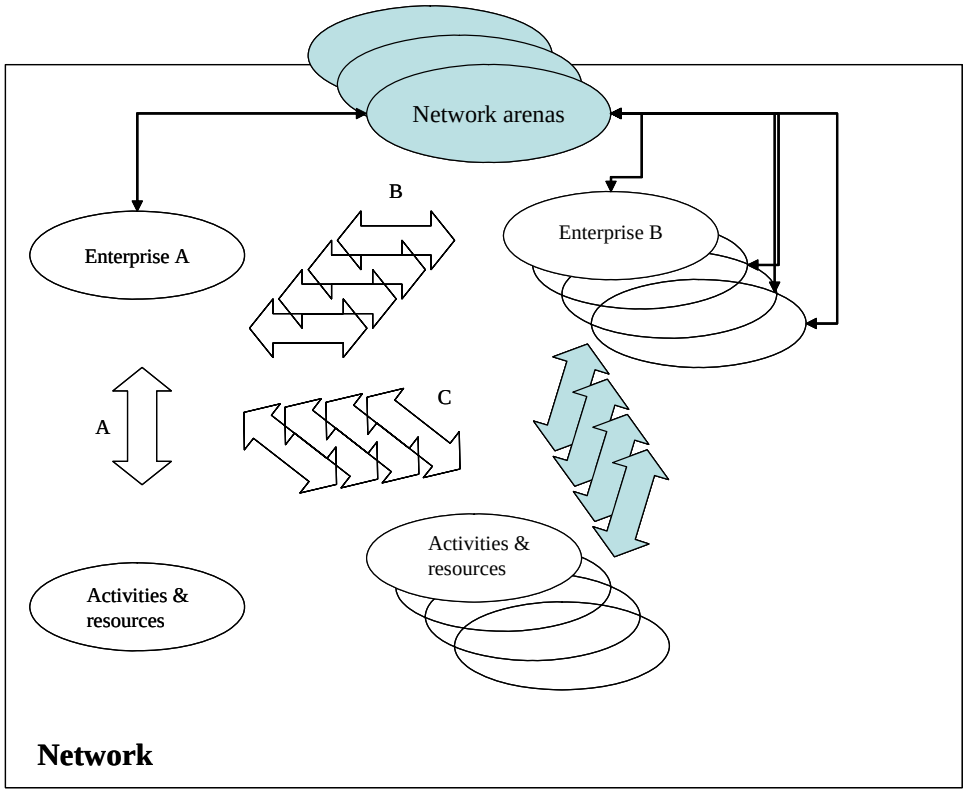

Figure 5: Network relationships

In the same way as in the market-as-network perspective, one main process for the individual enterprise is to evaluate its own methods of operating and producing. Another similarity is that the individual enterprise has relationships with a number of enterprises, where they can obtain knowledge about the other enterprises how-to-use knowledge and can evaluate other enterprises' problems and possibilities. Where my model differs from the model of Anderson and Dahlquist (2001) is where the participating enterprises have the opportunity to obtain knowledge about each other and are able to evaluate each others' problems and possibilities. The networks are constructed with a set of arenas where the intention is to bring together employees from the different membership enterprises. Discussing challenges, experiences, and results from internal and joint projects enable the enterprises to focus on improvement and innovation and receive support to improve over a period of time. Staying consistent for a long period of time is a problem for most enterprises, at least without support from external resources. The two cases presented in Haga VI, one typical improvement project and one innovative project, were introduced to the other enterprises in the network as a point of departure for reflection and as inspiration for new initiatives and projects. The necessary knowledge about the individual enterprise is displayed in

network arenas where all member enterprises participate (Haga VI). Sharing of experiences from improvement and innovation projects, joint reflection, and common knowledge creation are, thus, main activities in the network arenas (Haga V, Haga IV).

In the network-as-market tradition, the relations between two enterprises are what constitute a network. In this perspective, enterprises are naturally interrelated through exchanges of products and services needed to keep the enterprise in operation. When this is the case, the development tasks are closely connected to exchange relations between two enterprises. When two actors perceive their activities as being interdependent, they are inclined to start an exchange with each other. When exchanging, they learn about the other's capabilities and needs. To start improving these exchange relations, the "how-to-produce" knowledge is brought together to be explored, which is an obvious way to become more efficient and competitive.

This is different when using the network concept in the way for which I have argued. In contrast to the network-as-market approach, there are not necessarily former relations between the enterprises. There might be a customer–supplier relationship, but this is not a precondition for becoming part of the network. However, in order to use the network concept in this way raises one major question: How are network processes initiated and maintained in a network where there are no previous exchange relationships between the enterprises? In contrast, in the network-as-market approach, this will not constitute a problem to the same extent, because this approach presupposes the existence of a relationship, and the main issue according to this tradition is how this relationship between a customer and a supplier can be improved? Using the exchange relationships as the focal point, this will always be the point of departure for improvement and innovation. Then, there is no need to construct relationships and arrange for networking processes to happen.

As long as the networking processes constitute the network, it is necessary to analyze what is needed to activate and maintain them. The network-as-market tradition substantially contributes to the understanding of networking processes. In their analysis, Anderson and Dahlquist (2001) introduce vital features that have to be present in a network system. They point, for instance, to the presence of some sort of knowledge mediator, focus on the utilization of knowledge created as a consequence of the meeting between "how-to-produce" and "how-to-use" knowledge, and the importance of involvement in parallel activities involving different enterprises. Still, I will argue that

the authors do not present a consistent model of their network system. This might be due to the fact that they frame the network concept as an evolutionary-developed relationship between individual counterparts. Such a framing might not need the presence of a visible, strong system beyond the border of the enterprise.

In the last two sections, I have discussed the network-as-market approach. However, other researchers have explored the issue of the intentional construction of interorganizational collaboration. In the next section, I will briefly present some other positions.

2.3 Can interorganizational entities, as hubs for dynamic processes, be constructed?[9]

Cooke explicitly poses a similar question: "Can *clusters* be built?" (Cooke 2002). His unequivocal answer to this question is that clusters can be built. He supports this answer by putting up some assumptions that he claims to be necessary if such construction processes are going to be successful:

> "*Clearly a combination of a large capital injection to fund basic or applied research, or the presence of one or more of Michael Porter's 'demanding customers' in a place, and venture capital to fund start-ups, can stimulate clustering under circumstances governed by one condition. The condition is that the demanding customers choose to or can no longer satisfy their own demand by making the innovative products or service they need, and are forced to buy them."* (Cooke 2002:196)

Cooke points to vital preconditions for the construction of clusters. Surprisingly, he puts up an either/or between research and demanding customers, and this partition represents a major difference from my own point of departure. In this way, he makes research and demanding customers equal as point of departures for clustering enterprises around the development and production of certain products and services. It is difficult to perceive Cooke's message in other ways, based on his argument about demanding customers no

9 This section is linked closely to one of the individual papers in my PhD: 'The role of action research in initiating and constructing development networks' (Haga I).

longer being capable to obtain the necessary new innovative products and services. Consequently, enterprises will have to search for brand new partners, not only among customers and suppliers. They will either have to buy new products or services, or develop them in cooperation with specialist firms or research. The enterprise must anticipate research to be able to generate potential ideas for products and services that need a common effort among a number of enterprises to develop further to a commercial product or service that can be presented in the market. This "either or" points out demanding customers, specialist enterprises, and research as knowledge producers, separately. These actors develop demands, ideas, and concepts that need to be further developed by another set of commercial actors. Surprisingly, Cooke (2002) does not look into knowledge production as a result of collaboration between demanding customers, suppliers, and research. He presents the success of "triple helix" collaboration between industry, government, and academia (Leydesdorff & Etzkowitz 1996), but does so from a governance point of departure rather than from a knowledge production point of departure (Cooke 2002). Cooke posts the question: "Can public development agencies build knowledge economic clusters?" The answer he gives is positive, but is not clear-cut. In order to answer the question, Cooke (2002) emphasizes the importance of governance. To enable processes to be put to work, a number of preconditions connected to governance have to be present, according to Cooke. However, another approach could be to stimulate the knowledge production process locally and expand such processes to include more actors, with more of a bottom-up process.

Cooke is, on the other hand, not unequivocal when discussing whether public economic development authorities can build "knowledge economy clusters". He is still positive but is less clear-cut than above. Cooke (2002) emphasizes that there has to be a governance consensus between private and non-governmental organizations in a network, as well as practical engagement and a funding commitment from the governance structure in order to put a cluster construction process to work (Cooke 2002).

More importantly is that he takes for granted that an actor or actors can initiate the construction of a cluster, and that this might be internal actors exemplified by the demanding customer or external actors such as research. To initiate the construction of a cluster is an intentional action based on an actor or actor's initiative, which is a necessity. This does not mean that all clusters come into being by intentional actions.

They might emerge from spontaneous and natural causes. The intentional initiative might be based on needs or strategically deliberations, such as: (i) a need in an enterprise - exemplified by the demanding customers that no longer are able to support itself; (ii) an opportunity – exemplified by the researchers introducing an idea the can be further developed into a new product or service, and (iii) a need for local or regional development.

My study indicates how networks can be constructed to support enterprises to improve and stay competitive (Haga I, Haga 2006d). In the industrial network of Hardanger, which is used as a point of departure in this study, a 'triple helix-partnership' consisting of the labor market parties, the public policy system, and research initiate the network construction. The actual construction is chaired by research and supported by other partners in the partnership (Haga I, Haga 2006d). Thus, the construction of the network is not accidental, but is a result of a well planned process imitated by the partnership and executed by research, and is at least as well planned as a process involving separate individual enterprises with their own development agendas and permits.

Cooke's clusters look surprisingly like a network in this setting. As he elaborates his cluster, he exemplifies by using suppliers connected to one or more demanding customers as an example. This limits, for instance, the number of enterprises and restricts membership. These specifications and limitations make Cooke's clusters close to what I regard to be a network. What I regard as network characteristics have been elaborated in several of my papers, especially in Haga I and Haga V (see also further discussions in section 2.4 and 2.4.1). This means that I believe Cooke's statement will also pass for networks, not just clusters.

In the 1990's, most countries, according to Ledesdorff and Etzkowitz, found that they shared a mutual interest in fostering knowledge-based economic and social developments requiring the creation of boundary-spanning mechanisms (Ledesdorff & Etzkowitz 1996). To reach the goal of becoming a knowledge-based economy calls for the construction of mechanisms that are able to move the economy in the right direction: the mechanisms have to be boundary-spanning. Despite their quite different histories, a broad spectrum of societies have formulated innovation strategies based upon the deliberate elaboration of academic-industry relations through reflexive policies.

One major issue for these countries then becomes: What are these mechanisms, and how do we create them? Ledesdorff and Etzkowitz claim that three dynamics can be distinguished in a knowledge infrastructure: the economic dynamics of the market - the industry; the internal dynamics of knowledge production – the universities; and governance of the interface at different levels – the government (Ledesdorff & Etzkowitz 1996). They then propose to model these three dynamics into a complex system as a triple helix of university-industry-government relations. One implication of the triple helix model is the understanding of a binding force between autonomous, tightly connected institutional arenas. The increase in interactions among the institutions has generated new structures within each of them. These new structures have, according to Ledesdorff and Etzkowitz (1996), led to the creation of integrating mechanisms among the spheres, in the form of, for instance, networks where all three partners participate. Ledesdorff and Etzkowitz (1996) are less clear about what kind of network structures they are referring to, but emphasize that the role of the universities has changed. Universities are expected to offer their knowledge and capacity to the surrounding society. One of the aims is to generate new knowledge through collaboration. The triple helix model opens scope for initiatives from the different partners included in the model in order to initiate collaborative actions, especially among the universities. This model is, thus, open for the construction of collaborative structures.

The network constructed in Hardanger is part of an innovation system that geographically covers a larger region than Hardanger, namely the two counties: Hordaland and Rogaland[10]. A triple-helix partnership consisting of the labor market parties, the public policy system, higher education, and R&D has been established as part of the VC2010-programme (Haga I, Haga 2006d, Haga and Claussen 2006). As I have elaborated in my papers, the innovation system also includes a number of networks of industrial enterprises. However, the partnership and the networks are not separate parts in this system. There exist links between the partnership, the networks, and the enterprises. The participants in the partnership are actors able to jointly support

10 Hordaland and Rogaland are two separate counties located on the west coast of Norway. Each county consists of a number of municipalities, which are the lowest governmental administrative level. The administrative division of Norway is under debate these days. A governmental committee has suggested creating larger regions consisting of a number of counties (Regionsmeldingen).

initiatives in the networks and membership enterprises, financially and knowledge-wise. The more strategic collaboration in the partnership is, thus, closely linked to the executive work in the networks. Preparation for innovative projects and activities takes place in three different areas: participating enterprises, networks, and the partnership (Haga I, Haga 2006d, Haga and Claussen 2006). Thus, the partnership construction represents a precondition, and an obstetric aid, for the construction of the Hardanger Industrial network.

In this section, the question asked was "Can interorganizational entities, as hubs for dynamic processes, be constructed?" The answer, based on my own case studies and parts of the literature, is positive: it is possible to construct such entities. However, I intend to investigate the network specifically, and to do that, I have to elaborate on the content of the concept of a network. This will be done, in part, by comparing it with similar concepts used in the literature.

2.4 What is a network?

The network concept has been derived in different directions, depending on the point of departure for the author (Håkansson and Snehota 1995, Grandori and Neri 1999, Harrison 1994a and b). Thus, networks are not understood as the same phenomena in the literature, and the content of the concept differs considerably. The different interpretations are based upon various emphases on the presence of interorganizational relations. On the one hand, the market-as-networks perspective views the business relationship between enterprises as a network (Hallén 1986, Håkansson and Snehota 1995, Anderson and Dahlquist 2001). This approach strongly emphasizes the dynamic interplay, especially the interdependencies, between enterprises that have a close business relationship and are less occupied by the interplay between more loosely coupled enterprises as well as between the enterprises and external actors (Håkansson and Johanson 1993).

On the other hand, the industrial district perspective views networks as relationships between several enterprises, in some sort of entity that in some way is orchestrated. Their interplay is often regulated by a set of ground rules (Brusco 1999, Grandori and Neri 1999). The basic assumption behind this perspective is that the diverse and multiple numbers of external connections can speed up innovation processes internally in an individual enterprise (Powell 1996).

A third perspective is the strategic alliance (Piore and Sable 1984, Porter 1990, Harrison 1994a and b). In this perspective, the individual enterprises' competitiveness is claimed to be closely related to contextual factors, like the presence of a regional cluster, and their ability to utilize the industrial environment for economic profit. Thus, this line of research has emphasised the ability of the individual enterprise to utilize collaborative opportunities and, hence, resources in the business environment.

Based on these three different points of departure, I will try to develop my network concept. I understand network as an entity that enrolls enterprises as members. I have introduced two networks in my papers (Haga I, II, III and V). In both of these networks, the Hardanger Industrial Network and Sunnhordland Industrial Network are enterprises enrolled as members. The members pay a membership fee that partly funds the daily operation of the network, which includes funding a network administrator. Thus, to enroll as a member of these networks brings along an expense for the individual enterprise. Even if the membership fee is moderate, it prevents stowaway situations: the enterprises generally pay a fee to get benefits in return. This means that to become a member of one of these networks calls for a deliberate action from the enterprises. Thus, this is not about 'loosely coupled' enterprises regarded as part of the same group or cluster due to geographical location. Neither is a network limited to the customer-supplier relationship.

Furthermore, I argue that the way a network is initiated influences the ability to support development and innovative processes (Haga V). Firstly, it seems to be a connection between the enterprises acting as initiators and the network sustainability. In Haga V, a total of four networks are analysed, two of which are Norwegian and two which are Swedish. Two of these networks, the industrial Development Centre of Gnosjö (IUC Gnosjö) and Sunnhordland Industrial Network, have been in operation for ten and fifteen years, respectively. The common denominator in these two networks is that they were initiated by individual enterprises or entrepreneurs, and accordingly have shown remarkable capabilities of living. On the other hand, the presence of R&D in both the network initiation and construction, and network operation, seems to raise the focus on development and innovation (Haga V). In Haga V, this has been thoroughly discussed. The researchers have, for instance, in the Hardanger Industrial network, been important in the preliminary works of preparing the network: preparing a concept of a network, communicating directly with the possible membership enterprises, planning and accomplishing workshops, bringing in relevant experiences about networks and

networking, preparing applications for funding, documenting actions and preparing strategies, and functioning as door-openers to research in general. However, the most important issue in these early phases is to sell to the enterprises the possible gains of membership in the network. The presence of researchers in the daily operations is more obvious: their focus is on development and innovation, and their presence ensures a lasting focus on these issues. The enterprises' ability for joint actions is, thus, crucial for their ability to utilize the industrial environment, including R&D, for development and innovation.

The enrollment of enterprises presupposes some kind of network structure. I will argue that how the networks are organised, the presence of a network structure, and a network coordinator will influence the network's ability to support development and innovation (Haga V). In all of the networks introduced in Haga V, accommodated network structures offering membership enterprises network meeting places suited to their needs are established. To run these meeting places and maintain them in a way that they can represent the glue in the network, a network coordinator is needed. As I have made visible in Haga V, such coordinators exist in all four networks. The structure and activities initiated by the coordinator will drive both network and internal processes in membership enterprises. Thus, the network will appear as an activity system, utilizing interorganizational relations to activate improvement and innovations (see Section 2.1).

Therefore, I interpret a network as a governance structure. This structure may focus on both strategic and task-oriented processes (Haga V). In Haga III, I have presented how strategic decisions within networks regarding starting up training programs focused on training employees in the membership enterprises in development methods, on the other hand, have resulted in the accomplishment of a number of improvement and innovation projects. Thus, the network may take up functions that the enterprises leave out of their own organization, or it might reinforce their own internal functions. This means that networks hold skills and knowledge that are available and useful for the membership enterprises. As shown in Haga III, the above mentioned training programs were completed as a collaborative project between the researchers and the network coordinator, utilizing the network structure. Thus, the network holds specific skills demanded by the enterprises.

My interpretation of a network is that it is a solid entity with several characteristics: operations which last for a number of years, membership-based, local personnel who

are in charge of operations, agreed-upon objectives regarding development and innovation, network arenas that allow the membership enterprises to meet, development of joint training programs, the development of a common development language, and the initiation and accomplishment of a number of development and innovative activities. These characteristics are present in the two Norwegian networks that I have presented in my papers and with which I have collaborated closely. The different characteristics have been handled in several of my papers, as shown above.

This clarification of the content of the network concept is based on a wider literature than the one addressing networks. Are there clear and fine differences between the different concepts addressing interorganizational collaboration?

2.4.1 Characteristics of the network concept in contrast to other interorganizational entities like industrial cluster and industrial district

In the last couple of decades, several new concepts have been launched and some old ones have reappeared, in order to describe and conceptualize regional interconnectedness and regional development. Examples of such concepts are: network, industrial clusters, industrial districts, and learning regions (Piore and Sable 1984, Ebers 1997a, Grandori 1999a, Cooke 2002, Bardi 2005, Asheim 2007). Even if the concept of social network was launched in the literature as early as the fifties (Barnes 1954), the concept became common in use in the seventies and eighties, related to economic and regional development. These concepts have all become subjects in major academic discourses (Cooke 2002). My intention in this chapter is to pinpoint and highlight some characteristics of the network concept by comparing this concept to the characteristics of other concepts.

The understanding of what a network is differs along several parameters. The first issue to decide upon is what kind of parameters can be used. Some researchers have tried to do this by comparing clusters and networks. Rosenfelt has presented the following table (Cooke 2002).

Differences between clusters and networks

Clusters	Networks
Large scale	Small scale, inter-firm
Open membership	Restricted membership
Competitive with cooperation	Competitive through cooperation
Informal interaction	Formal partnersip
Input-output linkages	Interdependence
Mainly exchange relations	Agreed objectives

Table 1

In his emphasis on making a distinction between clusters and networks, Rosenfelt captured several parameters, emphasizing: (i) size, (ii) the extent of openness, (iii) the issue of competition, (iv) the extent of formalism, (v) the way the enterprises are linked together, and (vi) the agreement format (Cooke 2002). At the same time, Rosenfelt defines what he considers a network to be when he emphasizes these parameters. With a different entry to the understanding of network concept, one might consider different parameters to be as important as those indicated in Rosenfelt's table (Granovetter 1985, Grandori 1999a).

However, Rosenfelt's parameters display what the results of a passive observation of networks' functions from the outside will be. It is possible to measure all of his parameters from outside. The focus is not on how the network can support the enterprises in becoming more innovative and competitive, but on the description of what it looks like and how it functions. Thus, compared to what, in the former section (see Section 2.4), I emphasized as the main aspects in the network concept, Rosenfelt's parameters appear to be at a higher level. This is partly because my focus is on what enterprises can actually benefit from interorganizational collaboration, and how network can be initiated and operated to support the enterprises' intentions behind the constructions of the network. Furthermore, Rosenfelt leaves out a couple of interesting parameters.

Rosenfelt has, in his table, not included any geographic parameter (Rosenfelt 1997), while Harrison (1994) states that geography might be an important dimension to include. These limited number of enterprises that form a network will most often be

located in the same geographic area or region[11]. This geographic dimension is not about distance between the enterprises, but about closeness, such as trust, knowledge, and business culture. To use the feature of business culture as an example, it differs noticeably even over short distances. The differences might be due to, for instance, the differences in the business base and business environment. When the business base is industry, business culture is quite different from what can be observed in areas or regions based on, for instance, agriculture[12].

Time has also been left out as a parameter by Rosenfelt. Building a formal partnership and trust, and developing common and agreed objectives takes time (Harrison 1994a). Disposable time can, thus, be seen as a vital parameter to get networking processes going in a network.

Networks should, according to Rosenfelt, be understood as a collaborating body where a limited number of enterprises participate (Rosenfelt 1997). The network Rosenfelt draws is one characterized by close and formal relationships between the participating enterprises. This is highly relevant, and my study supports Rosenfelt's considerations (Haga I and Haga IV). However, the reason for developing such close relations, I will argue, is most likely for the enterprises to achieve competitive advantages or become more innovative. To achieve such aims, there is a need for the enterprises to take part in networking processes. This is an issue that Rosenfelt does not emphasise. Such processes are most likely to happen where close relationships between enterprises are established and where the rules of the game are known (Brusco 1999). To be this close, the membership has to be restricted, and is often established and developed over a period of time.

Clusters are, according to Rosenfelt, larger in the sense that both the number of enterprises is higher and the geographically area or region it covers is larger. The interconnectedness between the members of the cluster is not as close as it is among the members of the networks. The enterprises which are parts of clusters, with this point of

11 At least this is an experience my research institute, IRIS, has face, based on ten years of studying industrial networks in Norway

12 This is the case in Hardanger, where the industry is concentrated in local communities surrounded by agriculturally-based communities

departure, are most often not a formal part of any structure. Cooke, on the other hand, introduces this preferred definition of a cluster: “Geographically proximate firms in vertical and horizontal relationships involving a localized enterprise support infrastructure with a shared developmental vision for business growth, based on competition and co-operation in a specific market field” (Cooke 2002). Many of the same characteristics connected to networks by Rosenfelt are connected to clusters by Cooke. With Rosenfelt, I believe that the proximity between the enterprises in a network is closer than in clusters, and agreed-upon objectives at an inter-organizational level are more common in networks than in clusters.

Especially connected to the studies of the “Third Italy”, the concept of Industrial Districts has been launched. The Emilia-Romagna region has been known internationally as the homeland of small enterprises and industrial districts (Bardi 2007). The economy in Emilia-Romagna has, since World War II, been dominated by small and medium-sized enterprises clustered in homogeneous industrial districts. A diversification of this structure is now developing. The productive structure is increasingly becoming more of a network of interconnected clusters (Bardi 2005). This indicates that industrial districts may consist of several different clusters. The phenomenon of Industrial Districts includes larger geographical areas than the cluster. It may even be comprised of several clusters operating in different business sectors.

I perceive the three phenomena as separate, even if they all capture the phenomenon of regional connectedness. In the literature, there is often less emphasis on the difference between these three concepts (Harrison 1994a). For instance, in the book “Interfirm networks - Organization and industrial competitiveness” by Grandori (Grandori 1999a), where the subject is interfirm networks, several of the authors contributing to the anthology discuss the two other concepts without giving any explicit attention to differences (Brusco 1999, Hendry et al 1999). When Brusco examined the rules of the game in industrial districts, he did so without any explicit evaluation of whether this might fit for industrial networks as well (Brusco 1999). He argues that a competitive factor to consider in industrial districts is the relationship between the enterprises that simultaneously create competition and cooperation (Brusco 1999). To handle this duality, Brusco argues that there is a need for some rules of the game within the industrial districts. The issue to consider is whether this also represents a challenge in industrial networks. Ebers refer to the different forms of inter-organizational cooperation as inter-organizational networking relationships (Ebers 1997b). He prefers

that different forms for inter-organizational co-operation be collected under the same notion.

This discussion has tried to clarify the differences between various phenomena. Characterizing networks, industrial clusters, and industrial districts does not capture the essence of the social and economic processes involved, and why they are important. They just state that such phenomenon exist with a set of characteristics. Thus, a more explicit clarification between the static and describing phenomenon and the dynamic processes involved is needed.

2.4.2 The difference between network and networking: A matter of structure and action?

In the literature covering networks, there are two concepts used which partly cover the same thing: network and networking (Ebers and Grandori 1997). The point of departure here is to investigate if there are unambiguous definitions of these concepts that clearly separate them. *Network* is a noun, which means a proper name on a subject. This subject, network, has certain characteristics, but it is not an unambiguous concept. It may include a wide range of more or less different structures and relationships. Both vertical customer-supplier networks and horizontal development networks are covered by the general network concept (Levin and Knutstad 2003), as are individual networks and organizational networks. This is partly the reason for the interest this concept has aroused within research (Barnes 1954). The other reason for this interest is that network has, by parts of the business community, been seen as a useful tool to increase competitiveness and become more innovative (Brulin 2002, Piore and Sable 1984, Levin and Knutstad 2003).

Networking, on the other hand, is a verbal noun. This concept describes an action, or something dynamic. Networking is about creating membership and participation, and about the actions taking place within networks, which are a result of network membership and participation. Thus, it becomes a multifaceted concept, since participation in a network may result in a range of different actions, as well as a range of different actions that takes place in the creation of collaborative structures as networks. The concept is about the actions and processes that are generated as a result of the membership and active participation in networks, as well as in the network creation process. It is less about the products that come out of these actions, and more about what can initiate actions and processes leading to end-products.

It is vital to be clear about the difference between the two concepts, because the former concept captures the characteristics of a phenomenon, while the latter captures the essence of social and economic processes creating and reproducing the phenomenon. Harrison challenges this difference in two articles (Harrison 1994a and b). After discussing how the "theorists of industrial districts"[13] argue over whether the creation and reproduction of inter-firm linkages are dependent of trust, he posted these questions: But from where does such trust emanate? What reproduces it? (Harrison 1994a:8).

> *"The answer we are given is "experience" (by the "theorists" – TSH). Trust is built up over time, through continual contracting and re-contracting, through informal deal-making, through one firm or group's offering assistance to another in moments of stress, through mutual reinforcement in responding to contingency." (Harrison 1994a:8)*[14]

This is, according to Harrison, the industrial district theorists' explanation for the continuing relevance of agglomeration to regional vitality, giving content to dynamic interorganizational processes. He argues that this is a subtly different argument from the face-to-face communication which makes up an important part of the standard economist's explanation for the persistence of tendencies toward agglomeration, in an era when advanced technologies of transportation and communication greatly reduce the cost of coordinating geographically dispersed activities. Here, the argument is that proximity facilitates the exchange of information that again leads to reduced transaction costs. In his argument, Harrison claims that, in the theory of the industrial districts, perhaps the most important net result of the interconnectedness between the enterprises, embedded in the local environment is the paradoxical combination of cooperation and competition. This paradoxical combination is also present in Porter's "diamond" as one of the driving forces behind self-reinforcing growth within industrial clusters (Porter

13 In his article, Harrison uses Sable as a representative for these 'industrial district theorists' (Sable 1992).

14 This rattling off of possible interconnections between the enterprises displays the differences between how the interconnectivity comes into being in different interorganizational entities. While informal and non-governed interconnectivity characterize the industrial district, the formal and well-planned interconnectivity characterize the solid network (see page 35).

1992, Reve and Jacobsen 2001). That the enterprises within the districts can turn from competitors to collaborators overnight based on some mysteriously developed trust is challenged by Harrison. He goes on and asks some crucial questions:

> *"But does it work? Bombarded by intense competitive pressures from within and without, have these districts of co-operative competitors connected by trust proven to be stable social formations?" (Harrison 1994a:10)*

Harrison displays, through his case studies, that the common interpretation about the industrial districts conceals a multifaceted reality (Harrison 1994b). He displays that, within different districts, different development features are visible. He summarizes his finding by stating that that these socially embedded productive experiments can work and be viable for a certain period, but they cannot sustain themselves indefinitely against the logic of global capitalism (Harrison 1994b).

Based on such arguments, developing interconnectedness may seem irrelevant. Why bother, since the global economic capitalism will heavily influence the local or regional economy? Harrison points at interconnecting processes as an important feature to study. In this discourse between Harrison and the industrial districts theorists, especially Sable, the point of departure has been traditional Italian industrial districts. These districts are constructed in certain ways, and the focus has strongly been on customer–supplier relations. Do these experiences apply for all kinds of networks anywhere, or is it possible to see other outcomes in different environments and structures? Harrison's articles open up other relevant questions to ask when focusing on the interconnective processes: What activities or processes create the phenomenon? What processes reproduce the phenomenon or are the operational processes?

Harrison and others focus on the fact that the Italian Industrial District tends to attract attention toward typically market-oriented alliances (Harrison 1994a and b). Such an alliance or interconnectedness is often based on product-specific contracts that treat the manufacturing of specific products. This kind of interconnectedness is transitory, and must rapidly be replaced. Since the findings of Harrison are closely linked to a specific type of interconnectedness, it is relevant to question whether it is possible to create a lasting interconnectedness between enterprises based on other interconnecting processes

than is the case in the Italian Industrial Districts[15]. The fundamental issue is how the design of the interconnecting entity influences the interorganizational processes. Obviously, the solid network concept elaborated earlier (see Section 2.4) constitutes such a possible lasting type of interconnectedness. Thus, my intention is to explore the ability of this particular entity, including its peculiar design (see page 40), to initiate and support or reproduce interorganizational processes. I have discussed this issue in several of my papers (Haga II, III, IV and VI). Haga VI introduces the completed learning cycle in a network setting. The learning cycle represents a continuous networking process that has been constructed in the two Norwegian networks. In the cycle are: new innovative projects initiated by network initiatives; projects presented and discussed at network arenas while still ongoing, however dependent on the size of the projects; results presented for membership enterprises at different arenas gathering different kinds of personnel; and experiences from the projects reflected upon in joint meetings. These reflections may, again, stimulate to or directly initiate new projects, either in the individual enterprise or in joint projects. Thus, the network represents an enabler for constructing networking processes that the enterprises can benefit from.

The connection between the two concepts, network and networking, is vital for my study. Why is networking vital to the networks? To be reproduced, a phenomenon is dependent on reproducing processes, and networking processes reproduce the network as well as produce results for the enterprises. By focusing on networking, the dynamics of the networks is unfolded and made visible. The foundry station project presented in Haga IV and VI makes the learning cycle presented above and the networking processes visible. This project illustrates the importance of the network arenas as a place where ideas can be created and signals given. The signal from the process industry enterprises in the Hardanger Industrial network, about expecting to see the suppliers taking a new leading role as suppliers of technology, initiated the project. Furthermore, the results and the experiences from the project were repeatedly presented in the network as a point of departure for discussion and reflection. In this way, the project can cause new,

15 IRIS has, as an example, collaborated closely with two industrial networks on the west coast of Norway with a remarkable history. The TESA network (TESA = **Te**kologisk **Sa**marbeid or Technological Cooperation) was established in 1957 and was in operation for about 45 years. TESA was established as a private limited enterprise (Ltd). The history of Industrial Network for Sunnhordland (IfS) is not that impressive, but it is still operating fifteen years after it was established.

similar projects. The dynamics and actions in networking processes, in addition to reproducing the network, create ultimately economic results, as well as other vital results for the enterprises: employee participation, efficient processes, new products, change preparedness, and so on (Haga 2005c, Haga 2006a, Haga VI). The results of network projects are well illustrated in Haga VI, where two different types of projects are presented: one incremental and one innovative. The first resulted in essential reduction of the operation costs and improved efficiency in the foundry, while the other resulted in the construction of a brand new foundry station directed at the world market. However, as important as the actual outcome of the project was how the project was organised: both were based on wide involvement of personnel in the affected departments, and enterprise prepared the labor market parties in collaboration. The dual outcome, the results and the wide involvement, are what makes it worthwhile for the enterprises to participate in network collaboration. Strategic and economic interests and benefits must be central in order to engage actors in constructing networks (Levin and Knutstad 2003). However, to involve the employees in development and innovation improves the enterprises' competitiveness, which is also regarded as essential.

Even if dynamic processes are the most important element for getting the desired results out of interorganizational collaboration, they will arise within the frames of the different interorganizational entities. Thus, I will argue that the functions attributed to the specific entity and how the entity is organized will strongly influence the type of processes that may occur as a result of the collaboration. This has been displayed in my papers (Haga I, IV, V, and VI). The characteristics of the solid network structure in the Norwegian networks are presented in Haga V. How this solid structure makes the networking processes possible is displayed in Haga IV and VI, in which the role of research and the diversity of projects are explored, respectively. However, the main point here is that, by introducing the solid network structure allows for the usage of a wide set of enablers and resources.

My point of departure is that, to construct entities able to meet the expectations of the participants, which have entered the collaborative entity to achieve some sort of results, the functions attributed to the entity and desired results from the collaborative processes must correspond. I have argued (see Chapter 2) that links between specific functions attributed to collaborative entities and collaborative dynamics seem to be absent in most literature on interorganizational collaboration. This literature pays less attention to how to create dynamics, economic results for the owners, and work environment results for

the employees. Consequently, to investigate if such links are established is not relevant, but to investigate if functions can be attributed to collaborative entities might be relevant when the focus on dynamic processes is highly relevant.

In the next section, I will examine interorganizational collaboration, and focus on the functions that are attributed to the collaborative entities. Piore and Sable's (1984) work on collaboration in 'Third Italy' received massive attention. Their book is regarded as the one that opened a new path for enterprises using collaboration as a main element in their strategies. Thus, I will use their work as a point of departure for investigating functions attributed to collaborative entities.

2.5 What functions may collaborative entities have?

2.5.1 Interconnectivity: A pure response to radical market changes?

Piore and Sable claim that the economic crisis of the 1970's called for a different kind of responses from corporations and enterprises (Piore and Sable 1984). They identified two major strategically responses. The first was global, came from the economic policymakers, and addressed unemployment and stagnation. These challenges were attempted to be solved through instruments of domestic economic control. The other type of response, according to Piore and Sable (1984), came from individual enterprises. The enterprises struggled to meet the performance standards set by the market, and tried to establish stability and equilibrium to shelter them from competition from the international economy (Piore and Sable 1984).

What kind of responses do Piore and Sable see from the individual enterprises? They describe three types of responses:

- conglomeration;
- multi-nationalization; and
- the re-emergence of the craft paradigm.

These different responses have different implications for the enterprises involved.

For large corporations, *conglomerating* was one possible response to the crisis. Corporations tried to avoid the risk of being locked in their primary market by

diversifying into new markets. This was done either by setting up new subsidiaries or by merging with enterprises operating in these markets. The shortcoming of such a move was that the risk it sought to condense could not be reduced through conglomeration. The risks arose not in a single business area or branch, but from shocks that hit the world economy as a whole.

Another response used by large corporations was *multi-nationalization*. By multi-nationalization, Piore and Sable mean an attempt to extend the domestic market by producing the same good in different markets (Piore and Sable 1984). It was particularly attractive to go into parts of the developing world, because these markets would probably provide an expanding margin[16]. This strategy had enormous hidden costs, according to Piore and Sable. Firstly, the price the corporations had to pay to integrate the developing economies into a trans-national market was the price of dispersing the production. Dispersing the production went from being a benefit to become a cost within a decade. This change became a reality due to changes in the labor market in developing economies. Secondly, the inventory and quality-control costs that accompanied the multi-nationalization strategy were not foreseen. Compared to the Japanese kanban system, with only in-time deliveries, the large inventories needed in developing economies was very costly. The strategy was also inefficient due to the time it took to detect defective parts. Thirdly, it turned out to be more difficult than anticipated to consolidate the market around a standard, trans-national design of a product. The trans-national regulatory system was inadequate to create the necessary stability to consolidate the market. Fourthly, fluctuations in the exchange rate and general international instability made a huge impact on foreign competition and the level of world demand hard to predict.

A third response to the crisis came, surprisingly, from older industrial areas where mature industries were located. This passed, for example, for “Third Italy”, which stretches from northern Italy, through Austria, to Southern Germany. These districts are characterized by a large number of small enterprises, and have survived the mass production era by keeping up the craft tradition through the delivery of specialized

16 This strategy was first formulated by Rosa Luxemburg as a way for which capitalist accumulation could resolve its problem of over-accumulation. Luxemburg 1913/51.

goods. The success in the traditional industries located in these regions cannot be explained by simple affirmation or rejection of existing models. At first, industrial winners seemed to emerge by accident. However, when success led to further success, it became apparent that the underlying principle for success had to be interpreted. Piore and Sable explain the success of these districts by "craft has challenged mass production as a paradigm" (Piore and Sable 1984:207). They argue that what is distinctive about the crisis in the late seventies and early eighties is the shift toward greater flexibility. The enterprises, by offering flexible specialization, have found new ways to cut the costs of customized production. They argue that, when slowdowns in growth appear, it cast doubts on subsequent expansion. What do enterprises do in such an uncertain environment? Firstly, they claim, enterprises will probably defer mass-production investments, and secondly, they might be more disposed to invest in craft-production that allows a rapid switch between different markets, which means flexible specialization. They also emphasized another characteristic for these districts: the formation of networks (Piore and Sable 1984). To combine the small and medium-sized enterprises into a flexible production system and reduce their dependency on large enterprises or cooperations, it was necessary to coordinate their different skills in autonomous federations. They describe a system where tasks were distributed between several enterprises and one of the enterprises was the distributor. Through such a division of tasks, they were able to respond quickly to market demands. At the same time, this task division system coalesced the enterprises into a network.

I will leave the first two responses presented by Piore and Sable and take a closer look at what they call the third response. They advocate a position where the enterprises in "Third Italy" respond individually in a strategic way toward market changes by cultivating flexible specialization and network collaboration. Their analysis has been developed at a highly aggregated level, enabling them to elaborate a general theory. Not surprisingly, they have been criticized for not displaying empirical data in the book that supports their conclusions (Skorstad 1999). They have not displayed any analysis at the micro-level within the industrial districts. Using Piore and Sable's original sources and later research provides a detailed and multifaceted picture. The main features may be described in this way: Flexible specialization is generally a regional phenomenon. Within these regions, the flexibility and competitive power exist through the more or less reciprocal and binding cooperation between a number of small and medium-sized enterprises (Skorstad 1999).

The position of Piore and Sable has been challenged by several researchers (Skorstad 1999). The critics have emphasized that the production system found in “Third Italy” is peculiar to these districts and cannot be seen, as Piore and Sable do, as a general phenomenon (Amin and Robins 1990). The same critics claim that the flourishing of small enterprises may as well be a temporary phenomenon than a permanent one. The critics argue that it is entirely wrong to interpret phenomena like the textile industry in Prato (Northern Italy), the IT industry in Silicon Valley, vertical disintegration, and for that matter, the industrial network in western Norway, in the same framework. They claim here that Piore and Sable treat highly different phenomena as one singular phenomenon, and that this make no sense (Amin and Robins 1990).

Piore and Sable have not been able to justify if the flexible specialization actually represents a departure from Fordism. It is not necessarily, so claim the critiques, that new technology will be used in a flexible way within the single enterprise (Wood 1989).

These critics are interesting, because they emphasise that the phenomenon referred to is hard to generalize about since it appears differently in different contexts. To be able to generalize, there is a need to perform a micro-analysis that reveals how the flexible specialization and the collaboration take place in certain contexts. Such analysis may leave certain patterns that can enable comparisons, which can shape a basis for generalizations. Brusco has made a categorization of the production forms within “Third Italy” (Brusco 1990). He developed a division between four categories: (i) the traditional craft industry enterprise, (ii) the dependent supplier, (iii) the industrial district I, and (iv) the industrial district II. Of these four categories, Brusco claims that only the latter two will be part of what he defines as industrial districts, and of those two, the latter is the most advanced. Districts under the category “district I” (idI) appeared in the seventies in Italy. These districts were characterized by a large number of small and medium-sized enterprises that operated within the same business sector and were located within the same geographical area. The enterprises located in these areas operated as suppliers to each other as part of the production of finished products. To some degree, the cooperation was expanded to include common functions like accounts, and so on. The “district II” (idII) type appeared as soon as the government started to operate as a distinct actor in this field. Several service centers were established that were supported by governmental funding. In this way, the enterprises received support as services, not as direct funding. The service centers supported the enterprises by offering research assistance, development assistance, training, and

education (Piore 1990). Even based on Brusco's analysis, it is hard to make any definitive conclusions over Piore and Sable's postulate about the new production system. We might ask "What relevance do Piore and Sable's presumptions have in relationship to network and networking?"

To me, it seems that their presumptions about the individual enterprise using the network as a strategic tool to handle crises are not completely convincing. The districts that Brusco characterizes as part of idI are part of a production system that is based on a task division between suppliers within these districts. The enterprises that wish to operate within these districts will have to adjust to the way the production system operates. They can not simply resign from this system. I will argue that there is a close connection between the idI production system and the "network system" that some researchers advocate as the 'network-as-market' approach (see page 22ff). The network comes into being as a result of the need for establishing business relations. Taking this as a point of departure, the strategic decisions which Piore and Sable claim individual enterprises will have to make regarding how to handle a crisis will be very limited. On the other hand, the conditions described as part of idII call for strategic decisions from the enterprises on how to utilize the support system to develop the enterprise, how to cope with the market and product innovations, and so on. Thus, the idII system will underpin Piore and Sable's argument about the enterprises taking important strategic decisions on how to face the enterprises' challenges. Thus, the idII position is closer to my own position, arguing that, to achieve results, the focus has to be toward the creation of collaborative innovative processes, involving a wider set of actors than only the enterprises.

The production system described by Brusco as part of idI might be understood as a network, where all of the suppliers involved are part of the network. This is correct if the network is perceived as a purely business relation (ref. the 'network-as-market' position page 22 ff). The different enterprises must have relations with each other to be able to produce finished goods at the end. This is especially important when the production system is organized as in idI. All of the different suppliers are equally important and have to deliver on-time and with the right quality for them, as a joint venture, to be able to deliver finished goods to the end customer on time. This flat production structure leaves it to the individual enterprise to develop its operation. The enterprises' tasks include delivering their parts at the right time, and to do so, they must be part of a planning process that keeps their relations to the other suppliers open and

active. These relations might even involve certain claims to develop either the parts that the enterprises produce, or less likely, the way these parts are produced. This will probably be a result of customer demands, as the suppliers will be forced to adjust to market demands. Thus, this is less about strategic choices made by the enterprises, and more about forced changes by the market. The idI situation fits well with the market situation from the mid 90's for Norwegian SME's, and the enterprises are fumbling to find a strategy to handle the increased competition in the market due to globalization. However, it is not obvious that the interconnectivity track will be the mainstream solution.

On the other hand, the system introduced in idII opens up a quite different approach. This approach allowed the enterprises to be part of RD projects, training programs, and so on. The government funds the support system, and not the enterprises directly. The support system offers the enterprises different services, and the enterprises will have to decide if they will take advantage of these services or not. In such a system, the enterprises, to a larger degree, have to choose between different development strategies. Even if idII introduces a more dynamic collaborative field, it is not obvious how this may influence the network design and actual networking. I will argue that Piore and Sable's contributions and the succeeding academic discourse are less preoccupied by how to initiate the content of and the character of networking that should take place or actually takes place. Their focus is on describing the phenomenon, not on how to set up and orchestrate actual networking processes.

A discourse closely connected to the interconnectivity issue is the one focusing on whether a network, or any other collaboration structure, will increase or reduce competition for the participating enterprises.

2.5.2 Network: A catalyst for competition or absenteeism from competition[17]?

To analyze how enterprises respond to an initiative to construct a network of enterprises is much about how individual enterprises perceive their behavior in the market, and how they, as economic actors, relate to other enterprises and institutions. How social

17 This section is elaborated in detail in Haga I.

institutions are affected by their social relations is a classic question within social theory (Granovetter 1985). This discussion is very much about the view of how business actors behave in the market. One extreme position is that the business actors operate as rational, self-interested actors who are minimally affected by their social relations in a perfectly free market, consisting of independent producers and distributors (Porter 1990). Another position understands business actors as so constrained by ongoing social relations that they can not be construed as independent actors (Anker-Ording 1965). However, such a model with the two extremes is static, and is not concerned about changing conditions. The market might change over time, and so might the relation between the enterprises. Time will, from such a perspective, be an important element to consider. This also means that the influence of external conditions will fluctuate.

Another important condition to take into account is the problem of the market and hierarchy (Williamson 1975). This problem concerns the question regarding under what circumstances economic functions are performed within the boundaries of hierarchical enterprises, rather than by market processes that cross these boundaries. In my case, many suppliers have traditionally been closely linked to their main contractors, and most of their turnover has been made doing business with these main contractors. These suppliers have, as reciprocity, acted as external bases of resources, which the main contractors can use whenever needed. Recently, many main contractors have challenged the suppliers by untying these close relations. In Haga I, I have displayed how the main contractors in the Hardanger Industrial network are placing themselves in a position where they challenge the traditional task organization. They are leaving a strategy where facilitating inter-enterprise collaboration and reduction of transaction costs have been the main ingredients, and turning to a strategy where they are becoming more market-oriented, leaving the region to buy services and demanding system deliveries rather than buying man-hour locally. For the local suppliers in Hardanger, this means increased competition from suppliers operating in the national and international markets.

As a response to the change of strategy from the main contractors, the construction of an industrial network aimed to improve the interconnectedness between the suppliers and the main contractors may be regarded by some of the suppliers in Hardanger as a way to avoid the market (Williamson 1975). These suppliers may see the network construction as a way to keep up their special relationship or strong ties with the main contractors, and in this way, become the preferable supplier in an open market. In

contrast to the latter argument, the construction of a development network and the SME's participation in this network can represent a convincing argument for the main contractors to maintain strong ties to the local suppliers. Even if the network collaboration reduces external competition, participation of the enterprises in the development network will ensure the main contractors of the willingness among the suppliers to improve their own performance and to develop their services and products. Thus, participation in the network will underpin the conscious need within the main contractors to reduce their operational costs.

The main contractors will rarely accept to foster strong ties only to local suppliers, even if they are participants in network collaboration. Rather, they prefer to keep the competition open between suppliers they have developed strong ties with and suppliers they have developed less strong ties with. This is not necessarily seen from the local supplier's point of view as merely negative. Many local suppliers have in their strategy to try to reach new markets, either with already developed products or with new ones. The foundry station case, displayed in Haga IV and VI and in Section 2.4.2, is a result of such a strategy. Thus, I argue that networks may promote as well as hamper competition.

Another function that a network may have is as a gateway to new markets and, therein, to increased competition. This issue will be explored in the next section.

2.5.3 Network: A gateway to new markets and increased competition?

The question of the existence of a lock-in situation for regional development might be a relevant issue (Grabher 1993). Such a situation might hamper the opportunities for enterprises to move on to new markets. A lock-in situation appears when the ties between the main contractors and suppliers are strong, and at the same time the innovation system is exclusively directed against a certain field (Grabher 1993). This means that improvements and innovations are focused on this particular field, and this focus excludes going beyond borders to access new markets and use alternative technology.

There is no doubt that the traditional way to organize the task system between the main contractors and the suppliers, as in my case from the Hardanger Industrial network displayed in Haga I, has features that might give the impression of a lock-in situation. Even if the main contractors have focused on their societal obligations for the local

society for years (Williamson O. 1975), their owners are not located locally, and have been preoccupied by bringing in competitors to supply their own enterprises. As displayed in Haga I and in Section 2.5.2, the suppliers have lately been challenged from competitors both domestic and abroad. This is due to changes in the domestic economy, where foreign enterprises have easier access to the regional and local markets than earlier. At the same time, the demands to deliveries to the main contractors have changed from pure man-hour sales to system deliveries. These changes in the market have forced the suppliers to rethink their ways of relating to the main contractors. Networking, as a strategy, is only one way to face the market changes. Other strategies to face the market demands, such as organically developing the enterprise, creating a new enterprise by merging several former individual enterprises, or entering into close binding collaboration with one or more other enterprises, are also relevant.

For suppliers, these changes have brought a need to look for partners, not just locally, to connect to in order to be able to support the main contractors. In the foundry station case displayed in Haga IV and VI, an enterprise outside the network with specialized knowledge in a particular field was invited as a partner in the project. To be able to deliver system packages, as the main contractor demands, the suppliers need to collaborate. Individually, the suppliers are specialized and are, thus, not in the possession of the knowledge needed to face the contractor's demands. They might even go outside the region to provide the necessary competence and skills. The enterprises are not that used to collaborating with external enterprises. To connect to such enterprises, the suppliers need a network of connections to explore. This exploration of connections has often been called the utilization of weak ties (Granovetter 1973).

The utilization of weak ties or exploration of new possibilities has been studied by other researchers, and they have emphasized different aspects. When constructing a network, some enterprises will, as a consequence, be a part of this entity. At the same time, those which are not part of this entity will be left out. Still, the enterprises inside the network need to explore and connect to resources and enterprises outside the entity. This might be done in several ways, but as a part of a network, the enterprises need to have available "points of passage" (Law and Callon 1992). Haga IV includes a case from the electronic coast in Vestfold and in this case, the researcher becomes the "point of passage" to external resources such as funding and specialized IS-knowledge.

Membership in a local or regional collaborative entity might not only represent possibilities, but might, rather, be interpreted as a necessity:

> *"The more interwoven the national economies become, the more dependent become the enterprises and the national economies of innovative and learning regions and local societies. The paradox seems to be; the more global the economies become the more important become development power and competitive advantages based on local and regional conditions." (Brulin 2002:9, translated from Swedish by the author)*

This statement indicates that, in the new economy, the local and regional conditions will be decisive for the competitiveness of the enterprises. To follow the line of argument connected to this assumption, the enterprises that are able to compete in a global market have to rely on some kind of local competitive advantage, such as close local relations and dynamics (Porter 1990, Reve et al 1992, Reve and Jacobsen 2001). This assumption leads to several questions. Firstly, how will this affect the behavior of the enterprises in regions where there are no traditions for formal collaboration, and where, locally and regionally, interconnecting bodies do not exist? If the business environment forced the enterprises to interconnect or interact in some way, there should be some kind of collaborative efforts visible between the enterprises. On the other hand, when formal collaboration between the enterprises is absent in a local community, might this be a sign of the lack of need for collaboration? There is not necessarily accordance between *lack of* formal collaboration and the *need for* formal collaboration. There still might be a need for formal collaboration, but the actors may not have been able to set it up or they may be unaware of the need.

Who will advocate interconnectedness and why? It may not necessarily be the suppliers that are facing a new regime initiating interconnectedness. It may be the main contractors, as in the Hardanger Industrial network, where one of the contractors took the role as the driving force in pushing for the construction of closer interconnections or a network (Haga I, Claussen 2004). Enterprises that really face global competition see the need for change and support the construction of networks, while the suppliers that still wish to operate in the old task system or to be the preferred suppliers in a revised system often do not see the same need for interconnectedness or a network. This has changed, mainly due to the change in the international economy. The suppliers have

been forced to re-orientate, and we now find examples of enterprises being more eager to network.

Secondly, what kinds of relations constitute a competitive advantage? Is a social relation something that is "just there", or is it something that can be "released or activated"? Particularly in local communities, social relations might play a significant role. These informal relations connect people not only in professional settings, but also in social settings that constitute individual life, family life, and life in the local communities (Barnes 1954). Activating such relations might not be done regardless of task, but these relationships are powerful because they mean a lot to those involved.

2.5.4 Interorganizational collaboration: A precondition for innovation?

Both the presence of interorganizational collaboration and relevant knowledge have been regarded as important preconditions for innovation. Some recent contributions discussing "the knowledge economy" concept have focused their attention particularly on interconnecting entities' (a) capability for training, and (b) innovation abilities (Cooke 2002). One of the questions that arise from such a focus is: Why is collaboration seen as a critical precondition for innovation?

The main argument is that a network, as one of several interconnecting entities, in itself represents a precondition for innovation, in the same way that, for instance, training does (Cooke 2002). Thus, the pure existence of such an entity prepares the ground for improved innovativeness. However, this contradicts the findings of other researchers (Hanna and Walsh 2002), whose conclusions are that networks of small enterprises rarely develop new products. This argument is based on reviews of studies of small enterprise co-operation in three countries: Denmark, Italy, and USA. These reviews seem to indicate that small enterprises tend to keep their product and process innovations internal, and that network partners are rarely invited into such processes. Hanna and Walsh emphasize, based on these findings, that:

> *Networking is primarily a competitive response. It needs to evolve into a mechanism to enable small firms to develop innovative products and processes jointly. Small firms may have to rethink their approach to co-operation and their motives for initiating inter-working if they are to benefit fully from co-operation.*" (Hanna and Walsh 2002:201)

Hanna and Walsh emphasize that the enterprises do not fully take out all possible advantages by interconnecting to other enterprises. This is, presumably, not a question of simply "taking out" the benefits. This is as much about how the interconnectedness is designed and operated as it is about the enterprises' desire to bring in their ideas and display their strengths and weaknesses for partners. This is about making the interconnectedness into dynamic processes that can result in increased innovative abilities, within and between interconnected enterprises. In several of my papers, I have focused on network design (Haga I and V) and network operation (Haga II, III, IV and VI). I have, based on the experiences from the Hardanger Industrial networks displayed in Haga IV and VI, given an account for the need for network structure and orchestration to construct dynamic networking processes. My main argument is that a solid network structure, as displayed in Haga I and Haga V, allows for the orchestration of a set of enablers. How orchestration activates dynamic processes is discussed in Haga III, IV, and VI, connected to definite development and innovative projects. Thus, a solid network structure and the operation of the network become vital to enable enterprises to take out the benefits from network collaboration. Hanna and Walsh have not elaborated on how this can be done, but have just pointed out the need for reorientation. On the other hand, how does Cooke argue for his position?

In his argument, Cooke emphasizes three major elements to justify his position:

- Disequilibrium – in the knowledge economy, disequilibrium is not a special phenomenon. It expresses the natural state of affairs.

- Cooperation – while within the traditional economy, competition is regarded as the most distinctive feature, cooperation is the same in the knowledge economy.

- Systematic complexity – the knowledge economy is also characterized by a complex interaction between a number of actors that utilize each other's capabilities, and strengthen each other's competitiveness.

Cooke particularly emphasizes one aspect tied to the networks, which is that they possess a unique competence for knowledge transmission. This unique competence and transmission within the network will cause disequilibrium between those inside the network and those outside. Those inside can share a common tacit and explicit knowledge. This sharing and transmission of knowledge is exclusively for the enterprises within the network. The challenge for the enterprises within the network will

be how to maintain their competitive advantage. However, to maintain the network, enterprises as an exclusive group may not improve their innovativeness as much as if they utilize their ties to enterprises and actors outside the network. The foundry station case, presented in Haga IV and VI, exposes the importance of utilizing knowledge possessed by enterprises outside the network. Such knowledge became vital to create the foundry station.

While handling the innovation issue, some dilemmas and challenges will inevitably emerge. Firstly, creating something new seems to require a creative and non-bureaucratic (organic) organization of innovation processes (Burns and Stalker 1961). Uncertainty and instability characterize this part of an innovation process in an organization. Implementing the new ideas, on the other hand, requires more control and stability. More bureaucratic (mechanistic) ways of organizing this part of the innovation process are required. These two aspects of an innovation process represent a dilemma: *the innovation design dilemma*. Structured processes generate few ideas and proposals, while more non-bureaucratic and unstructured processes could generate more diversity, with the risk of conflicts that hamper implementation (Holbek 1988). This is a dilemma, but its importance might be de-emphasized because it might turn out to be less important in practice. My study indicates, rather, that structured networking processes, so-called incremental processes, may also lead to major innovations. In Hardanger, much emphasis was projected toward incremental change processes. This was reflected in training programs and follow-up procedures. At the same time, the search for more innovative projects, as described in Haga IV and VI, was addressed in the network. Of major importance here is that both projects presented in Haga VI, one incremental and one innovative, were treated in the same way in the network. This indicates that rather structured processes may not hamper innovative projects from occurring. However, this does not provide evidence on the opposite side, that structured processes are preferred, but indicates that structured processes may also stimulate innovations.

Secondly, an innovation process will be dependent on individuals who come up with new ideas or point out a new direction for further development. Thus, the entrepreneur's individualistic and heroic qualities have been emphasized (Schumpeter 1934). The entrepreneur is the one who, *on his own*, comes up with new creative innovations and is able to realize these innovations. Still, the entrepreneur operates within a social and geographical context. How will this context affect the entrepreneur's thoughts, cooperation with other individuals, communication with his surroundings, openness

between individuals, the training environment, and so on? (Cooke 2002). These aspects on how to conduct innovation also represent two types of dilemmas between an individual and a collective approach toward innovation.

The elaborated dilemmas relate to different organizational levels: firstly, they are connected to the individuals involved; secondly, to a departmental or enterprise level; and thirdly, to a network or cluster level. The dilemmas will appear differently, depending on the level on which they appear. Still, there are indications in my research that network and networking processes may reduce the importance of these dilemmas. This is thoroughly discussed in Haga IV.

Interorganizational entities are structures outside of the individual enterprise borders. Still, they might represent an important part of the individual enterprise's development organization and, thus, influence the enterprise's ability to improve and innovate. Why is this?

2.5.5 Network: A new approach to the governance of business life?

In inter-firm network research, there has been a dominant tendency to conceptualize networks as a distinct type of organizing economic exchange, to be added to two traditional forms of markets and hierarchies (Ebers and Grandori 1997). This way of conceiving inter-organizational networks seems to be shared by the main alternative views and definitions of networks that have been rival perspectives in other respects. One interprets a network as a hybrid organizational form in which some features of both market and hierarchy are present. A second view interprets a network as a third organizational form with its own distinctive features, different from those of the market and hierarchies.

When the concept of network is interpreted as the ability to direct and control the activities performed between the participating enterprises, the industrial network can be conceived as a specific governance structure (Håkansson and Johanson 1993). Thus, governance can be seen as the organizational forms and processes toward which activities are directed in a field. The industrial network can, thus, be conceived as a specific governance structure. This way to interpret governance may lead to a search for where the directions of activities originate from. Håkansson and Johanson have performed this search and argue that the directions of activities originate from two different sources: (a) the characteristics of the actor, and (b) external sources setting the

conditions upon which the actors base their activities (Håkansson and Johanson 1993). They divide these two main sources into sub-sources, interests and norms, and specific relations and general relations, and this allows them to construct a matrix by combining the two internal and two external sub-sources:

		Internal force is based on	
		Interests	Norms
External force is based on	Specific Relations	1. Network	2. Hierarchy
	General relations	3. Market	4. Culture, profession

Figure 6: Governance structures

This means that Håkansson and Johanson (1993) identify four different types of governance structures by combining the four different sources they have identified. The network governance (cell 1) differs from other types of governance structures because the activities here are governed by the individual and varying interests of different actors. These actors are connected to each other in specific ways, meaning that external forces are channelled via other specific actors. In hierarchy governance (cell 2), interests have been replaced by norms. The authors argue that this form of governance can, like network governance, exploit possible activity interdependency and achieve better productivity through coordination. The main difference is that this structure loses the dynamic ingredient, which lies in the confrontation between varying interests. The main difference between network governance and market governance (cell 3) is in the way external forces influence the actors. Units in cell 3 pursue their own interests and are, consequently, less connected to each other. The advantages to improving specific dependencies are lost. The last type of governance is culture governance (cell 4). This type of governance is ruled by strong norms regulating the behavior of individual actors. The authors emphasize that these governance types cannot be found in pure form in reality, and have to be regarded as theoretical types.

Håkansson and Johanson have as a point of departure that the network is interpreted as the ability to direct and control the activities performed between the participating enterprises. In opposition to their position, I interpret a network as an entity created to

improve established interorganizational collaboration and, furthermore, create new innovative processes that go beyond previously established ones. Håkansson and Johanson's point of departure will limit the network concept to include only the business relationships between enterprises. This interpretation strongly emphasizes that networking is mostly about improving existing relationships between enterprises, admitting entrance for suppliers in the contractors' strategy process, continuously challenging the interface between the enterprises, continuously defining and redefining core business for the enterprises, continuously challenging the suppliers' deliveries regarding technology content, and so on. The authors' position focusing on the ability to direct and control activities between enterprises should be followed by a focus of how the actors control certain activities. They argue that the actors perform their control by the way they manage their relations with other enterprises. How this differs from ordinary business relations between enterprises does not emerge.

To generalize about network governance is, however, rather difficult, much due to the great variation of network forms that can be found in practice and are described in the network literature. To view networks as a "third" way to organize economic exchange depends on a certain approach to the content of the network concept. Independent of the point of departure, if network is a hybrid between market and hierarchy or is a distinct organizational form different from market and hierarchy, then the inter-organizational ties have to be very well-developed. It is hard to otherwise understand the disappearing of the market forces.

There is a need to step down from studying the concepts and dive into the different form of practical inter-organizational networking. One strategy to follow to get the necessary insight is to investigate what kind of ties exist between enterprises and study how these are governed (Ebers and Gandori 1997). In my study, the networks involved are complex structures, and are hard to place into the typology introduced above (Haga V). This means that the network involved in my study may fit into several of Håkansson and Johanson's typologies (Håkansson and Johanson 1993). However, it is important to add that my study is strongly founded on comparison. In Haga V, the characteristics of most of the different networks involved, two from Sweden and two from Norway, were analyzed. Differences and similarities are made visible through comparison between these networks. Comparison is an important approach in two other papers as well. Haga III includes the analysis of training programs directed at training development agents in the membership enterprises, and Haga IV includes an analysis of the role of the

researchers in the networks and networking processes by using a comparison between a new set of Norwegian networks as a point of departure. Thus, networks from different parts of Norway, as well as a network from Sweden, are included in my study, as has been done by researchers from other institutions, mainly from Norway and Sweden, but also researchers from outside these countries, making these analyses stronger.

However, the networks that appear in my study can mainly be characterized as networks (cell 1) governed by individual and varying interests of different actors, in Håkansson and Johanson's terminology. Still, the enterprises have been able to agree upon the construction of a solid network structure and to attribute certain tasks to the network actors. As I have displayed in my papers (Haga I, II, III and V), the membership enterprises have accepted to enter into a network that handles development issues at network arenas, allowing for all enterprises to participate. Thus, the enterprises have accepted sharing knowledge and experiences. Additionally, they support initiatives, taken from the network coordinator and the researcher, that involve a number of membership enterprises, as the case displayed in the introduction and the joint training programs make visible. What kinds of tasks that have been transferred partly or fully may differ. However, the important part is that the enterprises accept the transfer and look upon the network construction as a tool to increase innovativeness and the ability to improve. Paper V reveals that the Norwegian networks either are, or have as an aim, to become self-financed, which implies that the enterprises themselves finance the operation of the network and the network management. The Sunnhordland Industrial network has been self-financed by the membership enterprises in the network, which was founded fourteen years ago. The younger Hardanger Industrial network is now partly self-financed, but this network will also be transformed into a self-financed network after the provisional first period of operation. This fact is itself a significant finding. If the enterprises consider the networks to be so important that they are willing to pay operational costs, it indicates that the networks are looked upon as investment objects, and are considered to be an important tool for the membership enterprises to increase competitiveness. Evidently, it is hard to perceive the history of the Sunnhordland Industrial network that has been in operation for fourteen years in other ways than it has given considerable support to its members. Consequently, to develop the network's ability to support the individual enterprise in its struggle to increase competitiveness becomes an important issue as well.

However, to be able to initiate innovative processes in a network is dependent on interaction between personnel belonging to different organizations. This means that they do not have as close professional relations as employees belonging to the same enterprise. Actually, the personnel in the different enterprises are dependent on relating to personnel they do not know, sometimes with little former interaction. Are they generally able to trust each other, e.g. exchange sensitive information about their enterprises?

2.6 Is trust a precondition for interorganizational collaboration or a result of it?

Along with the increased interest from enterprises about developing interfirm relationships, the scholarly interest in collaboration has risen accordingly (Powell 1996). The motives for this upsurge in cooperativeness among the enterprises are perceived as: strategic; risk-sharing; access to markets, technologies, and complementary skills; shortened innovation cycles; and enhanced learning (Powell 1996). Other strategic conditions may be added in this list, such as creating a dynamic environment or region, attracting skilled personnel, or utilizing unexploited resources. These aspects were apparent in Haga I. While discussing the construction of the Hardanger Industrial network in this paper, it was displayed that the intention behind the construction, clearly expressed by the Development Coalition of Hordaland and Rogaland, was to contribute to a turnaround of the negative spiral the region had gotten into.

However, varied forms of collaboration between enterprises are not rare. Macauley (1963) identified, decades ago, a broad range of business practices that fall outside of the details of a contract. He reinvigorated discussions of the non-contractual elements of the contract. This discussion brings about some core issues in social science (Powell 1996). First, can collaboration come about independent of trust? Second, can trust be a result rather than a precondition of collaboration? These questions are relevant to ask in my study as well. They can be restated as: “Were the construction and operation of the network dependent of trust?” and “Was trust a precondition for the construction and operation of the network, or was it a result of these actions?”

Trust is undoubtedly important in all kinds of collaboration, including interfirm collaboration as well as collaboration within organizations (Zucker et al 1996).

However, there is a well-established understanding that trust among members of the same organization will be significantly higher than trust among members of different organizations, and thus represent organizational boundaries, or efficient 'information envelopes' (Zucker et al 1996). This understanding has fastened because organizations have established internal exchange relations and enforcement mechanisms (Zucker et al 1996). These relations and mechanisms will ensure closeness between the individuals and increase the likelihood that these individuals will be open for social influence from colleagues. If such relations and enforcement mechanisms are likely to be in place within organizations, the question regarding networks will be whether it is possible to produce trust in a network setting. Trust production can occur when an individual is open to social influence from another individual, or when two individuals are open to social influence and a third party intervenes to mediate (Zucker 1986). This interpretation does not separate trust production within or beyond the organizational borders. This is, in a network setting, about creating meeting places where individuals can meet and establish social relations and where openness for social influence gradually increases. This may happen with or without the help of mediators.

In Haga IV, the case story from the Hardanger network makes visible how trust may be produced as a result of networking processes. The network arenas which were established as a consequence of the construction of the network were used deliberately to sell a message, which was the need for a renewed role of the suppliers (Haga IV and VI). As we learn from this case, the general managers at the 'industrial locomotives' strongly underlined the importance of, and need for, the creation of a new role for the suppliers. To build trust implies that information given or a message given at a certain time is trustworthy. If the information turns out to be false, this may strongly hamper trust production. Such conduct causes the recipients to judge the dispatcher as untrustworthy and it seems hard to turn around a recipient's judgement of the dispatcher. In other words, an enterprise has to earn its reputation as a reliable partner (Powell 1996). In the Hardanger case, individuals from one of the suppliers responded to this challenge by proposing a project based on the challenge given by the managers in the 'industrial locomotives' (Haga IV, Haga 2006c). The initiative from the supplier was received and seriously considered by the 'industrial locomotive'. They considered the proposal to be very interesting and responded positively to participation in a joint development project. This started a process of the exchange of ideas and sensitive information and constant, tight collaboration between suppliers and customers (Haga

IV). Of importance for the rest of the network, during the project execution, experiences from the project were repeatedly played back to the constructed network arenas (Haga IV). The joint reflection over experiences from this project prepared the ground for other joint projects. More importantly, such joint reflections are part of a general trust production process among the participating enterprises in the network.

This case illustrated that, even if there are established business relations between enterprises, there is a need for trust production if change is needed. Relationships between enterprises are often based on fixed services and products. To change this relationship creates uncertainty. For the enterprises, this often means moving to a vulnerable position (Powell 1996). Developing new positions and roles requires that trust also has to be developed. To engage in changing the relationship and roles is dependent on the presence of openness for social influence. There is a need for the participating actors to listen to what the business partners are actually suggesting, and respond to these in a creative way. The participants have to believe that active involvement in such a process will create a new extended trust between the actors involved. Trust is, then, not something that has to be present up front; rather, it is produced as a result of common efforts from a set of actors or participants.

As indicated in Haga IV, personnel who appear in certain processing roles may have an important role in preparing for trust production. This may be illustrated by how the mediator in Hardanger operated, by preparing network arenas, directing the network meetings, providing for experiences to be played back to the other participating enterprises at network arenas, and being involved in the project execution to ensure the exchange of sensitive information (Haga IV).

To develop a dynamic networking model that handles the initiation, construction, and operation of sustainable networking processes is my main aim in this dissertation, as stated in Section 1.3. However, to develop a purely theoretical model that is less relevant for the operation of a network in the field is irrelevant to me. As I have stated in the introduction (see Section 1.4), I have applied an action research approach in my study. The model that I have developed is, thus, developed as part of a real network construction, as a bottom-up process involving a set of actors. The members of the networks anticipate the researchers contributing in the network collaboration with tools, methods, and skills. They expect to see immediate results of the network collaboration, as well as long term results. Consequently, in a situation where the network actors

expect substantial practical contributions, a theoretical constructed networking model is of less relevance. However, I am not downplaying the importance of developing theoretical models; such models are of uttermost importance. In other words, I aim to develop a model that is of both practical and theoretical relevance.

To create a model that may function in practice as well as in theory calls for researchers who are able to transfer knowledge between the field of practice and the field of research. In Haga IV, the importance of knowledge transfer as an enabler to create dynamics is displayed. Thus, knowledge developed locally in a practical network setting must be transferred and related to general knowledge in the field of research, and visa versa. Such a task incorporates actually taking part in the development of definite, user-friendly instruments vital to the initiation and support of networking processes. Such oscillation between practice and theory calls for a carefully thought-through methodology. Prior to giving an account of my methodology, I will present my dynamic model.

2.7 The model of orchestration

I will argue that, when using a network concept where the participating enterprises are not necessarily in a business relationship, the presence of a well-orchestrated network is cardinal for increasing innovativeness and improvement ability. My research indicates that the presence of some specific features, enablers, in networks is essential for the creation of sustainable networking processes. To create results, as in the narrative presented in the introduction of this paper (see Section 1) and cases presented in the papers, are thus dependent of the utilization of such features and the interplay between them.

I have identified a set of enablers in the network part of this study. I perceive these enablers not only as tools for the networks to put to use, but also as important elements of a networking model. This dynamic networking model is presented in Figure 7.

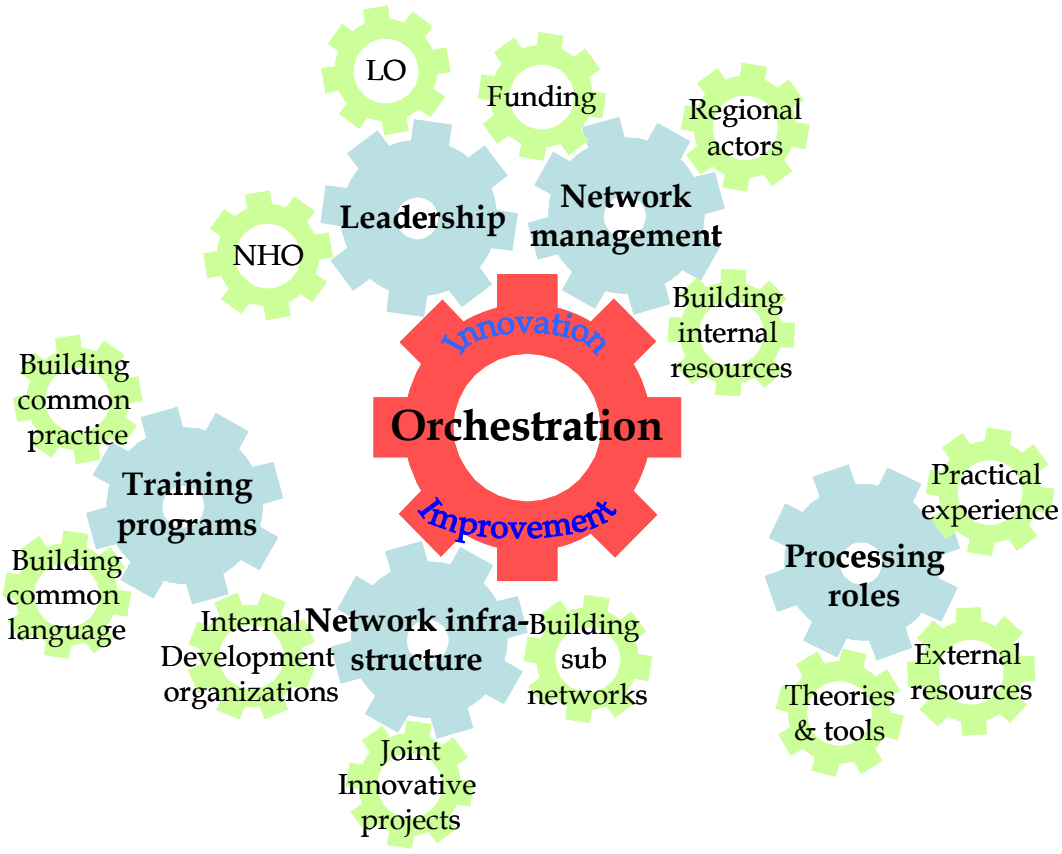

Figure 7: The dynamic networking model

I have adopted the gear wheel to illustrate my model. This symbolizes that, to be able to initiate and construct networking processes, several enablers have to present, and these enablers need, as in the gear wheel, to be well-orchestrated in order to reinforce the effect of the network collaboration. Thus, the orchestration part consists of the ability to utilize the parts of the gear wheel in a way which produces the desired processes and results dependent of the context. To be able to perform this orchestration calls for an understanding of situation and context at hand, as well as the ability to combine the parts adjusted to the context.

Thus, I have introduced several enablers needed to activate and maintain networking processes. Ebers and Gandori have framed this with the notion of inter-organizational ties (Ebers and Grandori 1997). However, it is not obvious what kind of ties or features will support the activation and maintenance of networking processes, or if some ties or features are counteractive. The selection of ties or features needs to be addressed, and that will be done in this section. Additionally, I will thoroughly discuss the individual

enablers that are part of the model presented above. This model is solidly grounded in my empirical data and papers elaborated from these data.

2.7.1 Enabler I: Training programs

Lave and Wenger (1991) have introduced their view on knowledge and learning in organizations that links such processes to everyday practice. However, communities of practice are not limited to work life, but are an integral part of our daily life (Wenger 1998). Lave and Wenger introduced a process called 'legitimate peripheral participation' (Lave and Wenger 1991). This term is connected to the way learning happens in a community of practitioners, and how newcomers, prior to attaining the mastery of knowledge and skill necessary to become a member of the community, must go through an apprenticeship process (Lave and Wenger 1991). Learning is not regarded as some sort of special practice that has to be de-contextualized in order to be studied, but is regarded as an integrated part of the everyday practice. At the same time, knowledge is not viewed as a stable product, but is rather regarded as a relational and transient product (Araujo 1998). Wenger (1998) argued that, as long as individuals consciously engage in social interactions, new situations, impressions, and experiences will be produced. These impressions will extend, redirect, dismiss, reinterpret, modify, or confirm – in a word, negotiate anew – the histories of meaning which they are a part of. Thus, living is a constant process of negotiation of meaning: learning as experience. Wenger (1998) integrates three more components in his learning concept: learning as becoming, learning as belonging, and learning as doing. These elements are deeply interrelated. That knowledge is regarded as relational also underlines the importance of situated knowledge as opposed to general knowledge. On the other hand, general transferable knowledge is of uttermost importance as an input in context-dependent knowledge production.

Still, some challenges connected to situated knowledge production must be addressed. Firstly, there exists a tension between exploitation and exploration (Nonaka and Takeeuchi 1995, Haga 2006a). In organizational learning, the ability to both exploit existing knowledge and explore or create new knowledge is vital. Thus, enterprises have a choice to focus on exploitation (incremental change), exploration (innovation), or both. However, in Haga VI, I demonstrate that, in a network, this tension may be downplayed. I demonstrate that projects focusing on exploitation and exploration are handled in the same way in the network, indicating less pronounced division between

the two types of projects. Secondly, knowledge conversion or knowledge transformation is important for the internalization of practices (Arauja 1998). Nonaka and Takeeuchi (1995) present a framework for knowledge conversion that relies on Polanyi's distinction between tacit and explicit knowledge. They introduce four modes of knowledge conversion, from tacit to tacit knowledge: socialization, externalisation, combination, and internalisation. Such knowledge conversion is about making originally tacit knowledge explicit and part of the tacit craftsmanship. A process started by a craftsman being exposed to knowledge that is ending up being internalized inside the craftsman as tacit knowledge. Thirdly, knowledge transfer or conversion may appear as an issue in a different way. Thus, to make theoretical knowledge applicable in the field of practice, as addressed in Haga IV, translation is needed.

It is necessary to address learning as an important concept in enterprise development and networking processes. Wenger (1998) argues that living is a kind of constant learning process. However, I will concentrate on deliberately activated learning processes. I will argue that it is important to address how learning processes may emerge (Haga III), such as processes that aim to activate the use of democratic participatory approaches. To be able to start deliberate collective participatory learning processes in enterprises and networks, initiatives will have to be taken. These initiatives may be taken from management in the individual enterprise or from a "network engine", as displayed in Haga III. On the other hand, to start a learning process that will result in a change in practice, of meaning, or of identity, participation from the personnel involved must be emphasized. In Haga III, two different training programs in two different networks are discussed. However, there exists a common denominator for both programs: to achieve wide employee participation. The main reasons for such an approach are that change processes are more likely to succeed and improve the work environment. Processes placing an emphasis on interaction, either between members of communities of practice or between the internal members and external actors based on situated knowledge, may result in a genuine change of practice, meaning, and identity. To be able to accomplish a full learning cycle going from tacit knowledge to tacit knowledge, the knowledge firstly will have to be made explicit, applicable, and understandable. This presupposes arenas where such processes may take place. In Haga IV and VI, the importance of network arenas as a point of departure for learning processes can be illustrated by the introduction of the foundry station case. I will regard

such learning processes, in contrast to ‘market-as-network’ supporters, as the core element in networking processes.

Still, to get arenas established, and processes started and ongoing presupposes the existence of a driving force (Haga II). What and who can be the driving force in learning processes in enterprises and networks? It has become evident that the existence of a “network engine” may stimulate such learning processes. The network engine may effectuate measures that deliberately activate learning processes. In networks, introducing training programs in development methods, as displayed in Haga III, has turned out to be an efficient solution. These programs may have a different appliance, but the main aim of the programs is to train members of the staff in the membership enterprises to become professionals and facilitators in initiating and accomplishing development activities and projects. The idea is that these facilitators will use their knowledge and skills to start interactive processes, triggering engagement from the rest of the personnel in their department or enterprise. To enable the employees from the enterprises to take up roles as facilitators, they have to be taught and presented general, transferable principles. The translation of these principles, to be applicable to the local context, will have to be done by the participants. Thus, the production of situated knowledge will be based on translated general transferable knowledge. However, knowledge production will be ensured by employees in the different enterprises and communities of practice participating in interactive development processes.

Training within networks and enterprises, as the programs introduced in Haga III, is about how to develop knowledge that can be used by employees, enterprises, and within networks of collaborative enterprises to elaborate their ability to innovate. So far, I have argued for the need for training of employees to enable them, as well as the enterprises, to become innovative. Still, I have barely addressed what has to be emphasised in this kind of training, and how this can be done in practice.

In addition to the content question, focus will have to be put on how to create space for training, both within the network and the enterprises or organizations. This space for training will contain opportunities and limitations for the employees within organizations and enterprises, regarding training in their daily work (Botterup 2002). A focus on creating space for training will also affect how we work with enterprises and networks, as well as the operation of networks. It is necessary to allow both individual and collective training to take place. At the same time, there is a need for systematic

operations that both: (a) promote training, and (b) utilize the results of the training processes. Still, there is a need to give attention to conditions that are decisive when working with training in the daily work.

2.7.2 Enabler II: Network infrastructure

Presently, the enterprises face complex challenges because of fundamental changes in the economy. Trade barriers have been removed and global competition penetrates formerly protected markets. This caused disturbances in the markets, which hit those not used to operating with such a degree of instability the hardest. Such complex problem areas are often referred to as 'problematique' (meta-problem) or 'mess' (Trist 1983:270). The issues involved are too extensive and many-sided to be solved by any single organization or enterprise. The overly-complex situation calls for actions from those involved. However, purposeful actions by any stakeholder may profoundly influence the ability of the others to achieve their goals. Hence, they experience being interdependent of each other. Collaboration has been proposed as the only viable response to such interdependency (Trist 1983, Gray 1985).

Gray (1985) has introduced a process model of collaboration to handle collaboration challenges. The model consists of three phases: problem-setting, direction-setting, and structuring. In the problem-setting phase, she focused on: identification of stakeholders within a domain, the recognition among stakeholders of the interdependency between themselves, perception of legitimacy among the stakeholders, and the possibility of a positive outcome. This phase is generally about recognition of the need to interconnect to actors beyond the border of the single enterprise or organization in order to meet the challenges at hand. In the next phase, direction-setting, the focus is on identifying and appreciating the common purpose. The process of developing a shared interpretation about the future and the articulation of commonly held values and goals serves to correlate the stakeholders' activities toward mutually desirable ends. In the third phase, structuring, Gray emphasizes the need for ongoing appreciative processes and the need to manage stakeholder interactions in an increasingly systematic manner. Thus, I will argue that, to ensure that stakeholders or network participants regard each other as potential co-producers of desirable changes, they need to create long-term structures to support and sustain their collective appreciation and problem-solving activities. In Haga V, I compared four networks in Norway and Sweden, and found that long-lasting

networks, as in Gnosjö and Sunnhordland, produce closeness and trust between the enterprises. This, again, opens a range of possibilities for the enterprises.

Gray strongly emphasizes the need for construction of long-term network structures. It is not sufficient to rely on one-time happenings to achieve the desired results. Through structuring the field, the stakeholders generate order and a system for coincident values. This is noticeable in Hardanger and Sunnhordland, where joint training programs justify common development methodology and the creation of a joint development language within the network (Haga III). Additionally, I will argue, based on my discussion in Haga V, that how the networks are organized will influence their ability to support development and innovation processes. A comparative study of four industrial networks in Sweden and Norway (mentioned above), performed by two Swedish colleagues and myself, reveals that a solid network structure including the presence of a network administrator or coordinator, the presence of R&D, and a stable group of participating enterprises over a period of time increase the network's ability to focus on development and innovation issues. The presence of the network structure also opens a variety of other opportunities for the participating enterprises.

A premise for creating order is to establish dialogue between the stakeholders involved, and to create sustainable dialogue calls for the construction of lasting arenas were the stakeholders can maintain dialogue over a period, as displayed in Haga I and Haga VI. However, in a network setting, as well as in an enterprise setting, restricted participation will hamper collaboration. Structuring the field is about constructing network arenas that can function as public spheres (Pålshaugen 2002).

In Norwegian work life, two different strategies toward democratization in the work place have been followed: strategies for participative democracy and strategies for representative democracy (Pålshaugen 2002). The latter strategy emphasizes the use of the law to ensure that representatives drawn among employees should have a minority of seats in the board and the corporate assembly in enterprises. The main aim of such a representative system is to increase the influence of the employees on management decisions. Contrary, the first strategy is less occupied by the employees' right to be represented in the steering bodies in the enterprise, and is mostly concerned with issues which pertain to the question of 'democracy at work'. The main aim of this strategy is to increase the influence of the individual employee on his/her own work conditions. In the basic agreement between the labor market parties, a full section deals with

collaboration at the work place[18]. This agreement is basically meant to organize cooperation between employees and management at the enterprise level on the topic of improvement and development of the enterprise. Thus, employees' participation in the development of the enterprises is regarded as a democratic issue. To be able to involve the employees in such work, organizational tools have to be introduced. Related to the issue of employee participation in the development of the enterprise is the issue of the construction of public spheres which enable the employees to openly discuss these topics. Thus, it is not about constructing a public sphere, but a sphere of publics. To limit the deliberations to one single public sphere will most likely exclude a number of people not comfortable operating at such a sphere. The prevalent purpose of the public sphere is to be a place for deliberations, not for decisions (Pålshaugen 2002). To construct a developmental organization within the enterprise is a way to construct public spheres and to ensure employee participation within enterprises (Pålshaugen 2002).

The environment surrounding the enterprises calls for enterprise collaboration and an opening of the enterprise borders. Thus, the organization in the individual enterprise will need to expand to also include the network structures established outside of the enterprise borders. The extensive use of network arenas, displayed in Haga IV and VI, where membership enterprises represent an inclusion of established network structures in the membership enterprise's developmental organization. Such structures may represent, partly, a developmental organization for the membership enterprises (Haga I). As important as in the individual enterprise is, thus, to construct public spheres within the networks that, on the one hand, represent a move toward maintaining a democratic work life enabling employee participation in the development of the enterprises in a changing landscape. On the other hand, these public spheres, labeled network arenas in Haga IV and VI, may also represent an innovative force that lies open for participating enterprises. Generating knowledge production processes that may lead to improvements and innovations is the main challenge for the participating enterprises. Efficient knowledge production processes need, on the other hand, to be nurtured by the enrollment of skilled personnel. Thus, constructing public spheres where such personnel

18 In section B of the basic agreement, one part contains "The agreement on cooperation"

meet, discuss, and reflect upon common challenges represents an opportunity for enterprises.

Supporting the construction of a number of public spheres in the network does not exclusively underpin democratization of a work life facing new challenges, but at the same time, becomes a source for renewal and development of the participating enterprises, as displayed in Haga IV. Deliberate construction of public spheres is, thus, an important issue when constructing and operating industrial networks: they enable wide participation in improvement work.

Still, to downplay the importance of the strategy to democratize work life through legislation would be a mistake. Legislation ensures the employee's right, through union representatives, to take part in the decision-making processes. However, at the same time, this participation will legitimize union representatives' right to ensure the implementation of a strategy of involving employees in enterprise development processes (Haga 2006a). In this way, the strategy emphasizing the employee's right to take part in the decision-making process is a premise for the implementation of public spheres and broad participation from the enterprises.

Meanwhile, to construct and operate networks and networking processes calls for particular skills and knowledge. Personnel possessing such skills and knowledge appear in several roles in the network.

2.7.3 Enabler III: Facilitation and brokerage – processing roles in networks

Establishing and operating sustainable networking processes calls for actors able to facilitate such processes and to exploit external resources located outside of the network. Facilitation, as discussed in Haga IV, calls for the ability to continuously renew ongoing discourses in the network, including making research-based knowledge applicable in the field of practice. To make research-based concepts relevant for solving practical problems demands processes of translating discourses taking place in the field of practice and in the field of social science. Thus, as we have argued in Haga IV, actors who contribute to the establishment and operation of sustainable networking processes and contemporary knowledge production need to possess a capacity to mediate and bridge these separate discourses into a joint actionable framework. Successful processes of bridging various discourses and perspectives are significant in situations when coping

with networks. Simultaneously, to contribute to contemporary knowledge production requires actors able to expand the networks by interconnecting people and institutions in joint work and to translate various stakeholders' perceptions and interests into an actionable ground.

Facilitation

My research demonstrates that reflections on action have enabled the participants to detect new possibilities, create new discourses, and bring new lines of action within reach. This has been displayed in the cases presented in Haga IV and II. Expansion of dialogues and activities demands actors who are able to discover and construct links to a manifold number of perspectives, activities, and resources (Haga IV). Simultaneously, the renewal of network dialogues and creation of new discourses rely on a facilitator able to include renewal of processes in the established network practices, as well as the utilization of different approaches to innovation and development (Haga II)

A means for developing networks revitalizing capacity and avoiding the introversion of relations has been to expand the discourses. Topics of practical relevance linking people in joint work are seldom known in advance, but occur over time by bridging the manifold perspectives existing in the local network as well as in the field of research. This is dependent of facilitators sensitive to perceived needs that occur within the network and the participating enterprises. Limited access to diverse sources of experience and recourse will constitute a hindrance to innovation, and hence restrict opportunities for local knowledge production. Thus, a vital issue is to promote expansion of the networks according to the nature of the developmental tasks. However, the processes of revitalizing the networks by bridging new perspectives, activities, or resources has not been accomplished without tension or conflict between different interests, economical motives, and expertise among the different stakeholders. In the case from Electronic Cost, presented in Haga IV, these tensions between different interests are displayed.

Brokerage

As my research indicates, when creating sustainable networking processes, it is important to expand the networks by interconnecting people, enterprises, and institutions in joint work, as displayed in the foundry station case (Haga IV and VI) and the case presented in the introduction. An essential task has been to improve the

network's innovative ability, by generating, channelling, and maintaining flows of resources and knowledge between local and global networks. To accomplish improvement or innovation projects, it is crucial to establish a bridging mechanism enabling a diverse number of actors to engage in various development tasks. This bridging mechanism from where recourses and actors are negotiated into local projects is termed *obligatory passage point* by Law and Callon (1992). The passage point constitutes, by integrating and terminating novel perspectives and resources into networking processes, a common point of references that enables the linkage of various social worlds in common goal-directed efforts. Taking the role as a passage point calls for actors able to translate a unified and coordinated meaning of a project to new actors, as in the case from Electronic Coast presented in Haga IV. In this case, the researcher, operating as a broker, was able to collect external expertise on the project by translating the meaning of the project to these actors. In addition, actors occupying this position have played an important role in expanding local networks' autonomy in relation to actors in the global network. This was also displayed in the two cases presented in Haga IV, where complementary expertise was brought in as a result of the broker operating as a passage point.

The role of the researcher as a broker has recently gained attention in the body of literature addressing network and entrepreneurship (Provan and Human 1999, Sverrisson 2001). Brokers are considered to be intermediaries, bridge-makers, negotiators (Sverrisson 2001), facilitators, and network membership developers (Provan and Human 1999). The picture drawn of a broker is partly that of an actor who facilitates and channels interactions from within the local network toward global networks. However, other aspects are connected to the role of a broker, and I prefer to exclude such aspects of this role. The role as broker is exclusively linked to interconnecting people, enterprises, and institutions.

Comparison and transferability

The personnel holding processing roles are dependent on vigorous methods and tools. One such method is comparison. By comparing the same phenomenon in different contexts, peculiarities may appear. Thus, this design was utilized in the comparison between networks from Sweden and Norway displayed in Haga V. These may be context-dependent. Even so, it is not obvious that they are without significance in other contexts as well. Exposed to others, these peculiarities may be regarded as interesting

and important for other contexts as well. However, they are, presumably, not directly transferable, but need some sort of accommodation to the context at hand. Thus, such comparison may lead to knowledge transfer, not as transfer of a pre-fixed solution, but of ideas on how to handle specific problems. In Haga I, the transfer of knowledge about networking, through the researchers from the Sunnhordland Industrial in operation to the Hardanger Industrial network under construction, was displayed. Moreover, comparison may be performed in different ways. The most common way to accomplish a comparison is to let someone collect and compare information about a phenomenon that appears in different contexts, and present the results. However, there are other ways to perform such comparisons.

If networking can be a strategic tool for the enterprises to support their development and become more competitive and innovative, the network itself also has to improve. A network should not be a static phenomenon. The enterprises experience a continuously changing business environment and have to adapt to these changes. For the network to be able to support the enterprises, it has to change accordingly. The question is what kind of network will best serve the needs of the participating enterprises.

One way to get ideas on how to develop a network is to compare the operations of one network with the operations of other collaborative entities. I will argue that such comparison, performed in a specific manner, is an effective tool to measure network operations. The comparison could be done in a number of ways, but involving the participants of the network in such a comparison is efficient. Moving beyond the network border to share experiences, compare practices, and prepare for joint reflection with personnel and researchers from other networks is, as shown in Haga V, a vigorous tool for network development.

The aims of such a prepared comparison could be multilateral:

- Get an impression of how networks operate in different contexts and how they support and promote their membership enterprises.

- Exchange experiences and compare practices with enterprises operating in these networks. How do they collaborate to become more competitive and innovative? What is the role of the network? What does the network represent for the enterprises?

- Exchange experiences and compare practices on how the networks and enterprises collaborate with R&D organizations? What kind of relationship do the networks have with R&D?

Thus, comparison is a vigorous tool that may be utilized differently by the personnel holding a certain process, and it may also differ according to the situation at hand.

2.7.4 Enabler IV: The network coordinator

Facilitation and brokerage are of highest importance for the renewal of networking processes. Equally important is another role that attracts less attention: the network manager (Schön 1971) or network coordinator (Haga 2006a)[19]. Schøn defined the *network manager* as one who: 'oversees official networks of activities and elements, assuring the flow of information, the processes of referral, tracking and follow-up, and the provision of resources required to the network to operate'(Schön 1971:199). Accordingly, the *network coordinator* keeps track of the threads and, therefore, secures the continuity of the networking activities (Haga 2006a). Of equal importance, however, is the administrative function of writing applications, calling for meetings, writing feedback notes, summaries, and so on.

However, the network coordinator is not just an administrator, but has several other functions. The coordinator is "the glue" in the network that establishes and maintains relationships with all of the participating enterprises. In a network that emphasizes collaboration between the labor market parties and broad participation, the network coordinator needs to establish relations not just with management, but also with unions, other groups, and individual employees within the membership enterprises. The operation of different sub-networks, public spheres within the network, calls for establishing a wide set of relations with personnel appearing in the sub-networks, who are, at the same time, employees in the individual enterprise (Haga 2006a).

The network coordinators' experience and former connections with the membership enterprises are, thus, not without relevance (Haga 2006a). The role of network coordinator is frequently held by locals who have established a set of local relations

19 I prefer to use the term 'network coordinator' for this role.

before entering the role as network coordinator. These relations are part of their knowledge base and they are able to utilize them (Haga 2006a). The networks are governance structures outside of the enterprises that lack the legitimacy that the enterprise organizations hold. It appears to be important for the legitimacy of the networks to have a network coordinator who either has a background as a union representative or who has close relations with the unions (Haga 2006a, Haga 2005c). This refers back to the importance of collaboration between the labor market parties and broad participation from the employees within the membership enterprises.

The network coordinators, with their extensive relations to the enterprises, groups, and individuals within the enterprises, represent a unique resource for accessing the internal life and needs within the different enterprises.

The role of a network coordinator is not static: the role develops along with the operation of the network it is a part of. Certainly, it interacts closely with the other roles operating in the network, including the roles of facilitator and broker. The coordinator's ability to facilitate network processes, and to relate to and enroll external resources increase, and these abilities become part of the role of the coordinator as well (Haga 2006a).

Why, then, focus particularly on the development of this role? This role is generally occupied by locals. The gradually increasing complexity of the role of the network coordinator is part of the strengthening of the local development apparatus. Enabling the apparatus to become as self-contained as possible is part of the strategy behind the construction of local industrial networks.

However, these reflections should not keep in the shade the fact that the role of the network coordinator is basically about network administration.

2.7.5 Enabler V: Leadership

The creation of network and sustainable networking processes calls for strong local leadership able to enroll enterprises into the network and networking processes. This is a prerequisite for successful networks (Haga V). However, as important as the managers are the union leaders (Haga 2006a). Additionally, in a geographical area that contains of a number of enterprises, some will more strongly support the network construction than

others. To be able to identify these enterprises, 'the network engines' are of uttermost importance for the construction of a network.

The union leaders are an important part of the network leadership (Haga 2006a). The Hardanger network, as displayed in Haga V, includes the union representatives' members of the board, who also have their own sub-network. I will argue that efficient networks are dependent on communication between the enterprises at various levels to be successful. A broad involvement of personnel in the networking enterprises calls for a strong union leadership that has developed a strategy about enterprise development. The union representatives' importance as facilitators for wide employee participation in development processes is discussed in Haga II. To take the initiative to establish such a strategy calls for union leaders who have a broader view on the role of unions compared to the more traditional view that perceives the all-important task of local unions to be negotiating wages. Thus, union leaders are of uttermost importance to establishing participatory democracy at the workplace (see Section 3.4.4). To achieve broad involvement from employees, the involvement has to be legitimated by the union. Thus, the union leadership role is to ensure that the encouraged broad involvement from the employees not only benefits the management, but also benefits the employees by: improving their work environment, utilizing their competence, and contributing to ensure the profitability of their workplace.

Thus, unions play a significant role as organizers and legitimators, displayed in Haga II, of the direct industrial democracy at the work place (Haga 2006a). I prefer to make a distinction between direct and indirect industrial democracy (Claussen 2001a). The first covers the direct involvement of employees in processes within the enterprises. The latter refers to the system of representative boards within an enterprise, where some of the board members represent the employees. My classification differs from Pateman's well-known concept of pseudo, partial, and full participation (Pateman 1970). Her concern is to display to what extent employees have the power to make decisions in enterprise development. I focus on the division between direct involvement and representativeness to display the role of the union as a facilitator.

I will argue that, for the unions to be able to prepare for employee participation in development and innovative processes, the indirect industrial democracy needs to be well-functioning. The unions and union representatives need legitimacy to become initiators in change processes. Not only may the members give them that, but

management as well may contribute strongly to underpin their legitimacy as representatives for the employees. This may be done by involving the unions in internal processes and preparing for an offensive use of the industrial democratic boards within the enterprises. Involving the unions in networking, as shown in Haga V, may also legitimate the unions to appear as initiators of change processes within and between the enterprises. In this way, traditions or procedures of how to handle internal processes for involvement of the unions and for exercising leadership are established. However, the management is often replaced. Thus, a well-functioning union may become the carrier of continuity in the enterprise. A well-functioning direct democracy, involving employees within the enterprise is, thus, dependent on a well-functioning indirect democracy at the work place.

Hardanger has previous union representative who held the position as network coordinators (Haga 2006a). This move has also contributed to involving and legitimating the union's role as a facilitator of change processes.

It is important to emphasize the importance of the role of union leadership connected to enterprise development and networking. However, equally important is the role of the managers in the participating enterprises. For a number of reasons, some enterprises are able to take a leading role, acting as a 'network engine', in the construction of networks and networking processes. To identify a single 'network engine' is common in most networks. Obviously, the managers and the union leadership in this enterprise become, as displayed in Haga V, of uttermost importance for the network. To achieve results from network collaboration, the management in the participating enterprises have to invest some resources and money into networking activities. However, the most important contribution from the leadership in the 'network engine', management and the unions, is their faith in network collaboration. Their attention is constantly on improvement and development of networking processes. I will argue that, to construct a network, a 'network engine' is needed to convince other managers and union leaders about the potential benefits of networking (Haga I). This may be impossible to construct from outside.

Even if some enterprises of the managers and union leaders have the necessary focus on the potentials of network collaboration and enterprise development founded in broad participation from employees, focusing on their own roles as organizers may be needed. I will argue that gathering managers and union leaders to discuss and reflect over their

roles in such processes is an efficient way to distribute knowledge and identify potential benefits (Haga 2006a).

Another important aspect that has to be addressed is the linkages between the local labor market parties represented by union leaders and the managers, and between the regional and national levels of the labor market parties. In the Norwegian context of industrial relations, the interplay between the levels is highly developed through legislation (the Work Environment Act), agreements (The Main Agreement), and joint agencies. These arrangements constitute major potential support for the local labor market parties.

2.7.6 Orchestration

To create sustainable networking processes in solid networks calls for, I will argue, orchestration. This may be vital to evolving networks described in the 'market-as-network' literature (Håkanson and Johansson 1995). Efficient networking processes are dependent on a joint actionable framework and the presence of a set of interacting enablers that make the enterprises, groups, and individual employees within the enterprises able to utilize this framework (Haga IV). However, neither the framework nor the content of the enablers are static - they are constantly changing. Thus, to negotiate the limits of the framework and enablers is a constant process. Simultaneously, there is a need for a 'maneuverable space' for knowledge creation within this actionable framework (Haga IV). The production of new knowledge, based on different sources as joint experiences in the network, translated transferable academic knowledge, and the enrollment of resources and actors from external global networks are the engine of sustainable networking processes. To ensure efficient networking processes and 'maneuverable space' for knowledge creation calls for orchestration of the available resources and enablers.

My research indicates that the utilization of a single enabler would not have generated sustainable networking processes. The different enablers have to support each other to achieve the desired results. This may be illustrated by another model developed in Haga VI and reproduced below (Figure 8).

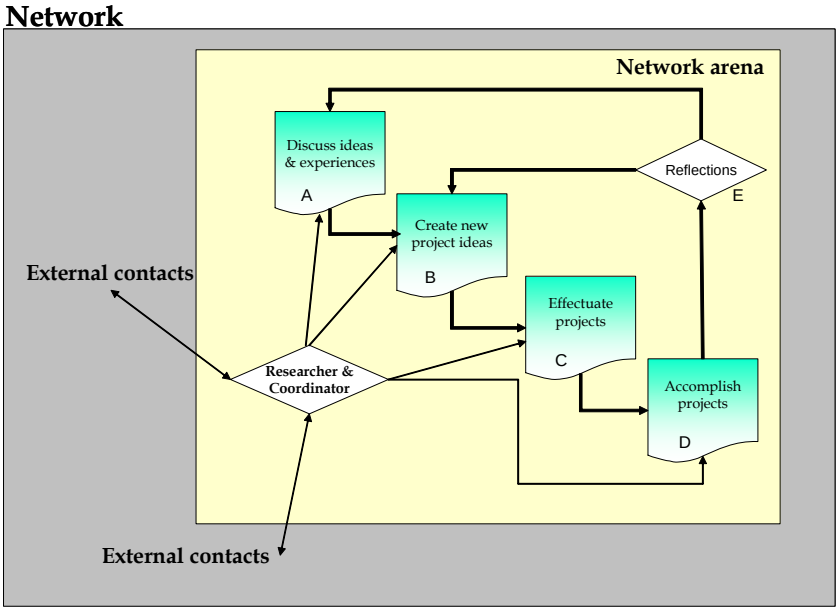

Figure 8: Networking processes

In the network arenas (A), experiences and local developed knowledge are discussed (Haga IV, Amble and Pålshaugen 2005). The local resource, the coordinator, and the external resources, the facilitator and broker, are the ones setting up the network arenas to enable dialogues using the actors' experience and knowledge as the point of departure. In these arenas, new ideas for improvement or innovative activities (B) may be created based upon knowledge and experiences from a participating enterprise, an initiative or input from the brokers and network coordinator, or other external resources invited to the network. The facilitator, broker, and the network coordinator may also play important roles in taking the project idea to project effectuation (C) and accomplishment (D). However, to effectuate and accomplish development projects, the enterprises are dependent on personnel skilled in development methodology. More important for network collaboration is that the experiences and knowledge created through project effectuation and accomplishment are presented for the other enterprises in the network, and are used as a point of departure for common reflection (E). These reflections may later lead to dialogues that open new activities and projects. Playing the experiences and knowledge created in the project back into network arenas will close the learning loop (A-B-C-D-E-A) and open sustainable processes within the networks. This model illustrates the need for a well-orchestrated interplay between the different features presented as part of my dynamic networking model. The model above (Figure 11) also illustrates the interplay between: facilitators, brokers, and network coordinators; the presence of network arenas; effective utilization of different network

arenas; and the presence of methodology and trained personnel that enable the enterprises to effectuate and accomplish improvement and innovative projects.

Thus, it was the force generated by interaction between the different enablers that made it possible to establish processes and launch projects (Haga V). Training programs and learning processes within network arenas in interplay is a point of departure for internal and joint projects. However, this could not have happened without intervention from the leadership and the legitimation of these activities, as presented in Haga II, III, IV, and V. To decide which enablers to utilize in the different network initiatives, including input from research, will be part of the role as orchestrator. Even if orchestration is about managing possible enablers and the interaction between these in networking processes, the other roles of facilitator and broker are just as important. This is dependent on the task at hand. However, most actors in the networks are not in a position to specialize in a certain role, but play most of them. Thus, in practice, to take up the role as orchestrator requires the ability to take up the other two roles as well (Haga IV).

Most important for the orchestrator is to understand the different enablers, such as how these enablers may support the construction of networking processes or support ongoing processes, and how the interplay between different enablers may reinforce these processes. However, it is important to emphasize that the enablers are not static. The design of a training program must fit the need of the specific network. These needs may differ from network to network, even if some basic elements should be recognizable[20]. How the sub-networks, public spheres, or network arenas are constructed and operate are based on the specific needs of the individual network as well (Haga V). Parameters that have to be taken into consideration are geographic location, infrastructure, networking intensity, the operation of the enterprises (the use of shift work, 24 hour operation), the industrial culture, and so on. To optimize networking processes calls for orchestrators capable of deciding on which enablers to put into play, even handle the design of the enablers, and at the same time be able to conduct the use of these enablers.

To construct complex development processes in a network means to transfer processes that have been taken care of by the single enterprise to a governance structure outside

20 e.g. training programs consisting of development methodology, the different network roles.

the border of these enterprises (Haga IV). For instance, the joint project displayed in the introduction that involved two of the membership enterprises was managed by the network coordinator. The coordinator is employed by the network and neither of the participating enterprises. However, the governance structure does not operate independently of the membership enterprises. The network takes care of vital processes for the individual enterprise and has to relate to these enterprises' challenges. Simultaneously, these enterprises have their own limits for what they will regard as an acceptable framework and as acceptable enablers. To be sensitive about limits of acceptance and to understand the reasoning for the limits is important knowledge for the orchestrator (Haga IV). Thus, orchestration to not take place in a vacuum at the network level, where an orchestrator is delegated the power to make decisions about the use and design of enablers. The orchestrators are dependent on clearance from those in charge of the network, and also need to collaborate closely with other actors present in the network. Decisions and clarifications are made through dialogue with necessary actors. Negotiations about limitations of the actionable framework and the use and design of enablers are both important tasks for the orchestrator. To extend the actionable framework and expand the number of enablers and new designs of enablers, these suggestions have to be promoted to the other actors by the orchestrator. These may also go the other way around. This field is not static, but is constantly changing. This calls for awareness of these changing conditions from the orchestrator.

My research has also displayed that orchestration is an important part not just of the network and the networking processes, but also within network projects. This was displayed in a joint innovation project that is described in two of the papers, Haga IV and Haga VI. For the orchestrator to be able to utilize the "maneuverable space" for knowledge production requires extensive processes of translating various perspectives and interests into something signifying common ground.

To focus on the presence of different features or "interorganizational ties" has been done by other researchers as well (Ebers and Grandori 1997). Ebers and Grandori have "focused on the role of resource interdependencies, trust and catalysts for networking" (Ebers and Grandori 1997). However, they have neither offered complete nor systematic tests of whether these three kinds of ties represent important building blocks for a theory of inter-organizational network formation. They indicate, however, that these ties are important conditions that might lead to and shape the formation of an inter-organizational network. More importantly, they emphasize that a more complete

analysis of the role of the ties for networking would require the identification of features of the ties that might prevent the formation of lasting inter-organizational relationships (Ebers and Grandori 1997). I acknowledge that this is important. However, in my dissertation I have focused on enablers that support, rather than prevent, the formation of lasting inter-organizational relationships.

Thus, my main argument is that networking processes are what constitute a network, and that a set of enablers must be present, or at least be well considered, along with a deliberate orchestration of these enablers to consolidate sustainable networking processes. However, I have argued for the construction of a dynamic networking model. This may be perceived as identical to developing a *general* model, which is, meanwhile, not the intention, and this issue will be addressed in the methods chapter (Section 3.2).

3 Methodology accommodating the field of inquiry

In my thesis, I argue that networking processes constitute a functional network between enterprises. Constructing networks and establishing sustainable networking processes within such networks depend on the presence of certain enablers: heterogeneous associated network constructors, coordination mechanisms, diffusion mechanisms, and mechanisms for facilitating interorganizational collaboration. Most importantly, there must be a well-orchestrated interplay between these enablers to activate networking processes. The different enablers are not able to support such processes individually. The thesis is based on current cases and comparison. This line of argument has been developed based on the discussions my research questions has generated. My research questions are directed at features that may influence networking processes: “Which features are particularly important when preparing networking processes?” and “Can these features be identified, created, applied, and utilized in construction of networks, in other words, in networking activities?”

To answer these questions, I had to select a specific methodology. Adequacy, in methodological terms, is ambiguous, containing a number of possible relevant elements. Thus, the aim of this methodology section is many-sided, and includes: why I am able to answer the research question, the methodology selected for the investigation, how this methodology could allow me to answer the research questions, why the preferred methodology was selected, how well my data responded to the research questions, and finally, a reflection over how well my investigation answers the research questions.

In the following sections, I will discuss the methodology used to answer the research questions and support the elaboration of my main argument. The task that I was up against in my study was bipartite: to participate in the construction of a network of industrial enterprises and, simultaneously, to develop a dynamic networking model. The theoretical model presented as a result of this study is, thus, a result of actions in the field of practice and reflection over these actions, and has gradually occurred. The model has been developed as part of a longitudinal field research project (Pettigrew 1990). However, a social construction, such as the network, is continuously changing. Thus, a network is not a static phenomenon, keeping its design forever. In my study, there is no one-to-one relationship between the two parts, the actual network

construction and elaboration of a model. The model is also grounded in previous experiences and contextually developed knowledge from other network contexts (Haga I). Transferable knowledge from these previous network experiences, developed from the contextual knowledge base, has functioned as a knowledge base for the network construction at hand.

3.1 Considering the selected approaches' ability to answer the research questions

The research questions collectively address the question of how to create premises for sustainable networking processes. However, this question is not just of interest from a theoretical point of departure, and equally interesting and important are the practical implications. Developing a model which identifies a set of important features to consider or make use of in the practice field can hardly be done without involving the actors operating in this field. Simultaneously, to develop a network and features that may possibly support networking processes is time-consuming. Thus, the intervention into the field of practice had to last for long period of time. At the same time, there existed no theoretical model prior to the intervention that should be tested in practice. The model emerged as a consequence of the oscillation between practical work within the network and reflection over the experiences gained through this trial and error approach. Thus, the research design needed to take into consideration these premises: involvement of the actors in the field, the duration of the intervention, and the incremental emergence of a model of networking.

This represents the main methodological point of departure for my study. As in Lewin's field experiment (Lewin 1946), social changes occurred as a result of the researchers' ability to make general theory relevant in a practical context. The idea behind Lewin's field experiment was to link theory and practice, represented by researchers and practitioners, in solving practical problems. Thus, in my study demonstrating conditions for constructing and operate networks and constructing sustainable networking processes that may support enterprises in becoming more innovative and competitive were practical problems at hand that needed to be solved.

As indicated above, my study has a practical side, which is constructing a network of industrial enterprises, and a theoretical side, which is developing a dynamic model with transferable elements based on contextually bonded knowledge. Given these premises,

an action research (AR) approach appears to be the best accommodated approach. AR, as a form of research, has the following core characteristics:

- AR is context-bound and addresses real life problems
- AR is inquiry where participants and researchers co-generate knowledge through collaborative communicative processes
- AR treats the diversity of experiences and capacities within the local group as an opportunity
- The meaning constructed in the inquiry process leads to social actions
- The credibility-validity of AR is measured according to whether actions arising from it solve problems and increase participants' control over their own situations (Greenwood and Levin 1998)

Particularly, the last point, which coincides with the issue of rigor in AR, has been challenged by conventional researchers (Greeenwood and Levin 1998). The alleged lack of rigor in AR has been pronounced after using conventional criteria that includes internal and external validity, and reliability and objectivity on AR. However, action researchers claim that the conventional criteria are not meaningful to AR dealing with social constructions. Taking the validity issue as an example, internal validity, on the one hand, is defined conventionally within the positivist paradigm as the extent to which variations in the dependent variable can be attributed to controlled variation in an independent variable (Guba and Lincoln 1989). External validity, on the other hand, is about generalizability, and is in regards to how one can determine the extent to which the findings of a particular inquiry have applicability in other contexts or with other subjects (Guba and Lincoln 1989). However, if realities are assumed to exist as mentally constructed, then why look for connections? Additionally, generalizability makes little meaning if the "realities" to which one might wish to generalize about exist in different forms and different minds. Since a network is a social construction, this applies to my network construction projects as well. Other rigor criteria are needed, and Guba and Lincoln introduce several: credibility, transferability, dependability, and confirmability (Guba and Lincoln 1989). The first criterion, credibility, which is a parallel to the internal validity criteria, focuses on the match between the constructed realities of respondents and those realities as represented by the evaluator and attributed

to various stakeholders. Transferability, a parallel to the external validity criterion, on the other hand, focuses on the game of making transferability judgements and then causal relationships. Thirdly, dependability, a parallel to reliability, regards a change in design as far from being a threat to dependability; rather, changes and shifts are hallmarks of a maturing – and successful – inquiry. The last criterion, confirmability, which is equal to objectivity, is also concerned about the data, interpretations, and outcomes of inquiries, which are rooted in contexts and persons apart from the researcher. In opposition to the conventional paradigm, the constructivist paradigm's assurance of integrity of the findings is rooted in the data themselves. The use of these criteria of rigor on AR may enable this approach to become less controversial.

In general, AR is concerned with emergent theories, in which theories develop from a synthesis of what emerges from the data and the use in practice of the body of theory which informed the intervention and research intent (Eden and Huxham 1996). Theory building, as a result of AR, will often be incremental, moving through a cycle of developing theory to action to reflection to developing theory. This may be illustrated by my own research process. My research questions particularly address the issues of the deliberate construction of networks and networking processes. Such construction processes are time-consuming and are not linear. The research field is constantly changing, and the change processes are not smoothly arranged; the process is hallmarked by a "pull and nab" progress. Thus, to participate in such a process calls for nearness to the field for an extended period of time. The design of my study, founded on longitudinal and action research approaches (see Section 3.3.2) makes a close relationship between the researcher and the field possible for the necessary period of time.

Thus, I have spent much time with the other participants in the network, including employees in the participating enterprises, union representatives, managers, network coordinators, and representatives from the public policy system, testing the effects of different enablers and elaborating on the results. I will argue that I have developed data, analysis, and knowledge by using the selected methodology, which allows me to answer the research questions. The knowledge creation process has been an incremental process, meaning that the different enablers and their design have been the object for discussion among the participants. These discussions have resulted in actions that have created experiences enabling us to jointly reflect over these experiences.

In my papers, the focus is on cases, projects, and initiatives that have been successes. However, these are often built upon experiences from former initiatives that failed. In Haga III, two training programs for developments agents are discussed. The program started in Hardanger was partly a result of a former program that failed. Many factors caused the failure, and most likely, the content was not the main reason. However, the experiences from the failure became important input when the next program was designed. In Haga II, another project is mentioned. An organizational project that was started in one of the enterprises was later temporarily stopped due to too many ongoing development projects. The enterprise was not able to restart the project later because of disagreements between the employees and the management in the affected department. To continue the project, it had to be redesigned in order to untie the locked situation. Both cases illustrate that development projects are often based upon trial and error processes.

The joint reflection process has created some kind of local contextual knowledge about enablers and networking processes that are shared among the network participants. This shared understanding among the participants is important because this supports the validity, as well as the confirmability, of the data. Thus, the acceptance of the developed joint understanding represents my main validity check. If the participants accept the joint interpretation and use the developed knowledge as a point of departure for further action, they accept the knowledge, data, as valid. Thus, I will argue that the premises for being able to answer the research question are present, and that the joint knowledge creation process has allowed me to answer the research question perceived. This includes regarding the longitudinal approach utilized in the study as a tool that increases dependability rather than weakens it.

Thus, theory building represents a move from the particular to the general in small steps (Eden and Huxham 1996). The research process in my study reflects the process outlined by Eden and Huxham that uses theories about network operations developed as a result of the previous program ED2000 (see the section ‘Point of departure’) as a point of departure for further development cycles - theory, action, reflection – to develop a new theory in my study (Eden and Huxham 1996). The results from my study can hardly be brought about using approaches such as controlled experimentation or surveys. Thus in my study and for AR generally, the participatory approach enables a focus on aspects that cannot be captured by other approaches, including the data development process, reflection, and emergent theories (Eden and Huxham 1996).

However, it is important for me to emphasize the research part as much as the action part within action research. Above, much focus has been given to the action part, and the impression of giving action some kind of superiority needs to be adjusted. Conducting research is as much about counterintuitive thinking, questioning definitions and premises, linking findings and processes analysis to other cases, and exposing the researcher's favorite interpretations of critiques (Greenwood 2002) In order to create an environment and processes, both within research and in the field, that allow and stimulate research processes.

3.2 A general model based on context dependent knowledge – a contradiction?

The model presented in Section 2.7 is developed based on practical network construction and network operation. To actually construct and operate networks involves a number of independent enterprises, and at the same time, strong emphasis on collaboration between the labor market parties and wide involvement from the employees is a complex task. This complexity makes a simple transfer of theoretical knowledge and models to solve the task less relevant. Such general theories and models rarely take into account all of the local conditions that need to be addressed. Rather, the situation at hand calls for a knowledge creation process that involves all of the local actors and R&D, which utilize a number of reliable knowledge sources.

In this complex field, the researchers have comprehensively participated in knowledge creation processes, as I have displayed in several of papers (Haga I, II, IV and VI). The accompanying considerations and actions that have taken place in these processes have also taken place within a specific context. Consequently, the knowledge created in these processes is dependent on the context where it appears. Thus, to argue that this context-dependent knowledge is automatically transferable to other contexts, and thus can be regarded as general knowledge, seems to be less reasonable based on the logic presented in the previous paragraph.

However, to argue that context-independent knowledge is not relevant in local, practical processes, and the other way around, that a context-dependent process, in principle, may not produce generalized applicable knowledge transferable to other contexts than the original, is less nuanced. The network construction process, described and discussed in Haga I, where the researchers initiated and comprehensively participated, was, thus, not

based on general theories and general knowledge. The definite construction process that I describe is strongly based on the researchers' experiences from previous collaboration with networks and enterprises in the R&D program, ED2000 (Haga I and V). Even if the geographical distance between these two networks is rather short, the contexts are very different. Firstly, the local industry in these two areas operates within different business sectors and has a different history, and their external conditions are quite different. Secondly, the enterprises in the network under construction are localized in one small town, while the other network is composed of dispersed enterprises. Despite these differences, knowledge about networking processes developed in the ED2000 program became cornerstones in the construction process initiated by the researchers in a quite different context in the VC2010 program. The transferability (see Section 3.1) of the knowledge and data from the ED2000 program, thus, became of uttermost important for the construction processes in the VC2010 program. The diffusion of knowledge was ensured by the researchers, but one question needs to be addressed: What kind of knowledge was transferred?

Through reflection processes within the ED2000 program, and after the program closed down, knowledge about network collaboration was identified and developed. However, this knowledge was not developed into a general theory applicable in all cases, like a recipe. It contained an understanding of how to develop network processes and how to operate solid networks. The developed knowledge was played into the construction process in the new context as knowledge to be further developed. Thus, the actors in the construction process did not perceive the knowledge developed as a recipe, but rather as a point of departure for their own network construction.

My intention is to further develop the knowledge about network construction and network operation. Thus, the aim is to identify enablers that, well-orchestrated, are able to support networking processes. However, the importance and the content of these enablers may differ according to the context in which they appear. Still, these enablers are important to consider independently of the context.

To summarize, I will argue that context-dependent knowledge may contain elements of more general context-independent knowledge that is transferable. However, this may not be interpreted as a general theory that can be used uncritically everywhere, but more as a point of departure or input to construction processes in related contexts.

Thus, my model is based both on an interplay between practical knowledge developed in the field by utilizing trial and error, and generalized academic knowledge. To oscillate between the practical construction and operation of a network, and a research-based discussion about how to construct and operate such a network calls for a carefully thought-through methodology. Thus, the methodology is founded on two main approaches: longitudinal field research on change (Pettigrew 1990) and the presence and participation of researchers in practical network construction, action research (Greenwood and Levin 1998). In the following sections, I will display my methodology.

3.3 The applied methodology

3.3.1 Framing the action research field

My study is part of a larger R&D program with a certain research agenda (see Section 1.1.2). Thus, regionally, the agenda has partly been defined by the Norwegian Research Council and partly by the participating regional research foundations that manage the different main projects, which includes my research institute, IRIS.

One decision, taken by the steering committee in UH&R (see Section 1.1.2), was decisive for my PhD project. This was the decision about constructing an industrial network in Hardanger[21], which was a region without a tradition of formal collaboration, and a region that for years had experienced a decline in population and manufacturing employment (Haga I and II). The committee argued that establishing closer relationships between the enterprises in the region, as in a network, could contribute to a halt in further decline in manufacturing employment, and even contribute to turning the negative trend around. The steering committee challenged IRIS to perform the construction process and to support the operation of the network based on our institute's experience of collaboration with industrial networks from the previous R&D program, Enterprise Development 2000 (ED2000). The committee anticipated a construction process that involved the participating enterprises, research, and other relevant actors. No predefined solutions, presented by any of the participants, were meant to control the process. The construction process was meant to be a participatory process where all of

21 Hardanger is a small region in Hordaland County encircled by the Hardanger Fjord.

the participants collaborated to design and construct an adequate solution. Thus, this project was not about testing a networking model pre-developed by researchers. It was about a collaborative effort from certain participants present in the actual region to develop a network suited for the context that it was going to operate within.

3.3.2 Making a methodology: Combining approaches

The complexity of the task under study calls for a methodology that utilizes a set of different methods, and that the methods that are brought in work together, thus supporting each other. The different methods and their contributions in answering the research questions will be presented below. In the end, the methodology, as a selected set of methods, will be discussed.

First, the study calls for a *longitudinal approach* (Pettigrew 1990). There are remarkably few studies of change that actually allow the change process to reveal itself in any kind of substantially temporal and contextual manner. Thus, they fail to provide data on the mechanisms and processes through which changes are created (Pettigrew 1990). Key points, according to Pettigrew, to analyzing change in a contextualized mode are: the importance of embeddedness, the importance of temporal interconnectedness, the need to explore context and action, and not to search for a grand theory (Pettigrew 1990). Thus, change and innovation processes are often deeply embedded in established structures and social processes. This may be illustrated by the example discussed in Haga I, about creating new customer-supplier relationships between enterprises in the Hardanger Industrial network. The traditional structures were challenged by stronger competition from external suppliers. Thus, the challenge was to re-organize structures embedded in the local context. This called for a multifaceted utilization of researchers and approaches. Both introducing direct and indirect approaches for change (Haga II), and establishing common ground for change processes that introduce joint development methods and development language (Haga III) were actively used. Thus, sorting out these deep seated continuities, both structural and social, calls for a longitudinal approach allowing the researcher to operate in the field for an expanded period of time. I met the actors in my field of research for the first time in 2002, and we still collaborate within the frame of the same project. Thus, I have been present in the same network for a period of four years. Periodically with an extensive presence in the field means to be involved in practical tasks and projects between 30 and 40 working days a year and to maintain an extended communication with the actors

between the joint working sessions. In addition, we have been challenged to “tell the story” about the network in several settings, making the connection even closer.

The longitudinal approach allows the actors to really get to know each other. This closeness makes collective reflection and co-generative learning (Elden and Levin 1997) a reality if it is arranged for. Introducing joint methods, joint development language, joint projects, and joint arenas for reflection and sharing of experiences (Haga I, III and IV) over a period of time allows the participants to reflect over a number of issues connected to enterprise development, networking, wide employee participation, and so on. Using a longitudinal approach allows for taking advantage of the established closeness between the actors taking part in the network collaboration. However, this is dependent on an action researcher who arranges for this to happen. An *action research approach* giving the researcher a number of roles, such as enterprise developer, organizer, process consultant, trainer, advisor, and orchestrator, is a premise for getting the enablers arranged. This was thoroughly discussed in Haga II, where the researcher in the cases presented had to appear in most of the above-mentioned roles. Nevertheless, the role of the action researcher is that of an enabler for local knowledge creation and building of local knowledge.

The presence of action researchers enables a third important approach: the introduction of *joint development methods and tools in the field of practice.* Haga III includes two different training programs developed in two different networks. The aim of these programs was to train employees in the membership enterprises in development methods and tools, making them development agents responsible for spreading these methods and tools within their enterprises. Standardizing the use of development methods and tools is crucial for an efficient exchange of experience between actors in the field. The joint exchange of experience is the most important premise for joint reflection and the launching of new actions. Additionally, launching joint innovation projects seems to be less difficult due to a compromised joint development method, as the foundry station case presented in Haga IV and VI indicates.

Fourthly, I introduce the use of *comparison as an approach* to reveal important features for constructing sustainable networking processes. The construction of a ‘solid network structure’, as in the Hardanger Industrial network introduced in Haga I, is a way to organize network collaboration. Comparing certain features in solid networks with networks that are organized differently may reveal peculiarities that are either closely

connected to this way of organizing network collaboration or may reveal enablers important for constructing networking processes. In Haga III, I compared two different training programs for training internal development agents. My comparison revealed that these two programs utilized different approaches for diffusion: one was top-down oriented and one was bottom-up oriented. This opened a discussion of the barriers and benefits of such approaches. In Haga IV the researchers' roles in two networks were compared, one in Hardanger and one in Vestfold[22], to find what characterized the researchers' appearance in these networks. Solid network structures in Sweden and Norway were compared in Haga V to identify the similarities and differences between the structures. The comparison took place over a period of time, allowing for a focus on features that appear to be interesting after some time studying networking processes.

Lastly, I have used an *incremental knowledge creation approach* (Eden and Huxham 1996) to create the model that is presented above. The point of departure for this study was knowledge developed on operating networks in the previous R&D program, BU2000. This knowledge was played into the field under study and further developed in Hardanger. Thus, knowledge about how to operate a network by nurturing networking processes was developed in collaboration between local actors and myself. Consequently, the papers presented in this dissertation are based on this knowledge development process. Nevertheless, the incremental approach used is closely connected to the longitudinal approach applied in the study. This last approach prepared for the use of an incremental approach since, time-wise, it allowed for continuous development of the model.

The set of approaches introduced above united the methodology that I have made use of in my study. As I have indicated in the presentation of the different approaches, they are strongly interconnected. However, the longitudinal and the action research approaches constitute the basic elements in the design of the study. This approach allows for using a number of approaches that otherwise would have been excluded. The methodology at hand is designed specifically to answer the research topic that I have posted: how to create premises for sustainable networking processes. There is no simple answer to this question, but the methodology allowed me, over a long period of time, to begin

22 Vesfold is another county in Norway and is located in the south-eastern part of the country.

elaborating on new features, and viewing them in a practice field enabled me, over time, to reflect and respond constructively to whether the features are well-suited or not. Additionally, the field is also able to adjust to the content of the features to make them suit their needs.

The different approaches utilized in my study are displayed above. In the next sections, the practical implications of the utilization of such approaches will be discussed.

3.4 The way of working in the field

3.4.1 Point of departure

Even if none of the actors involved presented a pre-developed networking model that the participants had to adapt to, the other actors involved expected that the researcher brought in some kind of transferable knowledge from previous network collaborations (Grønhaug and Hansen 2001, Kvadsheim et al 2001, Claussen 2000). The knowledge transferred consisted of different conditions that were regarded as important to network operation and to networking[23]. What was the main influence from this project that was utilized in the new networking project constituting my study? The most important elements are briefly explained below:

- Collaboration between enterprises in networks must be wide-spread, including not just the management, but also other professions and groups

- The necessity of having operative networking arenas where the exchange of experiences, generation of new ideas, and input from external resource milieus can be played out

23 My approach to the field has been strongly influenced by my own experiences, as well as those of my research institute, with the former R&D program, ED2000 (Grønhaug & Hansen 2001, Kvadsheim et al 2001). In this program, the Sunnhordland Industrial network was our main network connection. At the time, I was working in the 'industrial locomotive' within the network, Aker Stord, a 'super-supplier' for the offshore industry. The enterprise had approximately 1,800 employees and was the largest enterprise within the network. I was a part of the steering committee for the ED2000 project in the network for three years, representing Aker Stord.

- The involvement of both the management and the unions, and not just the top management in the larger enterprises – the middle management must be involved as well

- The development of a certain role as development initiator in the enterprises and a contact tip for research

- A multifaceted role of research in networking processes

- The role of the 'network engine' and network administration in network projects and networking processes (Grønhaug and Hansen 2001, Kvadsheim et al 2001, Claussen 2000).

In the initiation and construction process, based on previously developed theories, these experiences were exposed and explained to the other actors who participated (Haga I). Thus, the results from the previous R&D program acted as a theoretical knowledge base for the construction of the new network. However, even if this knowledge was important in the initiation and construction phases of my project, the experiences from ED2000 were collected from the operation of a project within an existing network. The researchers had no previous experience initiating and constructing networks, and this was virgin territory for the researchers.

3.4.2 Involvement – step by step

When constructing and operating an industrial network, involvement is of uttermost importance. The issue of involvement is complex: it contains several sub-issues that are important. Firstly, enrollment of membership enterprises is important - without membership enterprises, no network exists. Secondly, enrolling different groups of employees in networking activities is important for widening the network collaboration. This is about bringing the network collaboration from a sealed club to an open arena with wide involvement. These two issues are mainly connected to two different phases of the project: the enrollment of enterprises in the construction phase and the enrollment of different professions and groups in the operation phase (Haga I). Both phases are discussed in my study (Haga I, V, and IV).

Without 'any' knowledge of the region up-front, the issue of the enrollment of enterprises in a network represents a challenge. Among small and medium-sized

enterprises, no prior tradition exists for close collaboration between research and enterprises. In addition, IRIS had no prior record of working within this region and was dependent on other actors to obtain a foothold. Our strategy, as researchers, was to utilize the knowledge of other actors and their acquaintances in the region (Haga I, Haga et al 2006). The labor market parties and the public support system both had good relations with a number of enterprises in the region. These acquaintances were strongly utilized in the initiating phase to present the plan for the construction of a network and to mobilize for a search conference.

The search conference was meant to be a joint point of departure for the construction of a network. The conference attracted enterprises and actors that were either curious about the opportunities linked to the network or were interested in getting involved in a network. Some of the participants supported the network construction rather than taking part in it. However, the conference needed different follow-up activities. Firstly, the conference was followed by enterprise visits to all of the enterprises that had signalled interest. Secondly, workshops were held with participants from the enterprises, the labor market parties, and the public support system (Haga and Jøsendal 2002). Responsibility for the mobilization activities was gradually transferred from other actors to the researchers. As a result, most follow-up activities were accomplished by the researcher alone. The need for follow-up activities was not planned in detail up-front at the conference, but was rather planned as a result of the conference and after accomplishing the follow-up activities. This gives an impression of the construction phase. The action needed to keep the process going was taken as a result of concurrent evaluations of the ongoing process. Evidently, such a process needs a pragmatic approach that is not too rooted in one specific line of actions. However, the action researcher takes a vital role in initiating and constructing the network (Haga I, II, III and IV). This has been displayed in several of my papers, and is discussed in detail in Haga II and IV. In Haga II, I revealed that different approaches to innovation, direct and indirect, call for appurtenant roles for the researchers. In the cases displayed in Haga IV, we focused on the researchers acting in specific roles, such as: orchestrator, facilitator, and broker.

Enrolling different professions and groups is an activity linked closer to the operation of an industrial network rather than the construction. However, such enrollment is dependent on the construction of a network structure that allows such enrollment to take place, and is dependent on acceptance of the assumption that there are positive networking effects of enrolling a wide number of employees in a network. Even if wide

involvement was one of the key features in the VC2010-program, there is no automatic acceptance for such an approach of SME's management. Meanwhile, wide enrollment among employees in the participating enterprises is important: for the generation of inter-organizational project ideas (Haga IV and VI), for the sharing of experiences and joint reflection over these experiences (Haga IV and VI), and for development of a common development method and development language (Haga II and III). However, this issue is hardly discussable.

3.4.3 Strategy development[24]

Before starting the definite network construction, the researcher prepared a letter of intent for the enterprises to sign up to become part of the network collaboration. This was no surprise for the involved enterprises: the procedure was presented for them at the follow-up meetings after the search conference. As soon as a sufficient number of enterprises signed up as participants, a formalization of the network was needed. A number of actions had to be taken:

- To initiate the construction of a steering committee
    - Discuss with the management and the union at the membership enterprises to find a reasonable composition of the committee
- To set up a steering committee
    - To identify personnel within the enterprises who were interested in performing a job for the network
- To investigate different options to connect the network project locally
- To summon to the first meeting in the committee

All of these actions needed to be taken by the researcher.

24 The argument in this section is collected from Haga I.

As soon as the steering committee was established, a strategy for the construction of the network needed to be found, and consequently, decisions had to be made on a number of issues. The following were of vital importance for the network:

- The structure of the network
- The administration of the network
- The 'network engine' role
- The funding of the network and the network activities
- The immediate activities for start-up
- The interplay between several independent networking features
- The recruitment of more enterprises into the network
- The strategic positioning of the network (potential, defining funding partners, defining professional partners outside the region, defining R&D-partners, and so on)

Again, these issues had to be prepared for the steering committee. Most of the preparatory work, as well as the follow-up activities, were done by the researcher. The steering committee was preoccupied by soon-to-be improvement activities – it was important that the networking activities gave visible results. It is also worth noting that the steering committee was in the lead, and in this committee, the representatives from the enterprises formed the majority: thus, no action would be taken without agreement among the collaborating enterprises (Greenwood 2002).

The work of the steering committee gradually changed from construction activities to more operational issues. This change required adjustments from the researcher to continue serving the committee. At the same time, the researcher was expected to participate frequently in accomplishing developmental activities.

This change of mood in the steering committee indicates that this is a project that does not operate within a limited time-frame. The aim of the network project is to build the ground for the construction of a lasting industrial network in the region. The network construction is regarded by the steering committee, the participating enterprises, and the

unions as an important tool for developing their enterprises and workplaces. As a lasting tool for the enterprises, managed by themselves, the network is regarded to be of utmost importance.

3.4.4 Unions as a precondition for active participation

One of the most important issues in both the construction process and operation of the network is participation. The issue of participation was targeted through the involvement of the unions as well as the management. Under the construction process, the labor market parties were of utmost importance, from the role the labor market parties had in the mobilization phase to the composition of the steering committee where the local labor market parties were the key actors. This dual commitment was necessary to mobilize the enterprises and the employees to participate; without management, there are no enterprises, and without the unions, there are no employees.

Even if a part of the General Agreement between the labor market parties deals with collaboration, issues such as enterprise development are not always implemented in the individual enterprise. Albeit not implemented, this may not be a result of a conscious strategy from the management or the union, but rather a consequence of the market situation of the enterprises. As an example, SME's are often in a position of having limited time available for union representative-related work. These enterprises are dependent on the sale of every available hour and might view time spent on work for the union as 'lost hours'. To emphasize the role of unions and the union representative in enterprise development is, thus, challenging for many SME's.

Still, the key to legitimize participation from the employees in enterprise development projects goes through the unions. Such involvement may ensure a dual aim for such projects: firstly, to develop the enterprise to become more competitive and innovative, and secondly, to improve work conditions, to open a new division of labor, to create jobs containing more expert-knowledge, to ensure that the employees can influence their own working conditions, and so on. To ensure wide involvement from the employees, it is necessary to construct arenas where they can operate, both within the enterprise and in a network arena. Equally important are the union representatives' and managers' understanding of their own roles. The roles of unions and union representatives, as well as those of managers, are vital in enterprise development. Thus, supporting both unions and enterprises to develop these roles is of utmost importance for a structured development of the enterprises (Haga III).

3.4.5 My own way of performing AR

Though my project was part of a larger program, the design of my research project was left for me to decide, including the role of the researcher. The approach selected in my study placed the researcher in an important role in both the field of practice, constructing and operating the network, and more obviously, as part of the research community. Acting as a researcher, several tasks have to be conducted: collecting data, analyzing data, and developing knowledge about the field under study. The change processes and research process take place in parallel, thereby influencing one other. Incidents in the field of practice are considered to be important in the research process, and vice versa. Thus, the full process of AR involves a series of interconnected cycles, and undergoes an incremental research process. To write about research outcomes at the latter stages of AR projects is an important aspect of the knowledge exploration. Combining the process of explicating pre-understandings and methodical reflections makes it possible to explore and develop knowledge and theory (Eden and Huxham 1996).

The role of the researcher in the field of practice was much due to the local context: no former formalized collaboration between the enterprises was in place and no leading actor took the initiative to establish one. Nevertheless, I decided to operate individually in the field, which means that none of my research colleagues worked together with me while there. The decision to operate as a researcher on my own was taken as a result of several conditions: (a) the geographical location of the enterprises, (b) the funding, and (c) personal desires. The location of the enterprises made it easier for me, living closer to the site than the rest of the research team, to commute to the site. My co-location with another network administration[25] allowed for a possible collaboration with an external network. The VC2010 funding was limited and to operate in pair, the most obvious alternative would either be to limit the number of other initiatives in the two counties or the number of activities that we, as action researchers, could take part in. Additionally, in most of my projects, I have operated on my own and I am familiar with operating individually.

25 My office is co-located with Sunnhordland Industrial network at Stord.

I am aware of the methodological risk of selecting such an approach. Firstly, this may limit the use of approaches, methods, and initiatives in the field due to the fact that I do not have colleagues with the same field experiences as me. Secondly, the limitation regarding approaches may hamper processes and put restrictions on the results. Thirdly, this may limit the academic reflection process and the production of transferable and actionable knowledge. These concerns are, in my opinion, at least partly neutralized by the gains that my frequent presence in field brought about: I could more easily intercept signals from different actors and obtain a better understanding of the context and how actors acted. At the same time, I had an experienced action research team that I could rely on.

3.4.6 The relations to my research team

The VC2010 program engaged a small team of researchers in IRIS. The number fluctuated from four to five and up to ten, depending on the resources available and the tasks to be solved. The individual researchers or advisors[26] have been dedicated to certain tasks in the VC2010-project that most often last for at least a couple of years. Some of the main tasks last even longer. These tasks are most often practically handled by one individual researcher. This was also the case in my network project. However, in this project, I worked practically in the field and another researcher acted as a member of the steering committee. Professional discussions about the network project were, thus, performed in two different environments: one where the network actors and researchers were present, and one where only the researchers were present. This dualism has enriched the discussion in both environments. Practically, such a division of work has meant that the researchers have operated individually when operating in the field.

26 In my department in IRIS, the staff is divided: some are business consultants and some are researchers.

3.5 Are the available data able to answer the research question?

In contrast to mainstream social research are action researchers placing themselves *in* the field under study. Thus, these researchers cannot study the field and incidents from a distance, but are in the middle. To participate actively in the field disconnect the action researchers from the most common methodologies for collecting information; observing the field from a distance and accomplish interviews. Observing an incident that you take part in is not possible, as it is hard to interview fellow actors in the field about incidents and actions that one has been a part of. This implies that the researcher's perceptions, experiences, and reflections become a main source for the research process. Some of this is written down, but most are not. Obviously, to write down everything that takes place during a four-year process is not possible, and most data will remain possessed by the action researcher. Qualitative social research regards data as experiences and interpretations converted into texts (Miles and Huberman 1994). The data possessed by the action researcher is not always converted into words and texts. Thus, an important question to post is: Can the data that give and expression of the researcher's interpretation and experiences be regarded as valid and reliable?

My written data consist of a number of different texts (see the list in the next section). The texts are descriptions of network meetings, project meetings, training programs, and so on, that I have participated in. Some of the texts are possessed by the network, meaning that they have been prepared as part of the operation of the network. Other texts are notes that I have prepared to make sense of the incidents and processes taking place in the network. These texts are strictly personal; they represent my own reflections about the processes I am a part of.

Additionally, I possess a lot of experiences and interpretations that have not been converted into texts. What kind of data are the researcher's strictly personal texts or their reflections and interpretations?

In a research process, the researchers need to access data that are able to answer the research question posted. Traditionally, in qualitative studies, the data has been *collected* as observations, interviews, or combinations. However, this kind of data separates the researcher from the data; the researchers carefully collect the data and process them. They do not operate in the field under study. Researchers who rely on such methods look at the phenomena from a distance, and this distance contributes to

improving the validity of the data. The separation ensures that the collection and processing of data happen in a way that improves validity. The results that emerge from processing the data then enable the researchers to reveal new, valid knowledge about the phenomena under study. When a researcher is a participant in the field, the situation becomes quite different. The researcher's experiences, interpretations, and feelings about incidents and processes become the main data source. The clear separation between the researcher and the data disappear. The processing of data, understood as making sense of a number of observations, conversations, incidents, statements, actions and achieved results, takes place through the researchers' reflections. These reflections may start with a feeling of some kind of coherence. This feeling may later be supported or turned down. If coherence is supportive of other data or further processing of data, an understanding of a phenomenon might be achieved.

However, the results of the sense-making process of the researcher must be made explicit and tested. It might make sense to the researcher, but can be less reasonable to others. Even if the researcher has taken part in the incidents and actions, there is a chance for him or her to interpret these in the wrong direction. Thus, there is a need for making the processing of data transparent and verifiable. How can this be done?

Firstly, the data and further elaborations have been developed at different arenas, but primarily in the field in collaboration with a set of network actors. Nearly all of the written texts have been written, adjusted (commented on), or rewritten by representatives from the enterprises or the local project leader. Thus, the texts have been elaborated through close collaboration between the participants and the researcher, and this process has been verified by the local participants.

Interpretations, as a result of the researchers' sense-making processes, have been made explicit and verified in the same way. This has not been a result of joint writing, rather of the researcher presenting arguments and the participants verifying or rejecting the content of the interpretations.

Secondly, the data and the elaborations have been developed in the research team I am a part of. The data has been made accessible for other researchers at IRIS engaged in the VC2010 program (the IRIS VC2010 research team). This has been done through internal meetings and discussions. My fellow colleagues have collected the same type of data in other research settings. Thus, they have been able to participate in the

development of the elaborations based on their own data and experiences from other networks that are a part of the Development Coalition.

The credibility of data is about data providing valid information about the research questions. I argue that the way the data has been obtained, a process that involves both actors in the field and the researcher, will increase the validity, as well as the confirmability, of the data. The process includes a number of actors, lasts over a relatively long time span, and ensures a dense connection between researcher and actors, where actors and the researcher will meet frequently in different settings, will participate in activities (acting and reflecting) where actors and researcher collaborate, and includes being on the same 'team' negotiating with external organizations and partner.

A concern that might be raised against action research in general as well as to my study is whether I am getting 'a particular truth about a situation, rather than the truth' (Eden and Huxham 1996). One way to reveal if this is the case is to use triangulation. This refers to a method of checking for validity by approaching the research questions from many angles and employing redundancy in data collection (Denzin 1989). The principle is that if different approaches lead to the same conclusions, the validity of the conclusions increases. However, AR provides an opportunity to utilize a different interpretation of triangulation (Eden and Huxham 1996). AR opens for seeking out triangulation between (i) observations, (ii) the accounts the participants offer, and (iii) the changes of these accounts and interpretations over time. From these three perspectives, the data are not expected to triangulate (Eden and Huxham 1996). Importantly, a lack of triangulation acts as an effective dialectic for the generation of new concepts. Additionally, the lack of triangulation can neither be regarded as a lack of dependability, but rather the opposite. This might be illustrated by using an example from my study. The concept of networking opportunities has been important in the initiation and construction of the network. The observations and articulated views in the early stages of the network collaboration showed restraints, especially among the smaller enterprises. The accomplishment of, and reflections over, several projects, internal and joint, have resulted in observable changes, both in articulation and in actions. These changes may, again, be points of departure for further reflection and change in the content of concepts (Haga I). The joint reflection process ensures that the outcomes are rooted in contexts and persons apart from the researcher. Thus, the

confirmability of the data developed in such processes increases. The longitudinal research design favors reflections about change over time.

3.5.1 Available written data sources

Since I have participated in most of the construction processes[27] and in the entire operation phase of the network, I have been able to collect data during the whole project period. In the following, I will identify different available data sources and will elaborate on the data collection process. Finally, the analysis of the data will be examined.

There are a number of written data sources available:

- Notices of network meetings. *Written by:* the project leader and the researcher
- Minutes of meetings from the network meetings (from: the network meeting, the management sub-network, the union representative sub-network, the internal facilitator sub-network, and the HES sub-network). *Written by*: the project leader and the researcher
- Quarterly reports of the network activities to the financial institutions. *Written by:* the project leader and the researcher
- Presentations in network meetings. *Made-up of:* representatives from the enterprises and the researcher (the audience included representatives from other membership enterprises)
- Presentations at conferences and Development Coalition meetings about the network. *Made-up of:* representatives from the enterprises and the researcher
- Notices of project meetings in certain improvement and innovation projects. *Written by:* the project leader in the particular project.
- Minutes of meetings from the project meetings. *Written by:* the project leader
- Applications for financial support from the public support system to innovation projects. *Written by:* the researcher.
- The training program for the internal facilitators and the schedule for the practical training. *Developed by*: the researchers, the project leader, and others.
- Reports from the internal improvement projects that are part of the internal facilitator training. *Made-up* of: participants in the training program.

27 I entered the project after the search conference took place. The network collaboration is still going and I am still working closely with the network.

- Folders presenting: (a) the network, (b) internal projects, (c) joint projects, and (d) the role of research. *Written by:* the researcher and the project leader in the network, and quality-ensured by personnel in the enterprises.
- Field notes. *Written by:* the researcher.
- Notes from talks with representatives from the enterprises. *Written by*: the researcher
- Reports. *Written by*: the researcher.
- Several articles in some of the internal newsletters in the membership enterprises. Written by: *internal 'journalists'*
- Several newspaper articles in local and regional newspapers. *Written by*: newspaper journalists
- Articles in other publications, such as: VC2010 brochures, 'Fabrikkarbeideren' (the factory worker) members' bulletin for 'Norsk kjemisk forbund', 'Bedre bedrift' (Improved enterprise) bulletin for HF, and 'HMS-magasinet' (The HES magazine). *Written by:* journalists
- Presentations on the network's website: www.inh.no. *Written by*: the project leader or the researcher.
- External evaluations: HF – evaluation of ongoing projects and VC2010 Mid-term evaluation. *Written by*: external researchers
- Several other documents.

3.5.2 The data development process: Some basics

The data presented above have been developed over a period of four years, and the collaboration between enterprises, network, and research are still developing. The project is ongoing and the data collected are from a limited time frame.

The data were mainly developed from one specific industrial network: the Industrial Network of Hardanger[28]. I have also introduced data from another network to highlight some of the findings in my main network. This dataset was collected in the Sunnhordland Industrial network (IfS) (Haga III). In my papers, I have introduced other networks as well: the Electronic Coast in Vestfold (Haga IV), and two Swedish networks, the Industrial Development Centre in Gnosjö (IUC Gnosjö) and

28 *The Industrial Network of Hardanger* is now the official name. In their first period of operation, the name was VC2010 Hardanger.

Hälsoteknikalliansen i Halmstad (Haga V). In these networks, other researchers have developed and analyzed data, and we have used comparison as a tool to point out common features and differences (Haga IV, Haga V).

Since I have been part of the network collaboration nearly from the very beginning, I have been developing data since I entered the network collaboration, and I am probably the only one who has done so. The data development process has been accomplished by collecting data gradually, and developing the data has truly been a process.

I will argue that the model that I will present in the following section answers my research questions. The essence of the model is the presence of a set of enablers and, not least, an orchestration of these enablers. In the different papers, I have discussed the different enablers as well as their orchestration. In the following section, the arguments from the papers will, thus, be brought in to support the argument for developing a model containing the selected set of enablers. The transferability of such a model has been thoroughly discussed in Section 2.8.

3.6 The justification of the selected methodology

3.6.1 The main approach in social sciences

The topic under study is the dynamic phenomenon of networking processes. Different approaches can be used when studying this phenomenon. One common approach among social scientists is ‘the researcher as outsider approach’. By using this approach, the researcher studies the phenomena from a certain distance, not in any way interfering in what is happening in the field under study. The aim of research using this approach is to observe and describe what is taking place in the field, and to use the observations and prepared descriptions to develop universal theories. The approach allows the researchers to stay away from the world of application (Greenwood and Levin 1998). Built in to this approach is the maintenance of the classic separation between theory and practice (Gustavsen 2003). Thus, there is no thought given to the mutually-necessary dialogue between theory and application, or between theoretical development and practice (Greenwood 2002).

The study that I have conducted is part of the VC2010-programme. The fact that the study is part of a research program with a specific research agenda strongly influences the design of my study. Firstly, the aim of my work is dualistic: on the one side, the aim

is to contribute to the attainment of practical results of actual networking processes, and on the other hand, the aim is to contribute to the development of actionable and transferable knowledge. There is no sharp distinction between these two aims: local developed knowledge is supposed to be utilized to further develop ongoing networking processes, and has also been used in academic discourses, providing general principles.

Thus, in my study, I intended, as an action researcher, to influence the practical outcome in the field as well as study the networking processes by taking part in the construction and orchestration of the interplay between a set of enablers. Consequently, I had to design a methodology to approach the field that corresponds with the features framing my study. The approach is as much dependent on my orientation as a researcher: How do I legitimate the approach used in the study? Where am I positioning myself in the theory of science?

3.6.2 Legitimacy and positioning

As indicated in the previous section, I do not accept the 'the researcher as outsider' or the high science model as the only legitimate approaches to science. The model rests on two chief assumptions, the oldest of which is the assumption that the only authentic knowledge is universal, general, and timeless, and the younger is the assumption that knowledge could be organized in axiom systems (Toulmin 1996). The latter assumption stated that scientific theory was linked to several maxims of methods. These concerned the kinds of experiments and observations that are acceptable in a science, a detached posture of the scientist toward his objects of study, and the inferior status of 'practical' knowledge. If the only approach to science that is acceptable is the high science model with its vision of episteme, theoretical insight, then the methods of inquiry of participatory action research are philosophically indefensible (Toulmin 1996). On the other hand, separating theory and practice are against all logic (Greenwood 2002). Another approach, powerful and reputable enough to stand comparison with the familiar model of high science, is thus needed to defend the methods of inquiry of participatory action research.

To keep up the high science model, giving the scientific theoretical knowledge superiority and dividing sharply between theory and praxis as the only legitimate approach to science has been challenged by a new school of scientists studying the 'new production of knowledge' (Nowotny et al 2001, Gibbons et al 1994). Their point of departure is that research is becoming more and more interwoven with society. The

boundaries are changing, and so are the transactions across the boundaries (Gustavsen 2003). Research tends to become an actor among many others in larger innovation systems, and cannot stay outside of the knowledge production process or remain as an isolated individual looking at the world 'from outside'. The argument is that scientists become integrated in the knowledge production system consisting of several actors and are not able to maintain the purity of the high science model.

In the latter section, I have tried to legitimate the view that different kinds of inquiry aimed at creating particular, distinct kinds of knowledge may utilize methods of inquiry appropriate to the subject. By establishing linkages to academic knowledge production approaches other than the high science approach, I have shown that the high science approach is not the only way to create authentic knowledge. In the next section, I will elaborate on my position in the landscape of the theory of science.

Action research (AR) can be differentiated in several overall positions or schools. I feel close to the position that Greenwood and Levin take in 'Introduction to Action Research' (Greenwood & Levin 1998), which they refer to as 'pragmatic action research'. When presenting this position, they emphasize a set of what they refer to as 'generic characteristics' (Greenwood and Levin 1998). These characteristics are:

- Constructions of arenas for dialogue between participants and researchers
- Co-generative research where the research emerges out of joint experiences and mutual reflections
- The use of multiple methods in the research, rejecting the notion that AR is a particular theory or a specific set of methods

In many ways, these 'generic characteristics' capture what I would like to regard as my own AR practice. These characteristics are generic and can cover what happens inside a single enterprise project, within a project covering a network of enterprises, or in a community project.

Why pragmatic AR? Two parameters are central to me: knowledge generation through collaborative action and reflection, and the role of participative democracy. Greenwood and Levin (1998) have listed several characteristics of AR that widen the two mentioned parameters: (a) it is context bound and deals with real life problems; (b) participants and researchers co-generate knowledge; (c) it looks upon the diversity of experiences as a

resource; (d) it closes the learning circle, constructing meaning through inquiry – social action – reflections lead to the construction of new meaning; and (e) the credibility-validity of AR is measured according to whether actions solve problems and increase the participants' control over their own situation.

These characteristics also fit well with the notion of AR researchers as the 'friendly outsiders'. The picture of the 'friendly outsider' is one where the researcher closely cooperates with the participants in finding suitable solutions for both the enterprise and the employees. The role of research in this picture is: (a) to support and enrich ongoing processes by putting experience and general concepts into use, and (b) to monitor the construction of operational knowledge. This operational knowledge is constructed in the interplay between different actors. I find the notion of the researchers as 'friendly outsiders' attractive.

Though pragmatic AR is the position I feel closest to, I will emphasis that there is a need to discuss several issues on the position presented by Greenwood and Levin. Firstly, I feel a need to discuss the outcome of AR in a broader perspective. The quality of research should be primarily measured in terms of its capability to develop practical results that are regarded as innovative. By this, I mean that in addition, the local participants gain greater control over their own situation, as mentioned by the authors, and I feel a need to address the value creation issue. For the enterprises, there will exist a dual objective of what I will call the optimization of the human perspective (jobs that give the single employee opportunities and so on) and optimization of business opportunities. We have a problem if we do not deal with this dualism. Secondly, at the same time, the results can be measured in different ways. We might ask "What have the contributions from research resulted in when it comes to: (a) diffusion of actionable knowledge among participating enterprises, (b) new perspectives brought in to the local context, (c) action taken as a result of the new perspectives, (d) organizational change based on local knowledge creating processes, and (e) the ability to underpin integrated projects." The validity of a concept will be visible through the use of it. Theories should, therefore, be validated in practical situations.

The role of research is to support and structure a discursive context based on broad participation. Therefore, the role of research is to enrich the perspectives that can contribute to making the plans of action more multifaceted. This can be done by the 'friendly outsider'. Even if I find the role of the 'friendly outsider' attractive, I believe it

should be challenged. In the picture given of the researchers as ‘friendly outsiders’, they have to rely on local knowledge to a considerably degree. The question is whether local knowledge is something that is given and non-discussable. The local power relation will, to a certain level, color what is regarded as local knowledge. I believe that such issues will have to be addressed when discussing the ‘friendly outsider’.

This position also captured elements that are important because they prepare for approaches that open for going beyond the border of the single enterprise or organization. In my study, in addition to enterprise development, I emphasize: (a) industrial network development, and (b) university/industry linkages. Such approaches frame the enterprises in different ways; they appear to be shaped by their environment and are, to a larger degree, dependent on actors or organizations outside of their own basic organization.

At the same time, I feel close to the position called “systems-based perspective” and especially to the socio-technical perspective (Pasmore 2001). This position explores the nature of technical systems, social systems, and the work relationship structures that bring the two systems together. The general idea is to jointly fit the technology, the competencies of the personnel, and the organization to the task to be performed. The focus is on the content of work. The definite work situations are seen as important determinants for learning and human development. I find that this position also strongly emphasizes a human perspective: (a) the need to pay attention to human needs beyond those required for the regular performance of tasks dictated by the technology, (b) focus will be put on felt problems (context-bound and focus on real life problems) for the employees, and (c) a participatory approach to problem solving. Still, I find that this is not the only perspective emphasized in this position, and there is a dual perspective. On the one hand, we find a focus on the human perspective, but on the other hand, we find a focus on optimization of the technical or technological design of the plant. This will merge in a question of how the technology and technical design can be utilized to design meaningful and challenging jobs.

Not surprisingly, the two positions have a lot in common but differ somewhat in what is focused on. Both the pragmatic position and the socio-technical position are rooted in Dewey’s pragmatism (Greenwood and Levin 1998, Levin and Greenwood 2001, Pasmore 2001). Pragmatism unites theory and praxis into an integrated knowledge production process; it is directly linked to reflection and action in utilizing materials and

social factors in a given context (Levin and Greenwood 2001). Two central features stand out in pragmatism: knowledge production through action, and experimentation and emphasis on participative democracy (Levin and Greenwood 2001). The dualism between a process of learning from experience, knowledge production through action and experimentation, and ethics, and participatory democracy display that pragmatic action is integrally connected to ethics. Learning in action is, thus, not only about what works but as much about what matters (Forester 1999). However, even if the context is important, the pragmatists do not approach the field without a theoretical grounding, in contrast to research based on grounded theory (Glaser and Strauss 1967).

Putting together rules as a result of examining a society makes an identification of particular roles and institutions possible. More importantly, recognizing that social roles and institutions are constructed out of rules makes us aware of the possibility of changing them (Rosenberg 1988). Social institutions are not "inevitable", but are constructions which we mistake for facts which are fixed and independent of human actions. To claim that social institution are 'constructed' means that they do not exist independently of people's actions, beliefs, and desires. Such an approach to social science has been named a 'constructivist approach' (Rosenberg 1988). Mir and Watson identified six fundamental assumptions that are shared by constructivists (Mir and Watson 2000, Koivisto 2005). These include the following assumptions (Koivisto 2005):

- Knowledge is theory-driven. A researcher always approaches a problem with a preconceived notion about the nature of the problem.
- The separation of the researcher (subject) and the phenomena under investigation (object) is not feasible.
- The separation between theory and practice is equally unfeasible. Theory and practice are fundamentally interlinked.
- Theories are discursive and power-laden, and transmitted across space and time through discursive practice.

These assumptions fit very well into the 'pragmatic action research' position. Greenwood and Levin also emphasize monitoring the social construction of knowledge as a main target for action researchers operating as actors in the field (Greenwood and

Levin 1998). They also deny any fundamental separation between theory and practice. The socio-technical perspective narrows down the scope of the interest to the workplace, which my field of interest is basically focused on. Based on the above positioning, I will call my position ‘pragmatic social constructivist’.

4 Conclusion

In my dissertation, the main research question posted is:

> *Are complex networking processes possible in order to construct and maintain 'extra'-market collaborative structures?*

Through my main research question, I make network collaboration between industrial enterprises the main topic in the dissertation. Thus, my aim has been to explore if it is possible to construct a network between industrial enterprises that, for the participating enterprises, represents a valuable asset for becoming more innovative and increases their competitive power.

However, this could hardly be explored by utilizing traditional social research approaches. Contributing to the construction of a network that consists of a set of enterprises calls for involvement in the field from the researchers, rather then some sort of distant observation. Firstly, someone needs to initiate the network construction process, and I have explored whether research could initiate such a process, and if research has been, in this particular case, needed for the construction to take place. Secondly is whether further development of an industrial network calls for a wide involvement of the employees in a continuously network improvement process, and I have thus explored whether research can prepare for this process. Thus, the main research question asked relates to the issue of whether the utilization of a research approach where the researchers actively participate in the research field as action researchers is crucial for the research process.

Thus, I have used an action research approach in my study, interpreted as researchers operating as 'friendly outsiders' in the network.

The methodological point of departure in my study is close to Lewin's field experiment, in which social changes occurred as a result of the researchers' ability to make theory relevant in a practical context. The idea is to link theory and practice, represented by researchers and practitioners, in solving practical problems. However, as I interpret the field of inquiry, to be able to enter into problem solving together with local practitioners calls for a longitudinal approach, meaning that the researchers collaborate closely with the network and the enterprises for a long period of time. To join such processes calls

for thorough knowledge about actors, internal conditions, and processes. This knowledge takes time to build up. The joint problem solving in the network may have both internal projects and joint projects as a point of departure. Haga II displays a project where the aim is to create a new work organization in a department by involving employees in the process. On the other hand, in Haga III and IV, there are joint projects involving several enterprises. In the first is the construction of a training program for development agents, and the latter includes the development of a foundry station. Thus, I illustrate that, at the same time, these projects are important elements in the incremental knowledge production process, creating knowledge of how to handle improvement and innovation processes within the network. It is also shown here that this process is as important for competence building among the practitioners as it is for the research process and the researchers. For the researchers to be able to contribute in the local knowledge production process, adequate transfer of knowledge from the research field is needed. In my study, I have used comparisons with other networks, as displayed in Haga III, IV and V, as a source for knowledge transfer into the network collaboration. In Haga III, the comparison of two training programs for development agents has been used to display differences in approaches, while comparison has been utilized to display the roles of broker and facilitator that the researchers take in two different industrial networks. Lastly, in Haga V, comparison has been utilized to reveal specific features, especially about network management and network structuring, in four different networks in Sweden and Norway.

The research process that I have made use of in my study is divided into two closely linked parts. Firstly, I have been part of a network construction and maintenance process for more than four years, establishing sustainable networking processes. The experiences coming out of these processes represent my empirical data. Secondly, I have reflected individually, and have participated in joint reflection with actors in the research field, over experiences and the results of actions taken in the network. These reflections have resulted in the writing of six papers that are part of this dissertation. In these papers, I have discussed what I regard as the most important elements of network collaboration.

My ambition with the umbrella paper is to pull the different elements discussed in the different papers together to present a dynamic networking model. Thus, the model developed is a result of my research on several networks of industrial enterprises. However, the model is not meant to be a definite recipe for constructing additional

networks. I regard networks as social constructed, and as such, they are results of processes that involve human participation. The personnel involved have their own mental models that will heavily influence the construction and operation of a network. Thus, the model can merely be used to interpret the importance of the existence of a set of enablers while constructing or operating network processes. The argument for using these enablers in particular and understanding the character of these enablers may be of importance for future construction processes, as well as for contributing to the creation of dynamics in already established networks.

However, prior to presenting the model, I have, in the umbrella paper, discussed how interorganizational collaboration may represent a means to increase innovativeness and competitiveness. The literature on interorganizational collaboration has been mainly been occupied by these discussions, and has been less interested in how to get networks and networking processes constructed and maintained. However, in my study, understanding the limits of a network and the network as part of larger systems, as the network literature has discussed, is important for the particular network constructions, because such conditions affect the possible outcome of network collaboration.

Supporters of one particular approach articulate their interpretation of how networks are constructed, even though this is not a particularly well-elaborated element of this approach, and that is those supporting the ‘market-as-network’ approach. These researchers claim that collaboration between enterprises arises solely from their business relationships, which indicates that deliberately constructing a collaborative entity consisting of a heterogeneous group of enterprises is meaningless. The point of departure in my study is the opposite: I aim to construct and maintain a network consisting of a heterogeneous group of enterprises that do not necessarily have business relationships.

However, network is not a precisely defined concept. My network concept, solid network, has several characteristics: membership-based, headed by local people, agreed-upon objectives regarding development and innovation, the use of network arenas that allow for exchange of experience and learning to happen, the establishment of a joint development language and training programs, and a number of joint development and innovation projects. Such an interpretation emphasizes solidity: long durability, stability of participants, consistency in the networking agenda, stable

structures, and network management. Thus, my interpretation of a network differs from other interpretations of a network, as well as of other collaborative entities.

Why enterprises collaborate in a network or other entities rather than meeting possible challenges as individual units has been frequently discussed. As I have shown in Haga I, enterprises participating in the Hardanger network experienced increased competition from international suppliers in their previously protected market. This appeared to be an important backcloth for the construction of the Hardanger network. Thus, for the enterprises to join forces in a network may be regarded as a pure market response (Piore and Sable 1984). A changing market that worsens the competitive situation for the enterprises in a geographical restricted area may thus force them to search for new ways to operate, and joining forces in a network may represent a strategically correct move to take. However, in Hardanger, the contractors and the suppliers experienced increased competition in the opposite way, where the contractors benefited while the suppliers suffered, and both the contractors and suppliers joined the network. Thus, it is hard to interpret network construction as a pure market response because of the enterprises' less unambiguous market situation.

Increased competition in Hardanger, displayed in Haga I, was a result of the partial elimination of the hierarchical work organization between the contractors and the suppliers, which was replaced by a more market-oriented work organization. Participation in a network, as the contractors in Hardanger eagerly supported, may thus be regarded as a way to regulate the work organization in a way that made allowances for both extremities: the market and the hierarchical work organization (Williamson 1975).

However, constructing a network may not only be seen as a defense strategy. Through the network, enterprises in Hardanger actively searched for market opportunities that could open up new markets for them. The foundry station case, discussed in Haga IV and VI, displays how a group of suppliers, supported by one of the contractors in the network, are able to reach new markets by developing a new product. The case contains two important elements: by utilizing the enterprises' weak ties (Granovetter 1985) outside the region, making possible the construction of a new product, and by developing a new product for a larger market, the suppliers avoided a lock-in situation (Grabher 1993).

In my cases presented in Haga II, IV, and VI, the importance of utilizing network arenas for the sharing of experiences, transmission of knowledge, and knowledge creation, as a point of departure for the enterprises to initiate innovative and incremental projects, has been displayed. This supports, as well, a proactive use of networks, which is as a precondition for innovation (Cooke 2002). The main argument is that a network in itself represents a precondition for innovation in the same way as training. This means that the pure existence of a network prepares the ground for innovations. Thus, one particularly important aspect is tied to networks: they possess a unique competence for knowledge transmission. However, as revealed in the same cases, network structure is also important for preparing networking processes. Thus, a network structure can be conceived as a governance structure (Håkansson and Johanson 1993) that allows for transmission to happen.

However, the transmission of knowledge and experience are dependent on trust. In Haga IV, the case story from the Hardanger network makes visible how trust may be produced as a result of networking processes. The network arenas were used to deliberately sell a message: the need for a renewed role of the suppliers. As we learn from this case, the general managers at the 'industrial locomotives' strongly underlined the importance of, and need for, the creation of a new role for the suppliers. To build trust implies that information given, or a message given at a certain time, is trustworthy. If the information turns out to be false, trust production may be strongly hampered. Such conduct causes the recipients to judge the dispatcher as untrustworthy, and it seems to be hard to turn around the recipients' judgement of the dispatcher. In other words, enterprises have to earn their reputation as reliable partners (Powell 1996). In the particular case in Hardanger, the contractors were reliable, and the behavior created trust.

In this dissertation, I have presented a dynamic networking model that was developed as a result of my research on several networks of industrial enterprises. The model consists of a set of enablers identified through the research process in this study, and these are thoroughly discussed in the different papers and in the umbrella. These enablers are:

- *Training*. This is an important enabler that may increase knowledge about developmental work and processes, and the diffusion of such knowledge. The enabler has been discussed particularly in Paper III, where I have discussed the use of training programs for development

agents. These agents are later responsible for the training of their own colleagues.

- *Network management.* Taking care of the daily operation and closely linked to the enterprises, network management is important in initiating and support networking processes. Paper V includes a comparison between networks in Sweden and Norway, the management of the network was analyzed, and the most striking discovery is the solid structures that are constructed, including appointed network coordinators or managers.

- *Processing roles*. Personnel able to hold such roles are important for initiating and accomplishing networking processes, as well as for the supply of external knowledge, funding, and general support. Introducing this as an enabler implies, most likely, opening external resources to assist in operating the networking processes. This has been discussed in Paper IV, where two networks in Norway are compared, and also in Haga II. These two papers display many different aspects of a processing role. In both papers, researchers hold the position as 'outsiders'.

- *Network infrastructure*. The existence of a network structure that makes it possible for the enterprises to discuss experiences and ideas and to develop knowledge is vital. In Paper V is a comparison of networks in Sweden and Norway, and the management of the network was analyzed, with the most striking discovery being the solid structures that are constructed.

- *Leadership.* The management and unions in the participating enterprises need to take leadership to allow for networking processes to occur. The role of unions in legitimating wide employee involvement seems to be particularly important. In Haga II and Haga 2006a, the management and the union's roles as a driving force are discussed.

As I have indicated, the above set of enablers or instruments, acting differently, are needed to construct sustainable networking processes. Such processes may bring about important innovations or developments for individual enterprises or groups of

enterprises, as shown in several of my papers. Individually, the instruments may be good and important, but they may become even better by being combined with other instruments. My study indicates that the support given to network processes by combining instruments may increase beyond what the individual instrument may offer. The *orchestration* of instruments thus appears as an important and valuable coordination of contribution given to such processes. Thus, in my study, I have revealed that the presence of a number of enablers is necessary to establish sustainable networking processes, but these enablers are not sufficient to get these processes going. As I have displayed, orchestration is also needed to initiate and continue such processes.

Orchestrating network processes presupposes researchers possessing knowledge and skills about the different enablers. However, to orchestrate processes calls not only for skills about the enablers, but we also need skills in the utilization of the different enablers at the right time in a process. Thus, orchestration calls for researchers able to master the initiation and development of enablers, as well as to utilize them. This includes being able to consider the use of enablers against the specific context where the process appears. Such skills are derived from reflective practice, and thus call for action researchers.

Working closely with local practitioners in joint knowledge production also results in the building of local knowledge about networking and how to support innovative processes. Thus, the practitioners, through a joint network construction process where the researchers also participate, are enabled to take possession of an expanding part of the orchestration of the enablers and the networking processes.

Consequently, I argue that networking processes are what constitute a network. Constructing networks and establishing sustainable networking processes within networks are dependent on the presence of certain enablers: heterogeneous associated network constructors, coordination mechanisms, diffusion mechanisms, and mechanisms for inciting interorganizational collaboration. Most importantly, there must be a well-orchestrated interplay between these enablers in order to activate networking processes. The different enablers are not able to support such processes individually. By taking part in the orchestration of the interplay between the enablers, research is able to influence the outcome and study the networking process. There is no one best way, and orchestrators can learn from differences in their practices by engaging in mutual reflection.

The six papers that are part of my dissertation cover different issues connected to network construction and networking. These papers underpin, in different ways, the model that I have presented in my umbrella paper. The first paper deals with network construction underlining the importance of the involvement of the labor market parties. In the second paper, two main action research approaches are closely connected to two approaches to innovation, underpinning the importance of noticeable processing roles. In the third paper is a discussion of the use of development agents in enterprise development, presented based on two different training programs for such agents. Different processing roles are discussed in Paper IV, particularly emphasizing broker and facilitator. Based on comparisons between the four networks in Sweden and Norway, distinctive accounts are given of the networks' management and structure, discussed in Paper V. In Paper VI, I have compared one incremental and one innovative project, showing that these projects have been handled in the same way in the network, de-emphasizing the differences between such projects.

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6 Overview papers

I have structured the papers that are part of my PhD according to how they fit into the process of initiating and constructing a network. This means that I have disregarded other ways to structure the papers such as: presenting them after the completion date, implicitly meaning that the newest ones are the most advanced or presenting the ones published first, displaying that some of the papers are already published or in the pipeline to be published. Rather, I prefer to present them according to the process they are part of.

Thus, the first paper focuses on how action research may initiate and support the construction of an industrial network based on a set of contextual conditions that must be considered by the initiators or under the construction. By comparing networks operating in Sweden and Norway, the second paper focuses on the importance of a solid network structure for the construction of sustainable networking processes. The third paper focuses on why different approaches to innovation call for action research approaches that correspond to the different approaches to innovation. The fourth paper deals with the use of development agents in company development and the role of research in underpinning such a strategy. The next paper focus on the ability of research to support the construction of sustainable networking processes. In the last paper, I focus, by utilizing comparison, on the role of network collaboration in downplaying the division between incremental change and innovation.

Even though all of the papers are presented later in my thesis, I find it necessary to present abstracts, where the arguments in the papers are emphasized.

6.1 Paper I: 'The role of action research in initiating and constructing development networks'

Author: Trond Haga

The main objective in this paper is to analyze how to conduct action research in the initiation and construction phase of a development network in a region without a tradition for formal collaboration. This subject is obviously dependent on the context which the network construction is embedded in. In my analysis, several issues appear as more important to consider than others when discussing the conditions for conducting action research in this field.

In order to accomplish network construction, there is a need for such a project to be recognized by a larger global network, which includes actors outside of the network itself (Law and Callon 1992).

The actual initiative to establish a network came from global actors. These actors represented certain values and approaches, such as the emphasis on participation and an active role for social partners in the development of a culture that nurtured change and innovation. The action researchers represented the same values and approaches. When construction started, the approach promoted by a united global network restricted the local possibility to redesign and create an original network approach adjusted only to local conditions on all issues involved. Thus, how the network is initiated and established is an important condition to take into consideration by the action researcher.

Analyzing how enterprises respond to an initiative to construct a network of enterprises is much about how individual enterprises behave in the market and how they, as economical actors, relate to other enterprises and institutions. This discussion is very much about the view of how business actors in business life perceive their position in the market. One extreme position is that the business actors operate as rational, self-interested actors who are minimally affected by their social relations in a perfectly free market. In this market, there are no conditions that hamper free competition between the enterprises. Another extreme position is that the behavior of the business actors is so constrained by ongoing social relations that they can not be construed as independent actors.

In my case, the suppliers have traditionally been closely linked to the main contractors. The suppliers have had most of their turnover connected to doing business with the main contractors. These suppliers have acted as external bases of resources that the main contractors can use when needed. As a result, close connection between the enterprises has been elaborated over time. This has changed recently, and the main contractors have opened the marked for external competitors. Surprisingly, the main contractors became eager to participate in a network collaboration that is mainly designed to develop the local suppliers. This indicates that the turn toward a use of the open market may be reversible, but this will depend on the supplier's ability to adjust to the new demand from the main contractors, and the supplier's ability to inter-connect with other enterprises and organizations. This indicates that relatively stable relations between the local enterprises have changed to an unstable and open situation, where the enterprises will have to continuously reorient to be competitive. The problems of markets and hierarchy are apparent in this case (Williamson 1975). This problem concerns the question regarding under what circumstances economic functions are performed within the boundaries of hierarchical enterprises, rather than by market processes that cross these boundaries.

In a stable situation where all of the attention is focused on supporting each other within the frame of a customer-supplier relationship, less energy might be used to challenge the way the enterprises perform their tasks. The construction of a development network and the SME's participation in this network can enable the main contractors to maintain strong ties with the local suppliers and, at the same time, challenge their local suppliers. Even if the network collaboration reduces external competition, the enterprises' participation in the development network will ensure the main contractors of the willingness among the suppliers to improve their own performance and to develop their services and products. Thus, participation in the network will enable the main contractors to address the constant need for a reduction of their operational costs. The network can be seen as a way to balance between the market and the hierarchy, which is a constant challenge for the main contractors (Williamson 1975, Granovetter 1985).

For suppliers, these market changes have brought a need to look after collaborators, and collaborators, not just locally, to be able to support the main contractors. To be able to deliver system packages, rather then just sell man-hours, the suppliers need to cooperate. They might even go outside the region to provide the necessary competencies and skills. To connect to such enterprises, the suppliers need a network of

connections to explore. This exploration of connections has often been called the utilization of the weak ties.

An action researcher will take all of these contextual components into consideration. A skillful practitioner has the ability to determine what the actors are receptive to, and can switch between context-free and contextual components. The local actors do have their own local theories and interpretation of practice, but this is about their own practice. They do not know everything about practice; the action researcher may as well influence the dialogue by using their own experience from other practices. This is obviously not just about how to construct processes, but rather about how to put the researcher's knowledge into play in the design process of the "new solution" or "new practice".

The other important component in action research is the contribution of research in the transfer from an established practice into a new practice (Pålshaugen & Amble 2005). This is about bringing a project or a process from the design level down into new practice. For action researchers, this is about bringing their own knowledge and experience into the dialogue. The knowledge that the skillful practitioner can bring into the dialogue is the research practice of the action researcher, which means being able to address the number of contextual components relevant to the issue at hand.

6.2 Paper II: 'Action research and innovation in networks, dilemmas, and challenges: Two cases'

Author: Trond Haga

In this paper, I argue that different approaches to innovation may allow for accompanying AR approaches that may handle major challenges connected to innovation processes: (a) the challenge of the innovation dilemma, (b) the significance of innovations, (c) the dilemma of how to conduct innovation, and (d) the relation between training and innovation. Through presenting and discussing two examples, I illustrate how the creation of space for training is relevant for the two different approaches to innovation and for the AR approaches. In addition, I have presented some ways of handling the specific challenges facing innovation processes where AR is conducted.

I distinguished between two different approaches to innovation, and accordingly two different AR approaches: a direct and an indirect approach. The distinction between these two AR approaches is closely associated with the two different approaches to innovation.

First, I addressed the question of whether or not the analytical distinction between indirect and direct is valuable. In the first example, the creation of space for training was closely linked with the shaping of network collaborations, a possible new and innovative task for AR to engage in. An important task in the second example was to facilitate the renewal of the organization in one of the departments in one of the enterprises in the network. Both examples included facilitating the creation of space for training, as well as innovation through the creation of new arenas. Making distinctions between direct and indirect approaches to AR, as I have emphasized in my presentation, seem to be most significant. Secondly, I raised the possibility of viewing the distinction between direct and indirect as a continuum where practice positions itself somewhere in between. This was presented as a "solution" to the critical discussion above. To equalize differences along a continuum, risks become a "Winnie the Pooh" solution. It makes it difficult to get clear-cut guidelines on how to decide among different approaches when making a scope for a specific project. Thirdly, I asked what is distinctly new and innovative compared to more stepwise incremental changes. Here too, I questioned the possibility of operating with distinct categories classifying what is typically innovative compared to stepwise. As a fourth issue, I questioned whether there can be a drive in AR toward too much emphasis on consensus and homogeneity, eliminating diversity, and differences of interests/opinions, which can be important dynamic aspects of any creative innovation processes. As a fifth issue, I pointed out the challenge facing AR when engaging in innovative projects regarding the tension between dynamics and structure. On the one hand, there is a need for a dynamic phase to raise new ideas. On the other hand, there is a need for a more structured phase to commercialize new products or services, develop new markets, or develop new organizations.

These summarizing statements are important critical issues to consider when doing AR. They might be viewed as statements encouraging critical reflections on AR approaches to innovation, rather than definite solutions to basic subject matters regarding AR and innovation. Innovation might have to be viewed as a participatory collective process in any respect, just as AR. Society consists of systems of social relations, where it is impossible to view an individual action in isolation (Luhmann 1997). The same can be

stated regarding innovation (Burns and Stalker 1961), as well as AR (Greenwood and Levin 1998). Making clear-cut distinctions regarding what is innovative and what is not might be an impossible task to accomplish on an individual enterprise level. I might have to consider the working of a national economy through totally different approaches in order to determine, in any fruitful way, what is to be regarded as innovative, and what is not (Sfraffa 1979).

6.3 Paper III: 'The role of development agents in company innovation in Norway'

Author: Trond Haga

Turning innovation from an activity involving a narrow range of actors to an activity with a broad base within each enterprise implies confronting all of the issues pertaining to participation, cooperation, and communication within the enterprise as a whole. In this way, efforts to organize the processes of innovation become more and more interwoven with efforts under such headings as participation and learning organization. Issues like how to mobilize employees in general enter the picture, along with a broad range of issues associated with participation and innovative organization. Starting with the question of how training can contribute to innovation, my article deals with only some of the issues that emerge in this context, but these have to be seen in a wider context, particularly in the context of participation.

The cases presented indicate that there are some real dilemmas in this field. One example is that the development of a strong 'innovation core' in each enterprise may be counterproductive from the perspective of the active involvement of all employees. Furthermore, such 'innovation cores' can more easily collapse when the impulses that have led to their creation are weakening or disappearing. It may, in the long run, be more advantageous to go for a broad base from the beginning. This implies facing a broader range of challenges: the advantage is that the basis becomes more stable. With active involvement from all levels in the organization, there will, in principle, be no forces that undermine the efforts.

The process of the diffusion of development knowledge and skills in the facilitator programs is, first and foremost, about making the participants skilled in developing collectives and relationships. The more successful the training is, the better the

participants' ability to organize learning within their organizations. In a network setting like the two presented in the cases, the development of collectives and relationships will not stop at the enterprise boundaries, as they traditionally have done. Common development languages and development methodology are the foundation for establishing collectives and relationships far beyond the boundaries of each enterprise. A distribution of development knowledge and skills through network training programs may, thus, open a series of new arenas for innovation, collectives, and relationships established through common training for personnel from different enterprises. In one of the networks, there has been a noticeable change in how several of the enterprises look at their operations. As a result of the training and networking between the enterprises, they are now exploring new opportunities together. New innovative projects that involve several different membership enterprises have been launched and successfully accomplished. From a situation where each struggled with developing their enterprise individually, they are now enabled to do so collectively through network collaboration.

While adding inter-enterprise networking to the challenges associated with broad mobilization internally in each enterprise seems to add to the problems, these cases indicate a more complex picture: Under certain circumstances, cooperation between enterprises can make the handling of the challenges easier rather than more difficult. The main point in this context is that networking between enterprises is, in itself, a process between equal partners - it is horizontal rather than top-down. When network experience is fed back into the processes within each enterprise, the function is to strengthen the horizontal links and ties.

When issues are transferred from the enterprise to a network arena, new questions appear. Many issues are regulated by law and, in particular, by agreements, where it is presupposed that 'the enterprise' is the actor, not a 'network'. To handle these problems, active involvement of the labor market organizations is crucial. In the Value Creation 2010 programme, the Norwegian Confederation of Business and Industry and the Confederation of Trade Unions are not only partners on the level of the program board, but also share responsibility for the operative side. In this way, there is a certain amount of preparation for just this kind of shift. This does not, on the other hand, make itself and has implied, in this project, active efforts from the side of research to help construct a viable regional partnership where the potential for restructuring decision-making processes in working life is present (Tønnessen, 2001).

These links demonstrate, in turn, why regions are of growing importance as units of development and learning. To handle internal challenges within each enterprise, the enterprises need to join forces and form networks. For such formations to emerge, there is a need for a supportive infrastructure as well as for the ability to redesign decision-making processes. Neither infrastructures nor new decision-making processes can, however, be developed overnight, and nor can they be developed separately for each network of enterprises. They demand an arena where the main types of interest organizations can meet and launch processes that are, in some respects, political in the sense that they imply a broader reframing of major issues concerning work and enterprises.

6.4 Paper IV: 'Norwegian blues, enabling structured improvization'

Authors: Trond Haga and Svein Tore Kristiansen Vestfold University College/Work Research Institute

Researchers collaborating with enterprises in networks may play a considerable role in generating desirable developments and social change, and for making significant contributions to social science. However, the outcome of such collaboration, as we have argued, is dependent on the researchers' ability to enter specific and situational conditioned roles as part of the social interplay taking place in a networking setting. To get into a position from which to solve real life problems, the engaged researcher, in one way or another, has to merge the language of practice and the language of research.

Thus, our point of departure for generating research-based knowledge has not been to inform practitioners about the best theory available, but on the contrary, to construct situations that enable relevant stakeholders to meet and purposely share experience, and to develop applicable concepts for handling practical problems. The point is that neither the practitioners nor the researchers know in advance how to solve a practical problem. Their complementary perspectives, however, make it possible to develop new patterns of communication that enable new practices or solutions to occur. The most prominent role of the researchers in a networking setting is to make situations enabling various perspectives and resources to become translated and utilized in relation to concrete development tasks to come within reach. Achieving such a position is only possible if the researcher possesses interpersonal skills that enable the development of trustful

relations with the individual actors in the field. Pure engagement is hardly sufficient to establish such relations, but also requires personal skills that make it possible to get assess to and connect the various perceptions regulating individual actors' movements in the inter-organizational terrain.

We argue that developing knowledge about how to construct innovative network processes calls for researchers able to make research-based knowledge applicable in the field of practice. Such a perspective on the role of research relates closely to Lewin's (1946) field experiment, in which social changes occurred due to the researchers' ability to make general theory relevant in a practical context. Accordingly, the idea behind the contextual field experiment was to link theory and practice in relation to the situations that occurred when researchers and practitioners jointly engaged in solving practical problems. When research becomes involved in restructuring social practices in the inter-organizational terrain, there is, thus, a call for processes that integrate various stakeholders' perceptions and interests into a joint actionable platform. Understanding processes that make networks effective in relation to practical change and how these structures contribute to the contemporary knowledge production calls for researchers who possess the capacity to bridge discourses and link people to each other through the creation of shared meanings (Gustavsen 1992). However, these processes of restructuring and integrating discourses cannot take place unless a link to the practice and everyday language of people is created (Gustavsen 1992).

This interactive approach to knowledge production and change requires extensive processes of translating various perspectives and interests in ways that allow new social practice to occur. With this background, our intention is to explore how these processes take place and to conceptualize the new role of research in network innovation processes.

6.5 Paper V: 'Nordic benchmarking of regional development'

Authors: Trond Haga, Helena Eriksson Halmstad University, Bernd Hofmaier Halmstad University

All countries and regions are, in one way or another, trying to organize themselves in order to create economic growth. This can be done in many different ways, but collaboration between industry, politics, and R&D has been seen as a prerequisite for innovations and economic growth in the new economy. However, such collaborative

processes vary due to historical, political, and cultural conditions. Recognition of these conditions has an important impact on the role of research in the region, and thus, more specifically on the collaboration between industry and R&D. To make visible the impact of these conditions on the interplay in regional development processes will be of major interest. Comparison of collaborative processes in different regions in different countries will most often accentuate regional features and are, thus, an efficient approach to reveal the differences between the regions. Such an approach can also be the starting point for learning processes between regions. This was the origin of the Nordic joint benchmarking project 'Benchmarking of innovation processes in the Nordic countries'. The aim of the project is to: (a) study and analyze different ways of organizing and managing regional development and innovation processes, and (b) compare the results in order for the networking actors to reflect and learn from the different experiences and approaches of one another. However, the aim of this article is to compare and analyze the role of R&D in regional development and innovation processes.

In this paper, we argue that how the networks are initiated and organized influences their ability to support development and innovative processes. In the paper, we have compared four different industrial networks: two located in Sweden and two in Norway. These networks are embedded in their local context and have followed their own specific development paths. Two of the networks, one Swedish and one Norwegian, were initiated by the participating enterprises themselves, and are, by far, the ones with the longest history. These two have either been reluctant to participate in R&D collaboration or have been able to operate in long periods without any R&D support. The other two networks are younger and were both initiated by external actors. We argue that it seems like the presence of R&D increases the focus on development and innovation issues, and opens a variety of opportunities for the participating enterprises. Obviously, this is more apparent in the networks that are in and out of R&D programs compared to the ones that, so far, have had a constant R&D presence. When R&D pulls out, a drop in attention toward development and innovation seems to be the result. An activity drop might not be a surprise when the R&D personnel engaged in these projects are action researchers directly involved in enterprise and network projects. However, the aim of these R&D projects is to leave behind development knowledge and competencies that enable the networks and their enterprises to consciously focus on these issues.

Furthermore, we also argue that how the networks are organized influences their ability to support development and innovative processes. All networks need some kind of governing and management. The solution a network selects is adjusted to the organizational structure that is implemented, and the organizational structure is adjusted to the kind of processes that take place in the network. As described earlier, we see two different processes that are of current interest when it comes to organizing regional development processes. On one hand, there is a *strategic process* that calls for broad participation from all of the participating enterprises, as well as from different levels within these enterprises and from actors in the region. On the other hand, there is a *task-oriented process*, where the aim is to execute definite activities. This last process will, most likely, be organized according to the principles of a project organization and takes into account that there are a limited number of tasks to be performed. The time period is restricted, the resources available are limited, and so on. However, all of the networks that are referred to in this paper have a rather solid structure. All have a 'network administrator", who ensures that the operation of the network is taken care of. We argue that running the operation, collaborating with external actors like R&D, and preparing for different kind of processes causes an accumulation of development knowledge in the network administration that is crucial for the development of the network. On the other hand, we argue that a solid network structure consisting of a stable group of enterprises that take part in projects initiated by the network administrator or the board of the network will build trust between enterprises. Such a solid network structure may, then, allow for an extensive collaboration between the enterprises. Additionally, we argue that a solid network structure seems to ensure stability and continuous operation of a network over time.

6.6 Paper VI: 'Orchestration of network instruments: A way to d-emphasize the partition between incremental change and innovation?'

Author: Trond Haga

Incremental change and innovation are often regarded as two distinct concepts with different content (Imai 1986, March 1991, Boer 2001). The differences in content are closely linked to two conditions. Firstly, the concept of incremental change has been assigned toward stepwise improvements of products, processes, markets, technology,

and organization, while the concept of innovation has been assigned toward more radical changes in organization and processes, and the development of new products, markets, and technology (Boer et al 2006, Boer & Gertsen 2005). Secondly, the concept of incremental change as an important source for improvement has often, but not unambiguously, been linked to wide involvement and the use of the employee's knowledge and skills (Beer & Noriah 2000, Imai 1986), while innovation has been linked to small specialist teams or individuals and their use of knowledge and skills (Boer et al 2006). Such an interpretation of the concepts makes underpinning the incremental change more of an important cultural issue in the enterprises. For the enterprises to become more adaptable to changes, both improvements and innovations, the employees will have to participate in a way that makes changes possible, which means being involved in, and informed about, the change processes. In contrast, the specialist teams dedicated for a specific development task often seem to exclude the employees from getting involved and from being informed due to large differences between the competencies required to perform exploration (Boer et al 2006).

In this paper, I will explore if it is useful to make a sharp distinction between the two concepts - incremental change and innovation - while operating development networks of industrial enterprises. Based on the distinct differences between the perceptions of the concepts, and the practical approaches prepared as a result of the difference perceptions, the practical linkages between the two concepts have not been fully explored. I will argue that networking processes are what constitute a network. Well-orchestrated networking processes utilizing a set of network enablers contribute to improving the participating enterprises' ability to change and innovate. Equally important is that the orchestration contributes to de-emphasizing the partition between the different concepts. Processes that have either improvement or innovation as a point of departure are not reciprocal, expelling each other as many researchers claim; rather, they reciprocally support each other. However, orchestration calls for personnel able to develop and utilize this wide set of network enablers.

7 Attachments

7.1 Attachment I

7.1.1 Paper 1: The role of action research in initiating and constructing development networks

Author(s):	Trond Haga
Status:	Finished (the English version)/Finished (Norwegian version)
Published:	A short version of the paper will be published in Norwegian in a special issue of the Norwegian journal 'Regionale trender', guest edited by Tom Johnstad. The title of this paper is 'Orkestrering og improvisasjon: nødvendig ved danningen av nye samarbeidsrelasjoner?'
Date of publishing:	The short version – Summer 2007
No of pages:	35/15

The role of action research in initiating and constructing development networks

Trond Haga, Rogaland Research

Introduction

In this paper, I will discuss whether action research can contribute to the initiation and construction of a development network between manufacturing enterprises in a region without a tradition for formal cooperation[29]. I will base this discussion on a case study of a network in a one-industry town, Odda, in Hardanger, as well as on some carefully selected theoretical approaches[30].

This paper is a result of the work done by the Value Creation 2010 research group at Rogaland Research (RF).

30 By one industry town, I mean a town where one or a small number of large or medium-sized enterprises dominate business life to a degree where the rest of the town and the business life are totally dependent on them. These dominating enterprises are, in the following, called main contractors.

One of the main aims of the R&D program Value Creation 2010 (VC2010) is to stimulate innovative processes in networks of enterprises, both within and between enterprises[31]. The basic assumption is that network collaboration, appropriately assisted by action research, may stimulate development and innovation in and between enterprises (Levin 1993, Haga 2005). To stimulate innovative processes in networks presupposes the existence of some kind of network structure. If this is not the case, there is a need for the construction of such a structure. The existence of a network structure is often a visible sign of enterprise collaboration within a region. Nevertheless, collaboration between the enterprises is not dependent on a network structure. This might be ensured by other entities, such as pair cooperation.

There might be historical reasons for a network structure being absent. In several one-industry towns in Norway, the relations between the enterprises have been configured by the way the main contractors have organized their local task system. Historically, most of the tasks were performed inside the main contractor's enterprise border[32]. The task system was, at the time, internal. Most of these systems were later transformed, and at present, most of these systems are differently configured. Several tasks have already been transferred to enterprises other than the main contractors. Still, the expertise and the governing of these tasks have been, most commonly, left behind in the main contractor's organization. The suppliers have mainly received maintenance and construction tasks which are developed and planned based on the expertise within the main contractors.

This situation is due to change. The main contractors are ready to hand over tasks that their expert staff formerly performed. Such a change in the task systems will call for the construction of new arenas for dialogue, new ways to collaborate, and new ways to explore the weak ties to the world outside the region (Granovetter 1973). As a consequence of a transformed market, the suppliers, to ensure their economic

31 Value Creation 2010 (VC2010) is a R&D program funded by the Norwegian Research Council (NFR). This program is a successor of the former R&D program Enterprise Development 2000 (ED2000), also funded by NFR.

32 To operate these enterprises in rather remote areas, they could not, at the time they were constructed, rely their operation on the supplies from surrounding business life. This business life did not exist. The smelters had to care of everything needed to operate the enterprise.

development, might have to explore new markets beyond the borders of the region they normally operate within. In such an environment, the construction of a network will respond to several of the challenges that these one-industry towns face. Still, this favorable point of departure for network construction must be merged with some underlying principle, such as broad participation and collaboration between the social partners, in the VC2010 program. At the same time, there is a need to connect the construction of the development network to the enterprises' business interests (Levin & Knutstad 2002).

My research focus

The VC2010 program emphasizes enterprise development through network cooperation. Collective emphasis on the development issues based on collaboration in a network of enterprises is one of the cornerstones in the methodology that the R&D institutions within this program are encouraged to use. The VC2010 program encouraged the construction of Development Coalitions (Ennals & Gustavsen 1999). The coalitions were established to cover regions where the borders should suit the business life rather than the administrative systems (Claussen 2002). These coalitions have the authority to prioritize the initiatives and activities that they will fund through the program. In addition, some of the partners in the coalition are funding institutions that can give additional funding to initiatives that are supported by the coalition. To create a forum where funding institutions, the labor market parties, R&D, and higher education are present was the fundamental idea behind the construction of the coalitions.

The Development Coalition may, based on general information about the situation in smaller parts in their region, take independent initiatives to turn around or support efforts to revitalize businesses in this area. This was the case in The Development Coalition for Hordaland and Rogaland (DCHR)[33]. Since, for years, the Hardanger region had experienced a decline in the number of inhabitants and the number of jobs in

33 This Development Coalition covers two counties in Norway: Hordaland and Rogaland. A county is an administrative entity. Norway is currently divided into nineteen such counties. The Development Coalition for Hordaland and Rogaland disperses the administrative border between the two counties. Business-wise, the two counties are similar. The center of gravity is a bit different, but the same business sectors are apparent in the two counties.

the manufacturing industry, the DCHR took an initiative to support a turn-around of this negative trend for this region. The DCHR supported a construction of a network for industrial enterprises in the region. Since Rogaland Research (RF) had experience with collaboration with networks of manufacturing enterprises through the ED2000 program, the predecessor of the VC2010 program, they were asked to lead the construction of such a network.

The network concept has received overwhelming support by politicians, public administrators, and business life representatives. There has been less attention paid to what the aims of the networks are, how we construct them, and more importantly, why businesses engage in network collaboration (Levin 1993). To construct purely learning networks is probably not realistic. The enterprises operate in a market where there is strong competition. To achieve business development in such a market, attention must be paid to the operation of the enterprise. Why, then, engage in network and networking? For the enterprises to engage in network construction, there have to be some new business opportunities there, such as a way to reduce operating costs, the opening of new markets, possible new products, and so on. The content of the network is, thus, essential for the enterprises. To involve the enterprises themselves in the construction seems to be a decisive move to overcome the content problem.

Initiating and constructing a development network in a region without traditions for formal collaboration was the challenge given to RF by the DCHR, at least as far as what the enterprises themselves claimed. The first thing to do would be to deconstruct the question that actually consists of several sub-questions, namely distinguishing between the different phases of such a construction, and initiating, constructing, and operating. These different phases may have specific challenges. However, constructing a development network without support from the enterprises will be in vain (Levin & Knutstad 2003)

In the initiation and construction phase, these questions were important:

- What kind of actors is it important to involve in the initiation and construction of networks?

- What can each of these actors bring to the process of initiating and constructing a network?

- How do the enterprises respond to the initiative to construct a network?
- How does the individual enterprise look upon the option of closer collaboration with neighboring enterprises and R&D institutions?
- What kinds of resources are needed in the initiative and construction phase?
- Do the R&D institutions play a role in these processes?
- How important are the “industrial locomotives” in such processes?

When reaching the operation phase, these questions were important:

- How can we create and support interconnectivity between participating enterprises?
- What kind of networking activities are important to establish, and why?
- How is it possible to establish such networking activities?
- Who is it important to involve in the interaction between the enterprise, and why?

These questions connect my project to several discussions in the academic literature about features characterizing networks and networking. Firstly, when mobilizing in order to build a project, the actors involved will have to relate to an external, global network in order to obtain resources (Law & Callon 1992). The notions of context and content have been introduced as analytical devices to investigate and operate the negotiable space that exist in between the local actors and the global networks. Secondly, the discussion on how economic actors behave in the market and how they relate to other enterprises and institutions are relevant when constructing development networks (Granovetter 1985). Thirdly, based on the case, the discussions on lock-in and the strength of the weak ties are relevant for the discussion of the space for action research in this particular field (Grabher 1993, Granovetter 1973). Fourthly, the need for the enterprises to enter into some kind of collaborative relationship with other enterprises and organizations has been strongly emphasized by some researchers (Brulin 2002).

In this paper, I will use the case from Odda as a point of departure for a discussion of the relevance of using action research in the construction of developing networks. It is my assumption that answers to the questions above will be best arrived at through an action research approach. I will try to substantiate this assumption by using relevant knowledge from the Odda case in a reflection over the role of the action researcher.

Action research, according to Greenwood and Levin, is social research carried out by action researchers and members of organizations or communities seeking to improve their situation (Greenwood & Levin 1998). The principles of action research are that the stakeholders and the researchers together define the problem to be examined, co-generate relevant knowledge, execute social research techniques, take actions, and jointly interpret the results of the actions (Greenwood & Levin 1998). Action research is, thus, based upon broad participation among those affected by the problem that is to be examined (Reason & Bradbury 2001). Such an approach also explicitly rejects any separation between theory and practice, or between thought and action (Gustavsen 2001, Amble & Pålshaugen 2005) Rather, action research is occupied with bringing different theories and practices together for learning and the co-generation of new knowledge. This is relevant knowledge that is obtained by the participants and the action researchers through cooperation, with the purpose of supporting the process of developing a new practice or a new solution.

Prior to the presentation of the case, there is a need to introduce the context that encircles the case to better understand the actions and the action research approach.

The context

Hardanger is a small region located in Hordaland County on the west coast of Norway. The region encircles the Hardanger fjord, and the structure of business is dominated by agriculture, especially fruit farming. In addition, there are some local communities where the manufacturing industry dominates. The industry in Hardanger is centered on several process industry enterprises. The industrial center in this region is Odda, but this is not the only place where industrial enterprises exist. Another process industry enterprise is located in Ålvik. Both Odda and Ålvik are unilateral, based on the process industry. Most of the business activities in these two places are centered on these enterprises. I will focus on the community of Odda since all of the enterprises that have

chosen to enter the network are located here. This was not intended; rather, it is an unintended result of the construction process of the network.

In Hardanger, there were no traditions for close formal collaboration between the enterprises. In addition, the geography made communication between the communities dependent on industry difficult[34]. The road system is not that advanced, and in some communities, the inhabitants are dependent on ferries.

Odda is a small town with around 7,000 inhabitants. In the town, there are two major process industry enterprises: Boliden Odda, a zinc and aluminium fluoride producer, and Tinfos Titan & Iron, a titanium oxide and iron producer. These two enterprises have about 600 employees. Until recently, three process industry enterprises existed, but one of them, Odda Smelteverk, a carbide producer, was recently closed down. In addition to these large enterprises, there are several suppliers in the town that basically serve the two main contractors.

These three major enterprises were located in Odda as a result of easy and nearby access to hydro power. Around the last turn of the century, Odda was, within a couple of decades, transformed from a small place where the people lived off of farming and tourism, to an industrial center for both the region and the country. Odda was, in addition to some other places along the western seaboard and the fjords, industrialized because of the nearness to the waterfalls and the hydro power plants. At the time, transport of energy out of the region was not possible. Instead of transferring electric energy to the more heavy populated areas and constructing new enterprises there, the entrepreneurs moved people to where the energy was. New enterprises were built up, along with entirely new communities based on the hydro power from the waterfalls.

Odda – a community where strong traditions are kept alive

At that time when the new communities were constructed, the road system in Norway was not developed to transport goods and people. The road system by the fjord at the west coast was in particularly bad shape. Due to the location, most of the transport of

34 The driving distance between Odda and Ålvik is approximately 1.5 hours, including a 20-minute ferry. In addition, the roads are narrow, and are heavily exposed to avalanches during the fall, winter, and spring.

people and goods at the very ends of the fjords had to go by ships. Communication was slow and it resulted in the enterprises not being able to rely on supplies from others. The organizations that were built up covered all kinds of needs that the enterprise had. The enterprises located in Odda were, more or less, self-supported. A strong tradition established in the early years was that, to operate in such an environment, the enterprises had to be self-supported and not dependent on other enterprises or organizations.

The new communities were built by construction workers, navvies who travelled from construction site to construction site on the western seaboard and along the fjords. In this navvy culture, class consciousness was strong. The class distinction between blue collar workers and white collar employees was kept clear and strong. This culture was transferred to the workers in the enterprises in new communities that were constructed. This transfer was made possible by navvies who settled down in these new communities (The Norzink worker 2004). The workers in the enterprises unionized and they became important union departments in the trade union, “The Norwegian Union of General Workers”. This was the same union that the navvies were traditionally organized in. Some years later, a new union, “The Chemical Workers Union of Norway”, was established for those employed in the process industry (The Norzink worker 2004).

The communities where the enterprises were located became strongholds for left-wing political parties. In this setting, the positions as union leaders in the different enterprises in these communities became important power positions, both within the enterprise and in the local community. The unions have maintained their strong positions, especially among the blue collar workers, and they are still important power positions within the enterprises.

The community of Odda was an isolated place located a long distance from the markets and regional and national centers. The citizens in the community have a lot in common and face a lot of challenges together. As a community, Odda was an enclave of industrial activity surrounded by agricultural country. The community was characterized by industrial activity, and the industrial locomotives operated on a 24-hour basis. Their operations were organized in three eight-hour shifts, in contrast to the rest of the Hardanger region that organized life based on the need for agricultural production. This divided the region into two opposing cultures: industrial and agricultural. The citizens of Odda were proud to be a part of the industrial culture, and

the “struggle” to be accepted by their surroundings glued them together into a strong unit. This has also created an instinct for survival in the community. When an external enemy threatens the community, they unite in a common defense of their community[35].

In such a community, informal networks are obviously operating[36]. These become operative as soon as there are certain tasks to be solved. These informal networks which focus on solving certain tasks could be the source of several formal networks, such as between the industrial enterprises in the community. When the researchers entered the scene, there were no such formal networks established.

Groundwork for action research: What is the current situation for the Hardanger region and the Hardanger industry?

The Hardanger region has experienced a decline in both the general population and the number employed by manufacturing enterprises over the last couple of decades. The region has struggled to replace the lost jobs in the industry. The main contractors have rationalized their operations over a long period of time, and the number of employees has decreased. This has mainly been done by not rehiring people when employees leave the enterprises. Thus, the reduction has not been that visible, but considerable numbers of jobs have been lost over the years[37].

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35 This instinct of survival came to the surface, for instance, when the conservative government in 1983 decided to close down the aluminium production in Tyssedal (Tyssedal is a small community within the Odda Municipality, located about 3 km outside of the town of Odda). The whole community stood behind the demand for continued operation of the “DNN aluminium” enterprise. Leading this action committee were the local unions. The community lost this battle, but their continuous fight for their community ended in a decision made by the Norwegian Parliament that resulted in the construction of a new enterprise, an ilmenite smeltery “Ilmenittsmelteverket”, that still operates in Tyssedal (The internal newsletter “Rørposten” at Tinfos Titan & Iron, Nr.5 May 2005:6). The same mobilization of the community happened when the construction of the hydro power plant “Tysso 2”, owned by “DNN aluminium”, was finished. The enterprise then had a considerable power reserve that the owners would like to transfer out of Tyssedal. The unions and the municipality opposed the transfer of power and the owners decided to abandon the plan (The internal newsletter “Rørposten” at Tinfos Titan & Iron, Nr.5 May 2005:6).

36 See footnote 7.

37 To be found at ‘The history of Odda Municipality’ on the Municipality web-page at www.odda.kommune.no.

In parallel to this trend, there has been another noticeable trend. The process industry enterprises that were previously self-supported have outsourced several services to local suppliers. The dependency on suppliers has not resulted in a closer relationship between the "mother enterprise" and the suppliers. The tradition within the individual enterprise of mainly being occupied with the internal situation is kept alive.

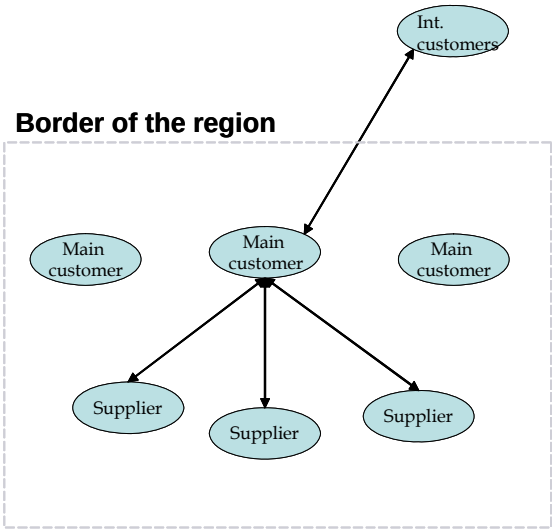

Figure 1

Figure 1 represents a model of the main relations between the enterprises as they have traditionally been in Odda. An inter-connection exists between the main contractors and each of the suppliers. The relationship between the suppliers and the main contractors has been strong in some respects. The preferred suppliers have received the tasks from the main contractors, and basically sold man-hours. The relations between the personnel and the enterprises have been close because the relationships have been maintained for a long period of time. Still, the task organizations and the deliveries from the suppliers to the main contractors have been fixed. The suppliers did not, in such a task organizational system, have the need to explore the external market. It was the main contractor that had external relations with international customers, and to enterprises in the same business sector as themselves. The main contractors brought new impulses back to Odda, and the suppliers had to relate to the signal given to them from the main contractors. The technical personnel at the main contractors were the ones to develop the plant and prepare invitations to send to the suppliers. In this way, the main contractors maintained the task system and kept the deliveries from the suppliers down to a man-hour sale. At the same time, this task organization did not encourage

collaboration between the suppliers. There were no incentives for the suppliers to spend resources on collaboration with other suppliers. Why should they?

The situation for the enterprises in Odda and the rest of the country has changed dramatically during the last decade. The globalization of the business life has exposed the local market to international competition. This has challenged the traditionally local task system in a fundamental way. International enterprises have entered the local market, and even though they are located far away from the market in Odda, they are able to compete and win contacts on services and deliveries that the local SME's have had monopoly on for years. How should the local enterprises meet this challenge?

One strategy to strengthen local industry competitiveness in this more competitive environment is for the enterprises to enter into more binding collaboration, such as an industrial network. To use network collaboration to develop the enterprises' competitiveness is a strategy that has been successfully utilized in the industrial district in Italy (Piore & Sable 1984). Networking between the local enterprises in Odda can, thus, be an answer to some of the enterprises' challenges, and can subsequently be decisive for whether the enterprises are willing to collaborate or not.

Within this context, the task was to construct a development network based on certain basic values put forward by the VC2010 program and related to the enterprises' business activities. How this was accomplished will be elaborated below.

The initiation and construction of the Hardanger Industrial Network (IiH)

The initiation of the IiH was closely linked to the work within the Development Coalition for Hordaland and Rogaland (DCHR). The DCHR was a new entity in itself. The construction of such entities was encouraged by the VC2010 program. To grasp the orchestration of the initiation of the IiH network, I will shortly review the construction of the DCHR, and the impact the actors in the DCHR had on the initiation of the network in Hardanger.

In VC2010's predecessor, ED2000, the aim was to underpin enterprise development in individual enterprises and networks of collaborating enterprises. The initiatives for

both of these programs, ED2000 and VC2010, came from the labor market parties[38], who strongly supported the idea of supporting direct development activities and research on participative enterprise development. The initiative to launch a R&D program on participative enterprise development originally came from an entity that is a result of close cooperation between the labor market parties, called "The labor market parties joint initiatives" (HF). The labor market parties were then involved through HF and not through their regional representatives. The ED2000 program was divided into modules that covered certain parts of the country. The module that covered Rogaland County and the southernmost parts of Hordaland County was governed by Rogaland Research. When operating the program, RF took several initiatives to involve other R&D institutions, like the University of Bergen (UiB), in the program without any success. The development activities and research conducted within the program were funded through different sources. The public support system consists of several different governmental agencies, and most of these supported parts of the activities united under the ED2000 umbrella. Nevertheless, the public support system did not participate actively in the program committee or other parts of the program. In this arrangement, only the labor market parties and RF were actively involved in the regional activity, which brought about no regional anchoring of the program and no regional mobilization to underpin the development activities.

One main aim of the VC2010 program was to become a driving force in the regional anchoring and mobilization of participative enterprise development and innovation. It is important to note the supplement of innovation to the development dimension. This is due to the fact that there has been an expansion from a focus only on incremental change to one including innovations (Claussen 2001b). Thus, when the program was launched, the construction of Regional Development Coalitions became a core feature.

38 The term "labor market parties" will be used to cover these two organizations: the Federation of Trade Unions (LO) and the Confederation of Norwegian Business and Industry (NHO). These two organizations are the umbrella organization that organizes more specialized federations, respectively, for the blue collars workers and the enterprises. In the manufacturing industries, these two federations, LO and NHO, are, by far, the most influential. In the general agreement between these two organizations, there is an important section that describes the unions' and enterprises' responsibilities for collaborative development in the enterprises. To support the enterprises' struggle to improve, the labor market parties have set up a joint operation, "the labor market parties' joint initiatives" (HF). This joint operation manages funds that support projects in and between membership enterprises.

In these coalitions, the regional public support systems, R&D institutions, higher education institutions, and labor market parties were supposed to become active partners. In the autumn of 2000, RF, based on funding from the VC2010 program, took the initiative to construct a Development Coalition covering the two counties of Hordaland and Rogaland. RF was picked by the VC2010 program to do so, based on their experience in the ED2000 program. When the final application to the VC2010 program from Hordaland and Rogaland was dispatched, it was a joint effort from a coalition existing of a united team of actors in the field of regional development.

In the first business year, DCHR had to prioritize where to initiate development activities within the two counties. In this decision-making process, the labor market parties in Hordaland were especially eager to focus on the Hardanger region. For years, this region had experienced a decline in population and employment. The one-town industry towns in Hardanger were strongholds for unions and business federations. These towns were especially hard hit by this decline, and in 2000 and 2001, two of the major enterprises in these towns were in a state of crisis. This was worrisome for the businesses, and the unions and federations were eager to support these enterprises so they could stay in business. The unions, federations, and the regional support system aired their concerns for the rest of the coalition. RF responded by suggesting the construction of a network of manufacturing enterprises in Hardanger.

When listening to the experiences and results that the enterprises in the Industrial Network of Sunnhordland (IfS) achieved during the ED2000 program, the construction of a network of manufacturing enterprises in Hardanger to stimulate development and innovation was supported[39]. The IfS network and the enterprises in this network worked closely with RF within the Rogaland Module of ED2000. Based on collaboration with the IfS network, RF could suggest a way to set up such a network in Hardanger. The proposal for the construction of a network in Hardanger based on the model used in Sunnhordland was supported by the coalition. The first step in the initiating process

39 The Industrial Network of Sunnhordland (IfS) is a network of just 20 manufacturing enterprises in the Sunnhordland Region in Hordaland County. The network is established as a separate private enterprise, with the membership enterprises as shareholders and owners. The network's aim is to underpin an increase in the value creation in the membership enterprises and to launch new development and innovation projects and programs (Claussen 2004).

was, thus, taken by the DCHR. One major difference between the foundation for a close relationship between enterprises and research in a development network in Sunnordland and Hardanger was apparent. In Sunnhordland, the construction of the network was already done when the RF was invited to collaborate. Thus, the enterprises in Sunnhordland had realized the importance and potential in network collaboration before they invited research to help them develop their collaboration. One important question appeared in the Hardanger case: how do we construct a network of manufacturing enterprises as a top-down initiative?

The DCHR saw RF as a strategic actor in the construction of such a network, but it was obvious that a dialogue had to be established between the enterprises located in Hardanger, and between the enterprises and RF. In such a dialogue, the advantages and limitations of such network collaboration would have to be discussed and reflected upon. Hardanger was a virgin area for RF; we had no former connection to the region or to the enterprises, and vice versa. Thus, there was a need for someone to connect the enterprises with the researcher. Our experiences from former projects told us that a door opener would ease the connection process[40].

In this situation, regional representatives from LO and NHO took the initiative to take the role of door openers. These representatives contacted and visited the enterprises, and presented the initiative for the enterprises in the region. These initial contacts were succeeded by an invitation to participate in a conference where collaboration about value creation and adjustments in the region was on the agenda. The conference was planned and accomplished as a joint effort by the regional representatives from LO and NHO, HF and RF.

At the conference, the researchers met the representatives from the enterprises for the first time. The preliminary contact the representatives from LO and NHO had before the conference prepared the participants for what they would meet at the conference and the main approach used by the researchers. The labor market parties especially emphasized

40 In the ED2000 program, Aker Stord acted as a door opener for RF to the rest of the membership enterprises. The enterprise needed a R&D partner, and invited RF to become a partner in a program they were going to launch together with several other membership enterprises. Aker Stord, as the industrial locomotive, promoted the program, and RF as a partner opened the door for RF to the other enterprises (Hansen, Kvadsheim & Tønnessen 2001).

the importance of participation from both the union and the management at the conference due to the use of the concept of participative enterprise development.

Even though several of the enterprises that were contacted did not participate, the conference was well attended. At the conference, the agenda was dominated by the use of dialogue to identify the challenges the different enterprises saw within their business sector. On the other hand, this was the first meeting where closer collaboration between enterprises in a network in the region was at the agenda. The main purpose was to start dialogues based on the enterprises' own experiences, which were widened by perspectives brought in by representatives from RF, from representatives from the IfS network, and from HF. The conference represented the first step for the enterprises toward closer collaboration between them in a network. At the same time, the conference was just a point of departure, and network construction was still an option for the participating enterprises (Helgesen & Junge 2001).

In general, the eight enterprises that attended the conference responded positively to the initiative. In the IfS network, we observed and experienced the importance of the industrial locomotive. The locomotives in a region will often be in a position to convince or attract their suppliers into network collaboration, or they can use their power to do so. This is due to their position as the center of gravity in business life in the region. If the locomotives are convinced that they will benefit from network collaboration, they underpin the construction of a network. They have resources to invest in network construction and network operation. As a result of these experiences, we were eager to involve the industrial locomotives in Hardanger in the network construction. Still, after the conference, no enterprises had committed themselves to join the network. Therefore, the conference was succeeded by individual visits to the enterprises that attended the conference. These meetings were orchestrated and accomplished by the researcher from RF, but the representatives from LO or NHO were present at most of the meetings. Over a period of time, contact with the enterprises was completely handed over from the labor market parties that had initiatively established contact to the researchers. These meetings generally had the same agenda: (a) management had a short presentation of the enterprise; (b) the researcher had a short presentation of what might be the intention behind a network collaboration, RFs experiences in a network and networking, and the foundation of the VC2010 program - participative enterprise development and cooperation between the labor market parties; and (c) a dialogue about what this could mean for the enterprise and the potential of

such a network. Those attending the meetings were the manager, the union representative, and the researchers. These dialogues were rich, and widened the perspectives on what potential benefits a network could represent for the individual enterprise.

Which of the enterprises were attracted by the construction of a network of manufacturing enterprises? Interestingly, some patterns were immediately established. The follow-up meetings with individual enterprises resulted in four of the enterprises signing a letter of intent to join a network. Firstly, all four enterprises were located in Odda, one of the two one-industry towns in the region. This town is located at the end of Sørfjorden. This fjord is a part of the Hardangerfjord and is located at the south side of the Hardangerfjord. Initially, none of the enterprises located at the north side of the fjord joined. The industry here is centered in the area around Ålvik, the second one-industry town along the Hardanger fjord. Secondly, the largest enterprises in Odda were among the first four enterprises to sign the letter of intent. In Odda, we were able, through dialogue with the enterprises, to find common ground for network collaboration. The lack of interest in joining the network among the enterprises located in the Ålvik area is probably due to the fact that the industrial locomotive in Ålvik declined to participate. Thirdly, the roles of the industrial locomotives are worthwhile to study. In Odda, three out of the four original enterprises can be characterized as industrial locomotives. They have been present in Odda in some way or another for seventy to eighty years. One of the enterprises faced serious crises in the construction phase of the network, and was closed down less than a year after the network started their operations. Still in the construction phase, just one of these acted as a locomotive that promoted and supported the network intensively. This enterprise had participated in ED2000, but not as a part of the Rogaland module. Their enthusiasm for the network construction was based on their experience from participating in ED2000. During this program, a lot of changes took place in the enterprise: cooperation between the unions and the management improved dramatically, a cultural acceptance for continuously change was established, and this had resulted in changes that improved the business performance and the HES conditions. This enterprise, although not the largest one, became the industrial locomotive in the construction of the network. Fourthly, the enterprises were in the possession of employees that were enthusiastic about the network, and had resources, connections, and power to underpin the construction of the network.

The number of enterprises to initially sign a letter of intent was not impressive, especially for the SMEs. Why did the enterprises respond in such a reserved way to the initiative of constructing a network for manufacturing enterprises? As indicated above, most of the main contractors did support the idea of constructing such a network. The only main contractor to turn the idea down argued that they worked so closely with their mother and sister enterprises that there was no need for a network. At the same time, the geography was important for the enterprises at the northern side of the Hardanger fjord. Traditionally, these enterprises had stronger relations to enterprises in the Bergen region than to the rest of the Hardanger region. As long as the large enterprise chose to turn down the invitation, the SME's did the same thing. The other main contractors took another approach. They signalled to their suppliers the need for a change in their connections. Traditionally, the suppliers sold man-hours to the main contractors. To increase their efficiency, the main contractors asked for more complex deliveries from the suppliers. They would like to see the suppliers deliver whole systems or sub-systems[41]. To enable the suppliers to respond to this request, a network where both the main contractors and the suppliers participated seemed to be a tool to achieve results. The network arena could also help the suppliers to start a collaborative project that enabled the SME's to deliver large system packages. Still, why were the SMEs reserved? For years, these enterprises had been working under the same regime or task organization. Understanding the need for a change in the task system is not done overnight, neither is understanding what implications this might have for the SMEs. This takes time and the process needs to be fertilized.

When the enterprises signed the letter of intent, a steering committee for the network was established. Initially, the committee had members from the different participating enterprises, and among the members were both union representatives and managers. RF also had a member of the steering committee. The committee made some strategically important choices on what features to focus on: (a) apply for funding to a position as project leader for the network and for network operation, (b) establish arenas where personnel from different levels in the enterprises could meet and open a dialogue around

41 Traditionally, the suppliers have sold man-hours to the main contractors. This way of operating is due to change. The suppliers are challenged to sell maintenance packages, to take over the operations of work stations and various equipment, and generally challenge the main contractors technologically. Projects have been launched to develop such services and products (see note 14).

development issues, (c) continuously work on expanding the network, and (d) try to initiate internal development projects within the participating enterprises. Even if the process of constructing a network was ongoing, it would not be a straight-forward process. Networking is much about trust, internally between management and unions, and between management and employees, but also externally between representatives from the different enterprises and other stakeholders. To establish a network that the different parties and levels within the different enterprises are committed to is a long-term project. Undoubtedly, the construction of an ongoing dialogue between the involved actors is most important. To keep the dialogue going, and to keep it wide, is a key element in the construction of a network.

Network construction is much about improving the individual enterprises through collaboration with other enterprises and actors. As an external actor, we considered it to be important for the researchers to get involved in the ongoing activities within the enterprises as soon as possible. Our experience from former projects is that researchers are looked upon from the enterprises' point of view as distant from the reality, and usually had nothing to contribute to their internal projects. We, as action researchers were invited into the largest organizational project in the largest enterprise in the network. This was not the enterprise initially considered as the industrial locomotive. As researchers, we acted as part of the project operation group. The operation group consisted of the internal project management and two friendly outsiders. In addition to the operation group, the project organization consisted of a reference group. This group consisted of union representatives, operators, and management. By joining the operational group, we met a broad range of employees and gained insight on the relationship between the employees and management, between the unions and management, and between the employees. In the group, we participated in the planning of the project, the work shops, the group-work, and we participated as process consultants in the workshops and group-work. This was a way for us to build trust and confidence, and brought in some new perspectives to the dialogues.

Improving enterprises separately or through some sort of network construction is very much about establishing dialogues and increasing involvement from the employees (Pålshaugen, Ø. 2002). The same comes into effect for network construction. The network construction in Hardanger started out as a top-down initiative. This means that we, as network initiators, needed to open and maintain dialogues to sell the idea of a network to dedicated employees that could support construction of the network, and at

the same time have resources to realize a network. There are a lot of dialogues to be opened with a lot of actors to get this process going. The dialogues between researchers and the enterprises have to be open so different perspectives can be launched and openly discussed. From such a discussion, local solutions can be found. Without openness, the necessary trust between the enterprises and researchers is hard to achieve. The enabling of the local actors to find local solutions adaptable to local conditions is of crucial importance. To construct and later operate a network is a conscious modification process: new and better ways of interacting in the network setting are constantly launched, and there is a need to be adaptable for all of the actors involved.

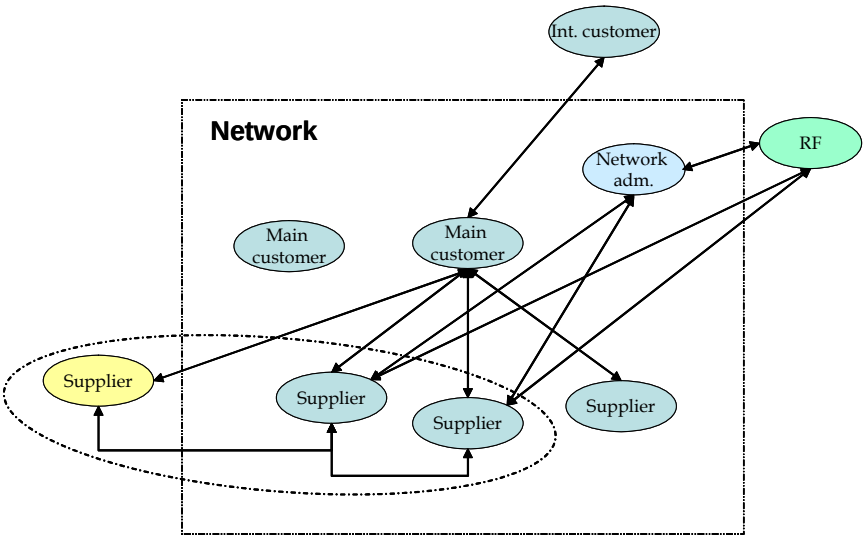

Figure 2

One of the aims for the network collaboration was to underpin a change in the task system, in addition to enabling the suppliers to take part both in a horizontal collaboration with other suppliers and a vertical collaboration with the main contractors. For the suppliers, the horizontal and vertical collaboration represented the opening of many "ties" (Granovetter 1973), or a change in the deliveries from the suppliers to the main contractors toward more complex system deliveries. At the same time, the utilization of ties to enterprises and organizations outside the region was an expressed ambition. When the products and services change, there may be a need for expert skills and competencies that are not present locally. These skills and competencies have to be transferred from other locations and must allow for collaboration with the local suppliers. Another aim for the network collaboration was to enable the enterprises to come closer to the external market, domestic and abroad. Through the new external

partners and other organizations, new markets may open[42]. The utilization of the weak ties will broaden the supplier's network and market contacts.

What was the role of action research in the initiation and construction of IiH?

RF was given, by the DCHR, the task to initiate and construct a network in Hardanger in collaboration with the enterprises in the region. Within the DCHR, the labor market parties were eager to do something for this region. After the decision made by the board of the Development Coalition to support an initiative for the construction of a network in Hardanger, the labor market parties collaborated closely with RF in the mobilizing process. The first question that was raised was how to clarify the enterprises' apprehension of the need of a network. The second question was how to get in contact with the enterprises in the region.

As an answer to the first question, RF and the labor market parties decided that the first step to be taken was to accomplish a dialogue conference where representatives from the enterprises in the region were invited, then both from the management and the unions. The regional LO and NHO representatives knew the enterprises in the region well, and made the first initial contacts with the particular enterprises. Meanwhile, the researchers started to plan the conference. The invitations were sent out and the conference was accomplished as a collaborative effort from the labor market parties and RF. The participants at the conference supported the network initiative, and came up with many suggestions about development initiatives to be taken in the region. Subsequently, the researcher had to start the construction of a network. Even if the initiative received support from the enterprises, they had no recipe to hand over regarding how to construct a network. The researchers used another network as a model for the construction of the network in Hardanger. Even if the enterprises supported the initiatives, there was a need for the researchers to talk to the enterprises separately about

42 There have already been projects and project ideas launched within the network where such collaborative approaches have been used or suggested. Fig. 2 is identical with the orchestration of a project launched to develop a fully automatic foundry station in the foundry of one of the main contractors. The aim of the project is to develop a foundry station that can be marketed and sold in the world market.

their ambitions for a network. The researchers visited all of the potential membership enterprises at least once, and discussed the initiative with them. In many of these talks, a representative from one of the regional labor market parties also attended the meeting. Some of the enterprises received several visits from the researchers due to uncertainty about what benefits a membership could give their enterprise. The construction phase was characterized by doubt from many of the enterprises: doubt about how such a network could support their enterprise, doubt about how the researchers and a network membership could help them improve their operation and give their enterprises new opportunities, and doubt about how network collaboration could be anything other than a waste of time and money.

When the network started out, just four enterprises had signed a letter of intent. Among these four were the two industrial locomotives located in Odda. During this initiating phase, the researcher accomplished several network meetings where representatives from the different enterprises attended. In these meetings, the researchers challenged the "industrial locomotives" to take the lead in the construction of the network. Two of the locomotives responded positively to the inquiry and contributed effectively in this phase. The support from the industrial locomotives enabled a construction of a network framework: (a) a steering committee with representatives from the management, the unions, and research; (b) a collective network arena; and (c) an institutionalization of the network. The last was very important for the further development of the network. The participating enterprises suggested that the network construction was considered as a project, and was connected to an enterprise constructed by the government to encourage development and innovation locally, Hardanger Vekst[43]. This municipal public development enterprise was running a six year project within the Odda Municipality at the time. Further institutionalization was ensured by the fact that the network received financial funding from the partners in DCHR: the regional public support system and the labor market parties. The researchers suggested setting up a hub

43 When a specific municipality or local community experiences severe problems regarding loss of jobs, the government gives the municipality or local community a special status, which qualifies the municipality for special funding to encourage development and innovations that take place locally. The municipalities are given such a status for a six-year period. To support local initiatives for creating new enterprises and jobs, the municipalities most often establish a municipal public development enterprise. These enterprises are enabled to partly or fully fund local projects.

that could act as a network engine, and the same applied to the application for funding of the hub. This funding enabled the start-up of several network activities like the training of internal supervisors.

As the case indicates, the researchers had different roles in the initiation and construction phases. RF was not a well-known research institution in this region. The researchers had to earn confidence from the different actors involved in the network construction. Why trust researchers who were usually seen as out of touch with real life? Earning trust had to be done through meeting the actors face-to-face and establishing dialogues that were meaningful for the participants. Creating such dialogues is time-consuming, because relationships of this kind are not established through a few short meetings. The researchers had to make visible their experience of working closely with the industries and networks of industrial enterprises. Most of the enterprises in the region were not used to working closely with R&D, except for the industrial locomotives. To convince the other enterprises of the need for network collaboration and the benefits of the presence of R&D, the industrial locomotives were used by the researchers to convince the SME's to become members of the network. To intervene and earn trust in the industrial locomotives, the researchers chose to participate in a major organizational development project in one of these enterprises. The researchers had to persevere to launch a network within the region, playing the initiator role and being consistent.

The researchers placed themselves in other roles as well, one of which is the door opener role. The existence of the DCHR made the application process for funding a network hub a lot easier. When struggling with the construction of the network, the immediate positive response from the funding institutions made the construction much easier. Since the construction of such a network had already been discussed in the DCHR board, the funding institutions that were present as board members were prepared to receive an application from the network for funding. That RF was present both in the network and in the DCHR made the application process less difficult. The communication between the researchers opened up for a close dialogue between the network and the DCHR. The researchers in the network also opened the doors to another type of funding, the labor market parties' fund for development projects (HF).

The researchers from RF also acted in the process consultancy role in the construction process. In the beginning, they were solely responsible for planning and accomplishing

the process of constructing a network. This was done in close collaboration with some of the participating enterprises, especially the industrial locomotives.

The enterprises and the researchers emphasized the importance of launching improvement and innovation projects within and between the participating enterprises. To enable the enterprises to run their own projects, there was a need to transfer knowledge on how to conduct development projects to the personnel in the enterprises. As a response to this need, the board decided to prioritize to accomplish a training program for internal supervisors. Personnel from most membership enterprises attended this training. The researchers participated in the design of the program and as instructors in the training.

In the next section, I will consider several dilemmas and challenges connected to the construction of such a network, as well as the space left for conducting action research.

Considerations

The main objective in this paper is to analyze how to conduct action research in the initiation and construction phase of a development network in a region without a tradition for formal collaboration. This subject is obviously dependent on the context which the network construction is embedded in[44]. When I analyze the IiH case, several issues appear to be important to consider when discussing the conditions for conducting action research in such a field.

In order to accomplish a network construction in Hardanger, there is a need for such a project to be recognized by a larger global network (Law and Callon 1992). For me, a

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44 A fundamental condition for the selected approach in the VC2010 program is rarely discussed: the presence of genuine collaboration between the local labor market parties. This is a fundamental principle in the program, but it is not obvious that this is in place locally. To base improvement and innovation on broad participation and to conduct action research, the existence of an elaborated and well-functioning collaboration between the labor market parties is an important precondition. If this well-functioning collaboration is not present, the process of involving the employees in such work seems to be a lot more challenging. In Odda, the unions and the union leaders are important actors within both the enterprises and the local community (se note 7). The unions and the management in the enterprises have developed, using the general agreement as a point of departure, a well-functioning collaborative base that underpins broad participation. This close collaboration represents a solid point of departure for a network construction that is based on the same principles as the collaboration was build upon.

global network is a set of relations between local actors and potential funding actors or other external actors who might influence the network construction. The global network is not understood as a worldwide network, but is called global because it represents potential regional, national, and international relations. The global network, then, represents all of the external relations out of the local network. How the concept of globalization is used above is different from how this concept is used in the globalization debate (Martin, P. & Schuman, H. 1998, Østerud, Ø. 1999).

For the local actors, there is a need to generate space and resources in which innovation may take place. The global network possesses the resources needed to support such a network construction. The process of constructing a network will often be a mutual shaping where both the local and global actors participate (Law and Callon 1992). In the Hardanger case, the actual initiative came from the global actors represented by the DCHR. These actors represented certain values and approaches, such as the emphasis on participatory innovation and incremental change, and an active role for social partners in the development of a culture that nurtured change and innovation. The action researchers represented the same values and approaches. Even the regional public policy system participated in the DCHR and then underpinned the same approach as the social partner and the researchers. When construction started, the approach promoted by a united global network restricted the local possibility to redesign and create an original network approach adjusted to local conditions on all issues involved. Still, many issues were left that could be decided by the local actors.

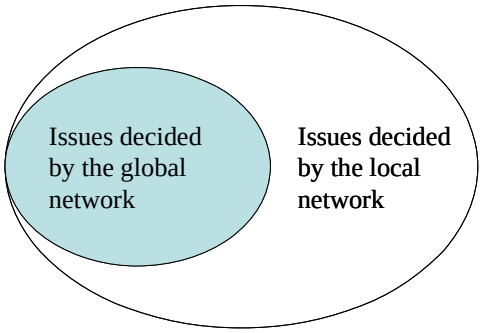


Figure 3

For the network, it was of utmost importance to get organized and appear as ready to move on to attain funding for the network operations from the regional public policy system. In the construction phase, the action researchers represented the link, or the point of passage, between the local actors and the global network (Law and Callon 1992). Initially, the labor market parties represented such a regional link, but these

parties gradually vanished as a possible point of passage as the construction went on. This probably had much to do with the actors' interpretations of their own roles. The researchers were supposed to support the construction and had to maintain and develop their relationships with the enterprises. The labor market parties had more of a door-opener role in this process. They were not manned to handle such a point of passage role. Gradually, the obligatory point of passage between the two networks became the researchers.

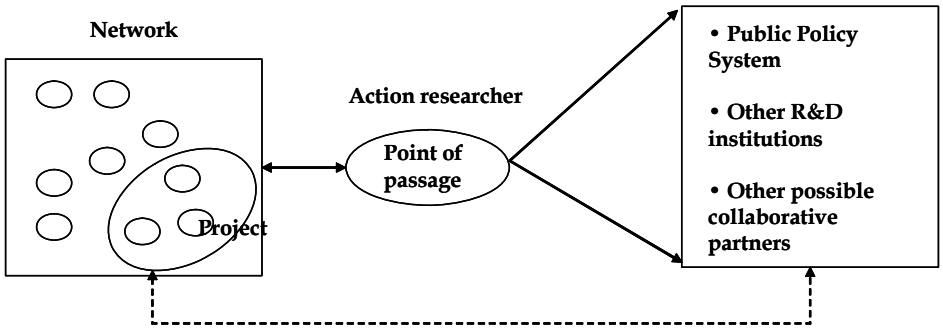


Figure 4

Later, this started to diversify again. This was when the network started its operation, and the regional public policy system funded a local network project leader. This funding caused a demand for reporting to these global actors, and the point of passage was no longer a single point. Still, the researchers represented a powerful point of passage, because they had central functions in the operation of both the network and the DCHR. The case shows that the exchange of intermediaries between the two networks is crucial.

To analyze how enterprises respond to an initiative to construct a network of enterprises is much about how individual enterprises behave in the market, and how they, as economical actors, relate to other enterprises and institutions. How social institutions are affected by their social relations is a classic question within social theory (Granovetter 1985). This discussion is very much about the view of how business actors in business life behave in the market. One extreme position is that the business actors operate as rational, self-interested actors who are minimally affected by their social relations in a perfectly free market. In this market, there are no conditions that hamper free competition between the enterprises. Another extreme position is that understanding business actors as independent is a grievous misunderstanding, since the

behavior of the business actors is so constrained by ongoing social relations that they cannot be construed as independent actors (Granovetter 1985). In the first position, the actors involved are regarded as purely economically rational actors who act solely in response to market demands and market opportunities (Porter 1990). There are no disturbing external conditions like historical conditions, social relations, or political forces involved in the decision-making process. The other positions emphasize the opposite side, where these external conditions are the driving force in the decision-making process within the enterprises. These conditions will influence the decision-making process to a degree that might question the understanding of the enterprises as independent economic actors (Williamson, O. 1975).

Figure 5

Granovetter places himself somewhere at the continuum between the two extremes (Granovetter 1985). First of all, such a modelling of the world is static and is not concerned about changing conditions. The market might change over time, and so might the relations between the enterprises. Time will, from such a perspective, be an important element to consider. This also means that the influence of external conditions will fluctuate.

When considering real cases, like the Odda case, time might be confirmed as an important element to consider. In Odda, the suppliers have traditionally been closely linked to the main contractors. The suppliers have had most of their turnover connected to doing business with the main contractors. These suppliers have acted as external bases of resources that the main contractors can use when needed. The interconnection between the middle management at main contractors and the managers at the suppliers has been close. As a result of this close connection between the enterprises, the interconnectivity between the organizations has been elaborated over time. The personnel from the suppliers can hardly be separated from the main contractor's own personnel. They are often regarded as part of the personnel needed to perform the work. In this way, the interconnectivity regarding work between the suppliers and the main

contractors has been very close. This represents a utilization of the strong ties (Granovetter 1973). Granovetter uses two categories to describe the relationship between enterprises: strong ties and weak ties. The strengths of the ties are, according to Granovetter, a combination of the amount of time, the emotional intensity, the intimacy, and the reciprocal services which characterize the tie.

The main contractors have recently challenged the suppliers by untying these close relations or ties. The main contractors are placing themselves in a position where they challenge the traditional task organization. They are leaving a strategy where facilitating inter-enterprise cooperation and the reduction of transaction costs have been the main ingredients, and are turning to a strategy where they are more market-oriented, leaving the region to buy services and demanding system deliveries rather the man-hour sale. The transformation for the supplier can be described as a movement on the scale indicated in Fig.1, from a situation where the suppliers can best be regarded as close to a position where the social relations in a restricted market are extremely important, to a situation where competition in an open market dominates. Does this displacement represent the end of an irreversible process? Obviously not, because the main contractors are eager to participate in network collaboration that is mainly designed to develop the suppliers. This indicates that the turn toward a use of the open market may be reversible, but this will depend on the supplier's ability to adjust to the new demand from the main contractors, and the suppliers' ability to inter-connect to other enterprises and organizations. This indicates that the time of relatively stable relations between the local enterprises has changed to an unstable and open situation, where the enterprises will have to continuously reorient to be competitive.

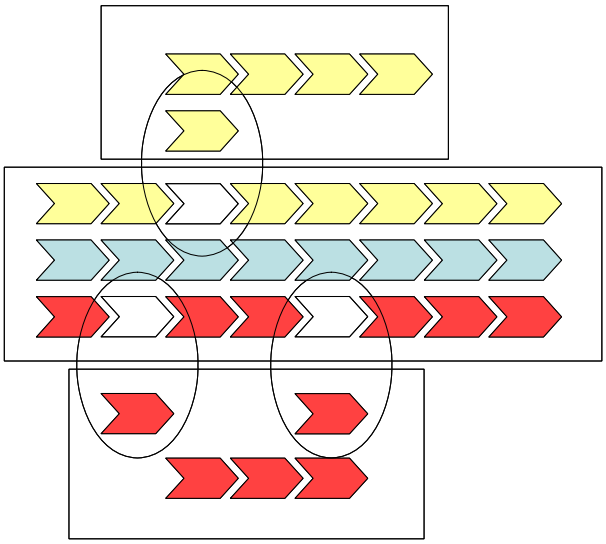


Figure 6 *To illustrate the transfer of tasks or outsourcing of tasks from the main contractors to suppliers (inspired by Porter 1985 and Reve 1992).*

In the Hardanger case, the problem of markets and hierarchy are apparent (Williamson 1975). This problem concerns the question regarding what circumstances economic functions are performed within the boundaries of hierarchical enterprises, rather than by market processes that cross these boundaries. This problem is visualized in figure 6 above.

As indicated above, the main contractors in Odda are challenging the way the task organization has operated locally. When they call for system deliveries rather than man-hours, they ask the suppliers to take over tasks that their own organizations have been performing. The main contractors are forced by the market to reduce their operational costs to reduce the cost of their end products to their customers. As a response to these demands from the market, the main contractors are challenging how they operate the business. One issue to investigate is how the division of work or the task organizational systems are functioning, regarding the inter-enterprise linkages between the suppliers and the main contractors. Traditionally, there has been less focus on boundary-spanning regarding these linkages. Enabling the suppliers to respond to the request of boundary-spanning will be one main issue to address. Traditionally, the suppliers have been less preoccupied by such activities, and have been concentrating on the operation of their business. The transformation of the enterprises, where boundary-spanning and innovations as a response to the request for system deliveries are key features, becomes the key issue for the network.

As a response to the change of strategy by the main contractors, the construction of an industrial network aimed to improve the inter-connection between the suppliers and the main contractors were regarded by some of the suppliers as a way to avoid the market (Granovetter 1985). These suppliers saw the network construction as a way to keep up their special relationship or strong ties with the main contractors, and in this way become the preferable supplier in an open market. The aim was to become part of the main contractor's hierarchy, and then avoid the competition in the open market.

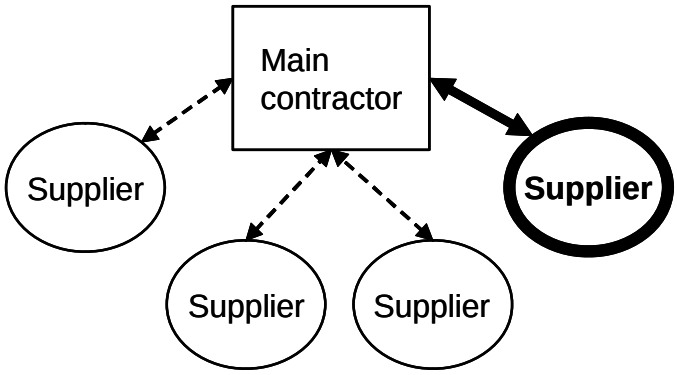


Figure 7

When the inter-connections between suppliers and the main contractors are organized as they traditionally have been in Odda, it raises a question on whether such a task organization might lead to inefficiency in task accomplishment. The strong ties between the main contractors and the suppliers might, on the one hand, lead to a reduction in transaction costs. The suppliers are located locally and are easy accessible, they know the layout of the main contractors' plants, close connections exist between the personnel in the main contractors and the suppliers' organizations, and so on. On the other hand, such a way of organizing the accomplishment of tasks might exclude the main contractors and the suppliers from external impulses that are in the market. When all of the attention is focused on supporting each other, less energy might be used to challenge how the enterprises perform their tasks. Opposed to this argument, the construction of a development network and the SME's participation in this network can represent a convincing argument for the main contractors to maintain strong ties to the local suppliers. Even if the network collaboration reduces external competition, the enterprises' participation in the development network will assure the main contractors of the willingness among the suppliers to improve their own performance and to

develop their services and products. Thus, participation in the network will underpin the need within the main contractors to consciously reduce their operational costs. The network can be seen as a way to balance between the market and the hierarchy, which represents a constant challenge for the main contractors (Williamson 1975, Granovetter 1985).

The question of the existence of a lock-in situation for regional development might be a relevant issue (Grabner 1993). The lock-in situation might appear when the ties between the main contractors and suppliers are strong, and at the same time, the innovation system is exclusively directed against a certain field (Grabher 1993). This means that improvements and innovations are focused toward this particular field, and this focus excludes border-spanning toward other markets and alternative uses of technology. Such a "functional lock-in", as Grabher terms it, might lead to other types of "lock in" (according to Grabher). When personal ties are strong and focused toward a certain field, it might lead to an unchallenged interpretation among a large number of people. This groupthink interpretation may prevent the people involved from seeing the signs of the need to look at alternative interpretations. This is what Grabher characterizes as "cognitive lock-in". When the same interpretation becomes the reign supreme in the political-administrative system, Grabher characterizes it as a "political lock-in" (Grabher 1993). There is no doubt that the traditional way to organize the task system in Odda has features that might give the impression of a lock-in situation[45]. Even if the main contractors have focused on their societal obligations for the local society in Odda for years, their international owners have been preoccupied by bringing in competitors to supply their own enterprises. The suppliers have recently been challenged, to a high degree, by competitors, both domestic and abroad. This is due to the changes in the domestic economy, where foreign enterprises have easier access to the Norwegian market than earlier. At the same time, the demands to deliveries to the main contractors have changed from pure man-hour sales to system deliveries. These changes in the market have forced the suppliers to rethink how they relate to the main contractors.

For the suppliers, these changes have brought a need to look after collaborators, and collaborators, not just locally, to be able to support the main contractors. To deliver

45 It might be sign of a political-administrative "lock-in" in the example presented in footnote 5.

system packages, the suppliers need to cooperate. They might even go outside of the region to provide the necessary competencies and skills. The enterprises are not used to collaborating with external enterprises. To connect to such enterprises, the suppliers need a network of connections to explore. This exploration of connections has often been called the utilization of the weak ties (Granovetter 1973).

The more interwoven the national economy becomes the more dependent the enterprises and the national economies of innovative and learning regions and local societies become. The paradox seems to be; the more global the economies become the more important becomes development power and competitive advantages based on local and regional conditions (Brulin 2002). This statement indicates that, in the new economy, the local and regional conditions will be decisive for the competitiveness of the enterprises. The VC2010 is constructed based partly on this assumption, so it has been widely accepted. To follow the line of argument connected to this assumption, the enterprises that are able to compete in a global market have to rely on some kind of local competitive advantages, such as close local relations and dynamics. The assumption leads to several questions. Firstly, if the assumption is just, how will it, in a local setting like the Hardanger case, affect the behavior of the enterprises? In Odda, there was, by the time of the initiative from the DCHR, no tradition for formal collaboration and no local or regional network existed. If the business environment forced the enterprises to collaborate or interact in some way, there should be some kind of collaborative efforts visible between the enterprises. On the other hand, when formal collaboration between the enterprises is absent in a local community, will this be a sign of the lack of need for collaboration? There is not necessarily accordance between a lack of formal collaboration and the need for formal collaboration. There still might be a need for formal collaboration, but the actors may not have been able to set it up or may be unaware of the need.

As the Odda case indicates, the main contractors pushed for the construction of the network. The enterprises that actually face global competition saw the need for a change, and supported the construction of the network, while the suppliers that still operated in the old task system did not see the same need for a network. This has changed, much due to the change in the international economy. The suppliers have been forced to reorient and have become more eager to network.

Secondly, what kinds of relations constitute a competitive advantage? Are social relations "just there", or can they be "released or activated"?

Do these considerations leave us with space for conducting action research?

When operating in the field, action researchers must rely considerably on local knowledge (Greenwood & Levin 1998). The local actors have a lot of knowledge about the actual situation and the history, and have, based on this knowledge, shaped their own theories and interpretations of their own practices (Amble & Pålshaugen 2005). All of these local actors will not, nevertheless, have developed one common local theory and interpretation of their practices, but rather a set of such (Amble & Pålshaugen 2005). To get the participants to articulate their theories and interpretations of practice is important as a point of departure for innovative processes. Thus, to collect and understand this knowledge is important for the action researchers. Understanding local theories and the corresponding interpretations of practices are vital to action researchers, but what are the action researchers' contributions beyond this in local processes or projects?

An often used distinction to capture the complexity of action research is to distinguish between "knowing what" and "knowing how" (Greenwood & Levin 1998). The "knowing what" represents the main activity of conventional social science, while the combination of "knowing what" and "knowing how" are seen as action research. Conventional social science has been occupied with examining why a certain issue or phenomenon exists and clarifying its definition. The action component has been absent. Action research, on the other hand, embraces both the examination component and the action component. Academic knowledge is important for action researchers, but such knowledge is not sufficient for an action research practitioner. Based on the argument that intelligence is more manifest in the way we act than the way we think, the "knowing how" will be manifest in intelligent actions (Greenwood & Levin 1998). To enable change, knowledge has to be played out and intelligent actions have to be taken. In this way, the "knowing how" becomes as important as "knowing what".

The "knowing what" distinction may overshadow the fact that the knowing component in action research must be operative. The action researcher must be able to use his knowledge to nurture the dialogues and challenge the local actors' positions (Amble &

Pålshaugen 2005). The action researchers have to, based on their knowledge, raise challenging questions that the participants will have to answer. In this way, the participants will find answers and this will secure the anchoring of the chosen solutions.

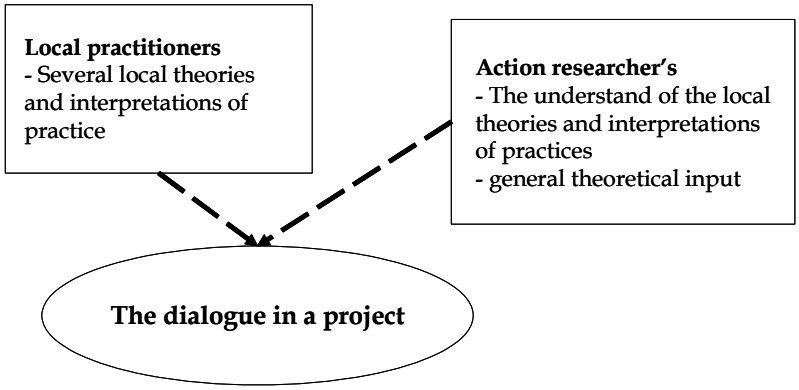
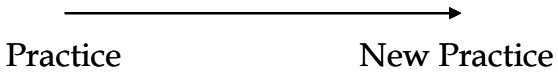


Figure 8

A skillful practitioner has the ability to determine what the actors are receptive to, and can switch between context-free and contextual components. The local actors have their own local theories and interpretations of practice, but this is about their own practice. They do not know everything about practice - the action researcher may also influence the dialogue by using their own experience from other practices. This is not just about how to construct processes, but rather about how to put the researcher's knowledge into play in the design process of the "new solution" or "new practice".

The other important component in action research is the contribution of research in the transfer from an established practice into a new practice (Amble & Pålshaugen 2005). In other words, this is about the transfer of the design of a new practice into practice.

Figure 9



This corresponds with the "knowing how" distinction, and is about bringing a project or a process from the design level down into new practice. For action researchers, this is again about bringing their own knowledge and experience into the dialogue. The

knowledge that the skillful practitioner can bring into the dialogue is the research practice of the action researcher.

The component that is rarely discussed is personal commitment from the action researcher. To fully participate in a project as member of the project team, the researchers will have to commit to the aim of the project in the same way as the rest of the project participants. Without this commitment, it might be hard to establish the necessary trust that enables the action researcher to challenge the other participants by giving input on practice and theory.

I will use these considerations regarding action research as a point of departure to approach the dilemmas and challenges that are drawn above. The researchers used in the initiation and construction phase of the INH network had to smoke out the local theories and interpretations of practice through several dialogues with the different local actors. What was their interpretation of the current state of collaboration between the local actors, and what was their interpretation of network and the potential in such a construction? Not all of the enterprises saw potential for their enterprise in network collaboration. How did the action researchers respond to the local theory that saw network collaboration as waste of time and money? The researchers had to use their theoretical knowledge and knowledge based on their previous experiences from network collaboration to put this knowledge into play. This was done in several ways, such as by presenting the potential benefits in network meetings and bilateral meetings between research and the enterprises, and by using the participation of the industrial locomotives as an instrument to recruit other industrial enterprises in the region.

Included in the construction process was the design of the network within the agenda. The aim of network collaboration was to underpin participatory innovation and incremental change, both in and between the enterprises. How could the design of the network underpin this aim? To support such an aim, it was important to come up with a design that enabled as many employees from the enterprises as possible to participate in the network collaboration. In the dialogue between management and the union representatives from the enterprises, the researchers brought into play their theoretical knowledge and practical experience from the IfS network (Claussen 2001). This network participated in the Enterprise Development 2000 Program, and RF, as owner of the Rogaland Module of ED2000, collaborated closely with the network and the separate enterprises. The IfS network utilized a model of network collaboration in

ED2000 that secured participation from a variety of employees from within the enterprises. This model was used as a point of departure for the network in Hardanger, and was further developed to fit the context in Hardanger through the design process.

In the same way as illustrated above, the action researcher will have to put into play knowledge about the dilemmas and challenges of networking. In this way, they can enrich the dialogue in the network, and most importantly, improve how the networks operate, hopefully increasing the potential for participatory innovation and improvement in and between the enterprises.

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7.2 Attachment II

7.2.1 Paper 2: Action research and innovation in networks, dilemmas, and challenges: Two cases

Author(s):	Trond Haga
Status:	Finished
Published:	Artificial Intelligence and Society, Vol. 19, No. 4
Data of publishing:	November 2005
No of pages:	30

Action research and innovation in networks, dilemmas, and challenges: Two cases[46]

Trond Haga

(1) Rogaland Research

Abstract

Innovation plays a central role in economic development, at regional and national level. The paper takes a practical approach to innovation and the support of entrepreneurship, based on experience of facilitating two contrasting networks of enterprises. Action research is seen as having a central role, but with different approaches according to the innovation process concerned, and the part of the process.

Keywords: action research, entrepreneurship, innovation, networks

46 This article is written based on experiences from the R&D program "Value Creation 2010" (VC2010) in Norway. The program is funded by the Norwegian Research Council and has a ten-year perspective. The main target for the program is supporting enterprise development through partnerships and networks. The paper is a result of the work done by the VC2010 research group at Rogaland Research (RF).

Introduction

An economy or viable business environment with competitive enterprises cannot exist without innovation. Without continuous development and innovation, disturbances in internal and external conditions would destroy the balance between supply and the demand in the market. This is recognised as the basic drive to innovate in a modern economic system, and the basic reason behind this drive (Schumpeter 1934). Creating innovation and supporting entrepreneurship will thus be very important issues to pursue. I argue that we need different Action Research (AR) approaches in different innovation processes and in different parts of an innovation process.

The classical definition of innovation emphasises the introduction of new goods, methods of production, markets, raw material and organization (Schumpeter 1934, Swedberg 2000). A more context dependent approach emphasises innovation as any idea, practice or material artefact recognised as new by those adopting it (Holbek 1988).

Firstly I distinguish between innovation and entrepreneurship. These concepts are often mixed up in everyday language. Innovation and entrepreneurship might not necessarily be the same. Innovation might be understood as the creative part of a process where ideas are processed into products or new solutions, while entrepreneurship might be understood as individuals or groups of individuals ability (a) to innovate and (b) to start producing the new product or using the new solution (Schumpeter 1934).

Secondly the relationship between innovation and creativity needs to be clarified. These concepts are often used together. Creativity can be seen as a prerequisite for innovation (West & Rickards 1999). Creativity is then regarded as the process of generating ideas, while innovation is seen as the use of these ideas in new solutions or products.

Thirdly there is a need to address the difference between entrepreneurship and intrapreneurship. While entrepreneurship is regarded as launching new initiatives or solutions outside existing enterprises or organisations, intrapreneurship is the same but inside enterprises and organisations (Pinchot 1985). Here I focus on innovation, and the concept of innovation is understood as the creative process from the generation of ideas to the creation of new solutions or products, including both an individualistic and collective approach.

The issue at stake for enterprises and organisations is to develop innovations, to keep them competitive in the market. These innovations will be developed through the use of different approaches to innovation. In this paper I analyze different approaches to innovation, and how Action Research might support these approaches.

For analytical purposes I introduce two different approaches to innovation; (a) direct innovations and (b) indirect innovations. The direct innovations approach will emphasise definite innovations. This is often what is regarded as working with innovations in public. The focus is on the development of a single product or solution. The development might be done by a single entrepreneur, or collectively. The second approach is the indirect innovation approach. This approach will emphasise preparation for definite innovations. The preparation can include different conditions that are necessary to conduct the needed activities. One condition that seems to be urgent to address in preparation for innovation is *training.* To be able to bring to light and to utilize the human resources available for innovation activities in the enterprise or network, training seems to be one of the key issues.

I look into how Action Research (AR) might meet some of the challenges connected to the use of different innovation approaches and dilemmas linked to innovation. Two ways to conduct action research will be considered, and they are closely connected to the described innovation approaches. One action research approach will be termed a *direct approach.* In the direct approach action research is conducted in order to *create* an innovation or something new. Action research is conducted as a co-generative *creation* process (Elden & Levin 1991). In the second approach, action research is conducted in order to *facilitate* co-generative training processes (Greenwood and Levin 1998). The emphasis is on ways to prepare favourable conditions for innovation, rather than dealing with the innovations themselves. Here action research is regarded as an *indirect approach* to innovation.

These two approaches will be illustrated by two examples, both within the context of a regional partnership at the west coast of Norway. Both the examples are taken from one of the networks within the regional partnership in Hordaland and Rogaland. One is related to a definite development project in one of the participating enterprises in the network. In this example, organisational change, with the aim of empowering blue collar workers, is the essential innovation. It is important that this is done through a process where preparation for innovation is considered to be an important success

factor. In the second illustration, the focus is on the process of preparing for innovation, in order to conduct development projects inside specific enterprises, and in network relations among several enterprises[47].

The two examples are interrelated empirically, as they are derived from the same network. Working in a network of enterprises makes both innovative and action research activities possible, at both a network and an enterprise level. Comparing the two examples gives an opportunity for critical reflection on the two innovation approaches, and the two action research approaches to innovation. This critical reflection will serve as an opportunity to highlight some important challenges facing action research approaches to innovation.

Innovation – dilemmas and challenges to be addressed

While handling the innovation issue, some dilemmas and challenges will inevitably emerge. Firstly creating something new seems to require a creative and unbureaucratic (organic) organisation of innovation processes (Burns and Stalker 1961). Uncertainty and instability characterises this part of an innovation process in an organisation. Implementing the new ideas, on the other hand, requires more control and stability. More bureaucratic (mechanistic) ways of organising this part of the innovation process are required. These two aspects of an innovation process represent a dilemma, *the innovation design dilemma*. Structured processes generate few ideas and proposals, while more unbureaucratic and unstructured processes could generate more diversity, with the risk of conflicts that hamper implementation (Holbek 1988).

Secondly, an innovation process will be dependent on individuals that come up with new ideas or point out a new direction for further development. Thus have the entrepreneur's individualistic and heroic qualities been emphasized (Schumpeter 1934). The entrepreneur is the one who, *on his own*, comes up with new creative innovations and is able to realize these innovations. Still the entrepreneur operates within a social and geographical context. How will this context affect the entrepreneur's thoughts; the co-operation with other individuals, the communication with his surroundings, the

[47] The development of an idea of a process of preparing for innovation has been inspired by the use of the concept of space for training (Botterup 2002).

openness between individuals, the training environment etc? (Cooke 2002). These two aspects on how to conduct innovation also represent kinds of dilemma, between an individual and a collective approach towards innovation.

The elaborated dilemmas relates to different organisational levels; firstly they are connected to the individuals involved, secondly to a departmental or enterprise level and thirdly to a network or cluster level. The dilemmas will appear differently, depending on the level they appear on. In this paper I focus on the departmental or enterprise level, and the network level.

Innovation processes differ. First of all to get innovation processes launched there are a need for enthusiastic and idealistically individuals or groups of individuals to activate and to accomplish such processes. We know that the ability to innovate differs (Schumpeter 1934). Some individuals or groups of individuals are more eager to get involved in innovation processes than others. When such an innovative environment is established, the individuals will often get involved in innovation processes. On the other hand to obtain belief in and enthusiasm for innovation processes may call for some kind of training or preparation. In an environment that has not been characterised by innovative activities there might be such a need. At the same time there might be a need for training or preparation in enterprises where broad participation is on the agenda. It is possible to divide innovation processes in two; direct and indirect innovation. The first represent innovation processes where the focus is on actual innovation projects. The second focus on processes for enabling individuals and enterprises to become innovative.

One main issue to address within enterprises, organisations and networks, when working with innovation, will be the question of enabling the employees to participate in innovative and intrapreneurial activities. The issue is about finding a way to try to cope with the innovation design dilemma and the individual-collective dilemma. To be able to handle the tension between structure and creative freedom, there is a need for skills and competence. In the same, way skills and competence are needed to handle individual-collective dilemma. These skills and competences might be obtained through training. Thus there is a need for training within enterprises, organisations and networks to facilitate fertile conditions for innovations. Preconditions for fertile innovation will have to be examined before I enter into a discussion of innovations and AR approaches.

Preconditions for innovation

Both network and knowledge have been regarded as important preconditions for innovations. Some recent contributions to the discussion around the concept of "the knowledge economy" have focused their attention particularly towards the clusters or networks (a) capability for training and (b) their innovation abilities (Cooke 2002)[48]. One of the questions that arise from such a focus is: why is network co-operation seen as a critical precondition for innovation? The main argument is that a network in itself represents a precondition for innovation, in the same way that, for instance training does.

Cooke emphasises three major elements to justify his position:

- Disequilibrium – in the knowledge economy disequilibrium is not a special phenomenon. It expresses more the natural state of affairs.

- Co-operation – while within the traditional economy competition is regarded as the most distinctive feature, co-operation is the same in the knowledge economy.

- Systematic complexity – the knowledge economy is also characterized by a complex interaction between a number of actors that utilize each other's capabilities, and strengthen each other's competitiveness.

Cooke emphasizes particularly one aspect tied to the networks; they possess a unique competence for knowledge transmission. This unique competence, and transmission of it within the network, will cause disequilibrium between those inside the network and those outside. Those inside can share a common tacit and explicit knowledge. This sharing and transmission of knowledge is exclusively for the enterprises within the network. The challenge for the enterprises within the network will be how to maintain their competitive advantage.

Cooke (Cooke 2002) turns to training to find a way for enterprises within networks to maintain their advantage. The content of such training will have to improve the ability

to develop and put to use new knowledge. Competence consists in according to Cooke; (a) networking competence, (b) organisational competence and (c) individual competence. To increase competence, emphasis has to be put on creating space where training can happen (Botterup 2002). So if the enterprises within a network wish to maintain a competitive advantage, they will have to further develop their competence and knowledge transfer internally in the networks.

The other main precondition for innovation that Cooke (Cooke 2002) emphasises is networking. By networking he means the active sharing of competence and knowledge that happens between the enterprises within the network. This will enable both individuals and groups within enterprises to come up with new ideas and solutions and develop them into new innovations.

The creation and utilization of competence and knowledge can be approached in different ways. One approach will be to train the employees within enterprises and organisations, and use them as the source of renewal. Another approach will be to turn this around and rely heavily on external R&D experts and use them as the source. These two different approaches do not exclude each other. They can easily be combined.

Training within networks and enterprises is about how to develop knowledge that can be used by employees, by enterprises and within networks to elaborate their ability to innovate. So far I have argued, based on theory, for the need for training of the employees to enable themselves and the enterprises to become innovative. Still I have not addressed the question on what has to be emphasised in this kind of training, and how this can be done in practice.

The focus will have to be put on how to create space for training, within both the network and the enterprises or organisations. This space for training will contain opportunities and limitations for the employees within organisations and enterprise, regarding training in their daily work (Botterup 2002). A focus on creating space for training will also affect the way I work with enterprises, networks and the operation of networks. It is necessary to allow both individual and collective training to happen. At

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48 The concept of “cluster” covers different meanings and phenomenon. The most common understanding of the concept is some sort of geographical defined group of enterprises that co-operates closely in some way or another. So there is in the literature no clean cut between for instance the concepts of “cluster” and “network”. I prefer to use the notion “network” in this paper.

the same time there is a need for systematic operations that both (a) promotes training and (b) utilizes the results of the training processes. Still there is a need to give attention to conditions that are decisive when working with training in the daily work.

What conditions are important to emphasise when training to increase the capability for innovation?

Enterprises have invested in training their personnel to fit the needs of their future organisation. Many enterprises have spent a lot of energy, time and money on analysing the competence level among the present employees in various areas and the enterprises' future competence needs. The training of personnel, however, is no guarantee that the personnel have either acquired the requested occupational qualifications, or innovative skills (Botterup 2002).

There are observable changes in approaches in the training of personnel in work life. The interest for internal, informal training processes is increasing at the sacrifice of formal external education and training. The focus is changing from (a) the topic of training to (b) the training process (Botterup 2002). Such a change places the individuals engaged in the training process at the centre of attention. However these kinds of approaches have limitations. As a producer of training processes, it is possible to set up some kind of framework and give some opportunities.

Another important condition connected to these approaches is that training is not an area characterized by consensus. Ulterior conditions will influence the opportunity for training and individual motivation for getting engaged in training processes. Without being able to start using newly adopted skills and exploring new possibilities, the motivation for engaging in the process will decrease.

Space for training covers possibilities and limitations individuals have, regarding training through daily work and the use of newly acquired skills in new ways (Botterup 2002). Using the term space for training had many similarities with the way Stephen Kemmis uses the term *communicative space* in relation to his discussion of Habermas (Kemmis 2001). Every day life in an enterprise opens up different ways in which training may happen. This openness characterises both space for training and communicative space.

There are big differences in the possibilities for training in different jobs. For instance, will both how the work is organised, and how management are looking at giving space for training for the employees during the hours of work, influence the possibility for training? Despite obstacles everyone within an enterprise or organisation will "own" a kind of space for training. Another characteristic connected to the concept is that it is not static. Space for training will change when times passes.

I have presented arguments for the need for training to support innovations within enterprises and in a network of enterprises. One important issue will obviously be the creation of space for training. How does the creation of space for training relate to action research? As I present in the case below, a particular action research approach gives special attention towards the creation of; (a) arenas for sharing of experiences and reflection over one's own practice at a network level and (b) organisational solutions that support training processes within the participating enterprises. This support will cover both formal and informal training. In the two following sections I use two cases to illustrate different approaches to innovations and different AR approaches.

What kind of roles can action researchers go into in the enterprises and the networks?

An action researcher can, according to the way we perform as action researchers at RF, appear in different roles. The action researcher has a multifaceted approach to the field that is under investigation. The different roles can be described shortly as:

- **The Enterprise Developer** (professional knowledge in certain areas where the enterprise needs help – organisation, IT, technical/technology)
- **The Organizer** (participates in preparation of development processes and training)
- **The Process Consultant** (participates as support or "process engine" in development processes in enterprises or network)
- **The Trainer** (train personnel from the enterprises in methods and tools)
- **The Advisor (**guiding personnel from the enterprises in development processes and projects)

- **The Communicator** (documents activities and results)
- **The Evaluator** (looks critically on activities and results and comes up suggestions for adjustments of processes etc).

Innovation processes can be categorized as indirect or direct. What will be the connection between the different innovation approaches, and the roles that are placed emphasis on? Some of these roles will be more common when an indirect innovation approach is selected, and some more common when a direct innovation approach is selected.

Creating training space, an indirect action research approach [49]

The partnership "The Development Coalition of Hordaland and Rogaland" operates in mainly three different settings; (a) the first setting is where the social partners, the representatives from the governmental apparatus and representatives from R&D organisations and Universities decide which developmental activities the partnership wish to support within their region. (b) The second setting is the network. The partnership has decided to work through networks of industrial enterprises within certain local areas. (c) The third setting is within the different participating enterprises.

The case that will be presented to illustrate the creation of training space, as part of a conscious emphasis on employee's participation in innovative activities, is taken from the network and enterprise setting. In one of the networks, called The Industry Network of Hardanger (INH), Rogaland Research (RF) co-operates as part of the R&D-programme Value Creation 2010 (VC2010), consisting of ten industrial enterprises. The participating enterprises differ in many ways; in business sector, in size and role within the network. Some of them are customers and some are suppliers. Two of the enterprises are in the process industry, and clearly are the largest ones. The other enterprises are mostly suppliers to the process industry. These enterprises are all located in a region with low population density. The population is slowly decreasing, as are the number of people employed by the industry. Despite the fact that the participating

49 This section is based on field notes and observations from the project "VC2010 Hardanger". This project is a part of the regional partnership "VC2010 – The development coalition of Hordaland and Rogaland"

enterprises are located in the same town, there has been hardly any tradition of co-operation between the enterprises.

INH was established as a result of an initiative from the regional social partners and supported financially by the VC2010 programme, the county and the local branch of Innovation Norway. It was seen as one of many efforts to turn the negative trend locally and create new enthusiasm and economic growth. The enterprises that I originally approached reacted differently to the invitation, from enthusiasm to scepticism. This reflects the enterprises' role within the network today. One of the large process industry enterprises was enthusiastic about the opportunities such a network gave. They therefore put a lot of interest in to the network and became the "bellwether" for the whole network. Other enterprises were more reluctant, but their interest in the network increased rapidly.

The main goal of the network is (a) to launch successful development projects internally within the enterprises and (b) projects between two or more of the participating enterprises. These goals were established based on a dialogue between representatives from the participating enterprises and the aim set by the VC2010 program. Among the participating enterprises, both in the management and the unions, there is a common understanding of the need for a mobilization of the employees. The employees have to get involved and engaged in this kind of work, to succeed. All the innovative activities both within and between the enterprises are thus based on (I) broad participation and (II) co-operation between the social partners.

As I show below, this case indicates that it is *not* enough just to prioritize one or two fields out of the three that constitute the social life of an enterprise when designing a functioning and effective space for training. To make results of changes permanent, there is a need for attention towards all three fields to succeed; the production field, the field of politics and the informal social field.

To get the employees engaged in development work on a regular basis requires a framework within the enterprises that encourages training to happen among the employees in the organisations. Training will be linked to the local setting; the plant, the machinery, the equipment, the work process, the organisation, the work methods etc. The network expands the local setting from within the enterprise, also to cover all other enterprises in the network. Training is not first and foremost formalised intended training, but rather informal not necessarily intended training processes. To allow

training to happen, there is a need for space for training. This space will allow the employees both (a) to unlearn practises and understanding, and to (b) relearn and acquire new understanding and develop new practises (Botterup 2002).

The network is organised with a project leader who functions as a network co-ordinator, and a steering committee. RF, as the networks R&D partner, cooperates closely with the project leader. When the strategic decisions are made in the steering committee the project leader and personnel from RF execute the decisions made in the committee.

The steering committee emphasised first of all training of personnel in participating enterprises. The personnel that were given training were called internal supervisors. Their main targets were to; (a) establish arenas where the employees could talk and discuss issues relevant to their situation (b) train their fellow co-workers development project methods and (c) to facilitate development projects. At the formal courses, employees from all the participating enterprises attended. This implied that key employees in the different enterprises in the network attended the same training. The selections of employees to attend these courses were crucial. The procedure used in most enterprises was to let the management and the union together pick out the participants. The main target for the selection was to pick out interested informal leaders. The strategy was then to let these informal leaders help out to promote the attitude towards participation in development work. After the training the supervisors shared the same language and the same methods and tools regarding development work. This common training prepared the ground; (a) for exchange of experiences from enterprise to enterprise and (b) for shaping of common development or innovation projects. The discussions, which were launched officially through the work of the internal supervisors and the training of fellow co-workers, were thought to be the key to open up dialogues within the organisations, resulting in informal training.

One of the participating enterprises organized their internal work around groups of co-workers that were given the responsibility of the development activities within a certain area. This was organised in such a way that at least one third of the employees was engaged in the groups at any given time. With exchange of personnel in the groups, most of the employees had some kind of intervention with these groups within a relatively short period of time. Resources were tied up to the responsibility, so that the groups could decide on actions without consulting the management. In each of these groups at least one of the participants was an internal supervisor. The design of the

selection and the training of the supervisors encourage them to become the driving force in the groups. They gave legitimacy to an active attitude towards this new way of engage the employees in development work. It created a different, more concerned, attitude towards the future of the enterprise.

The organisational priority was to focus the employees' attention towards the situation on their own work place. It was also about giving the employees tools and opportunities to analyze problems and challenges at their work place, and to participate in finding effective solutions to the problems they were facing. In the end it was also about designing training space for the employee's within the enterprise. It was not about a single development project, it was a transformation towards more continuous focus on development and improvement. A general change took place in the employee's attitude towards training, continuous improvement and development.

All these organisational arrangements influenced the organisation. The employees started to talk, and to discuss issues that occupied them. Either they themselves raised a question or issue, or they were challenged by some external source. In this way the informal training processes were started and opened up for the employees to seek new ways to organise the operations, new ways to operate the machinery and to improve the production processes. The management tried in this way to change the culture in the enterprise. By allowing informal training processes to happen, they managed to change the attitude among the employee's towards training and development. The employees got involved in improving the operation of the enterprise and in the development activities. On the other hand it became a challenge for the management to manage the employees with a strong wish for participation and influence.

It is important to notice that not only the management at this enterprise were the driving force. The union who organised the workers encouraged the development towards more responsibility given to the employee's in both (a) the operation of the enterprise and (b) in encourage training to happen at the work place. Without strong support from the union, this transformation would have been a lot more difficult, if possible at all. The way towards a joint understanding between the management and the union were twisted. With a strong will on both sides to find a solution, they were able to sort things out. This process of creating mutual trust was facilitated through the close working relationship with research. The role of the action researchers in this respect was to play an active part, without supporting any specific interests of the involved actors; neither

management/union nor researchers specific interests as such. Here researchers have a possibility to play a different role than consultants, who normally have a specific "solution", approach and product to promote. Action researchers can exercise a possible advantage, by being self critical and self reflective in relation to their role and actions in the specific context that they participate in. By self criticism and reflectiveness they can put effort into exercising participation, without bias towards specific interests and power plays in the field of politics.

Within the main network, a sub network for internal supervisors has been set up. The main goal for the sub network is to create space for training; (a) to open an arena for the supervisors where they can exchange experiences from their own practice within the different enterprises, (b) to open an arena for further training of the supervisors and (c) to open for the option of setting up joint projects where two or more enterprises participate. In these joint projects, the internal supervisors will be the key person. Joint projects can function as a space for training for the participants in the projects. A development and training process, that includes not only personnel from one enterprise, but includes participants from different enterprises, can result in the use of multi faceted approaches. This might lead to changes in the participants' more fundamental understanding.

What kind of role do the action researchers play in this case, and in the creation of space for training within the network and enterprise setting? When I call the approach "indirect", it implies that the action researchers do not give attention first and foremost towards development projects within the enterprises. Much of the researchers' attention is directed against the preparation for the design of space for training; (a) first of all the training of internal supervisors, (b) the design of practical cases within the enterprise as a part of the training of supervisors, (c) the design of the development organisation within each enterprise and (d) the design of different networks consisting of internal supervisors, union representatives and management respectively. All these activities are focused towards the creation of space for training through the three fields; the production field, the field of politics and the social field.

In the next case, the arena for creating space for training will be the enterprise. The case connects to the presented theory by (a) focusing on innovative actions as part of the discussion between individual and collective approaches to innovation. At the same

time, the case will (b) connect to the question of tension between dynamics and structure in innovative processes.

Empowering blue collar workers, a direct action research approach [50]

In the VC2010 programme the target is to initiate enterprises development through partnership and networks (Claussen 2001). The former example focused on the network level. In the next example I will leave the network arena and enter into an enterprise. The project that will be presented focuses on empowerment of blue collar workers and the creation of space for training. The need for another action research approach then becomes evident.

The enterprise involved is a participant in INH, the largest one in the network when it comes to annual sales and the number of employees. In a process industry enterprise, operations go day and night around the clock. The enterprise has an eighty year history at the place it is located, and there is both in the community and within the enterprise a tradition for strong and influential unions. The enterprise is part of an international manufacturing concern. The enterprise has experienced lately (a) intensified competition especially from competitors from China and (b) a pendulous market. At the same time the market expects certain quality standards to be met. The processing industry has to face tough environmental requirements from the public authorities. As if this was not enough, the company expressed a demand for higher profit from the operation of the plant.

The management in the enterprise was aggressive, and tried to figure out a way to meet this challenge. After a process of considerations and discussions that also included representatives from the blue collar union, they launched a project called “The shift team in focus”. The management released that the best way to maintain a competitive advantage was to develop an efficient organisation in operational departments that (a) made use of the employee’s competences and skills, and (b) used small team as the basic unit. As the name of the project indicates, the focus within the enterprise was to shift, from upward drift in hierarchical organisation, to the operation of the shift team. These teams were the ones that created profit, and the rest of the organisation should be

supporting these teams. The teams were supposed to; (a) plan, perform and report on their own work (quantity and quality), (b) handle and solve problems that aroused in the operations within the area were the team were responsible, (c) take care of machines (first level maintenance) and tools within their area, (d) keep up the safety and environmental standards (HES-standards) and (e) infer the learning circle in such way that the teams systematically obtain new knowledge. The main objective for the management was to develop an organisation that made them operate the plant smarter than the competitors.

Even if it was urgent for the management to get results from the project, they realised that the employees had to be involved in forming this new organisation. Implementation of a management decided organisational change would be very difficult. There was a demand from the employees and the union for participation in forming the new organisation. Without their support and enthusiasm among the employees, it would be impossible to implement a new organisation. The case illustrates on the one hand that the innovation was based on a co-operative effort by the people involved. On the other hand, the case exposes that the project both contains a dynamic, innovative phase and a more structured (planned) implementation phase.

So the management initiative was organised as a development project, and attached to the already established development organisation within the enterprise. This formal organisation (Enterprise committee - BU, Department committee - AU and Work Environment committee - AMU) has different levels and representatives from both management and unions attend the meetings. “The shift team in focus”-project was placed under BU. A manager was first appointed to the job as project leader, but later a blue collar worker was appointed to the same position. The project group consisted of the department head, the union representative within the department, blue collar workers and foremen. In addition to the project leader, another person worked on the project. At the same time external resources, among them an action researcher, were brought in. Together these resources formed the project team.

The role of the project team was to; (a) design the project, (b) plan the project activities and (c) perform the meetings. The project design decided by the project team was based

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50 This section is based on field notes from my participation in the project “The shift team in focus” in

on an extensive involvement of the employees within the affected department. The design of the project had these elements (Haga 2003);

(I) to develop a common picture or vision of the what the department should look like at the end of the project (organisation, work environment, tasks etc)

(II) to develop action plans to reach the elements in the picture or vision

(III) to set up action groups to identify and propose solution to challenges

(IV) to train people in the affected department in new tasks and roles

(V) to start up gradually to work within a new organisational context

Between each of these steps, the project team planned to perform meetings all the employees at the affected department attended. The basic idea behind the design was to give the people affected time for *reflection* and *direct influence* on how the design of their "new department" should look like and create a strong ownership from they affected to the new organisation.

One major obstacle in the design of the project was the fact that the operation of the plant was based on shift work. The employees in the department that were picked out do however not work around the clock. They are organised in three shift teams, and were thus easier to involve than employees in the other operational departments at the enterprise. The operation of the department still has to run continuously so it is impossible to gather all the people in the department at the same time. The meetings thus had to partly take place in the personnel's leisure time[51]. They were paid by the enterprise, but still they had to use their leisure time to participate.

Another obstacle that was addressed, both by the union representatives and some of the employees at the affected department, was they were not sure about what was on the agenda for the management. Did the management operate with a hidden agenda? The case on stake was the position of the shift leader. This position was still in the organisation.

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one of the participating enterprises in the Industry Network of Hardanger.

51 In the personnel's shift time table there was some time allocated to such events, but still they had to put in leisure time.

A third obstacle that became more obvious as the project went on was that “The shift team in focus”-project was launched at the same time as another major development project was launched. The company had decided to expand the plant in Hardanger, and this development project represented a major enlargement of the plant. It soon became apparent that to have two such important development projects ongoing in parallel was too much for the organisation. One of them had to be given priority.

The first action taken by the project team, after finishing the design of the project, was to plan meetings with the shift teams separately. On the agenda for these meetings were to inform the people affected about (a) the background and the aims of the project and (b) the design of the project. In the planning process, the union representatives were involved. The project leader was distinct about what the management saw as the aims of the project: a new organisation should give the enterprise a competitive advantage towards their competitors. The main concern from the union representatives was to find organisational solutions that included all the employees affected. They believed that it should be a place for everyone in the “new organisation” no one should be excluded because of lack of *skills or competence*. The fact that people as a result of the project could be moved to another department, or as an extreme consequence be laid off, was not a topic.

The project team followed the designed process and went on to the first major task in the activity list: to form a picture or vision for the department involved. This was done through separate meetings for the different shift teams. The whole shift team attended these meetings, and the agenda included these items; the vision for the enterprise, brain storming to obtain elements for a vision for the involved department, suggestions for a vision for the Department and discussion about the further process. Through the meetings with the shift teams, proposals were posted in project team so they could develop them further. After some preparation the project team could present a synthesized vision for the project group. After some kneading of the text in the project group, the vision was presented for the shift teams. Again it was done in separate meetings. The revised vision was accepted by the different shift teams.

This was the way the project team planned to take the project further. Because the organisation had focused their resources into the enlargement project, the further process in the “The shift teams in focus” was postponed. When the project leader and

the project team tried to restart the project where we had stopped temporarily, we were not successful[52].

How can we characterise the action research in this case? Compared to the first case, where the researcher's involvement was characterized as indirect, the involvement from the researcher in this case is of a direct character. The case is about a definite development project within a particular enterprise, and the researcher participates in the project team as an ordinary member, and as a "friendly outsider". As a member of the project team, the researcher participates in all the considerations about the project: to define stakeholders, to design the project, to decide about involvement of the shareholders and those affected, to decide the agenda for the meetings, clarify the purpose of the different contributions in meetings, and decide on who should contribute on the different subjects, etc.

Methodologically it is worthwhile to reflect on the design the project group decided to follow. Usually in such projects, there will be a large session on what the situation is like in the affected department[53]. Here the project team, consisting of mostly internal personnel, decided to focus right away on what the vision or the picture of the project should be. Instead of spending a lot of time and energy on a situation analysis that in this case all the participants had a fairly mutual understanding of, the team decided to skip this session. The team came to the conclusion that the participants had a sort of common understanding and common platform as a result of being part of the process in the affected areas[54].

I have been looking at two examples that illustrate both different approaches to innovation and different approaches on how to conduct action research. More correctly, I have introduced two approaches to action research. I next consider if the distinctions between the different approaches are fruitful, and fulfil some kind of analytical purpose when discussing if different approaches to innovation and to AR can give substantial contributions to the effort of stimulating innovation.

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52 The causes for the failure of the restart of the project will not be elaborated in this paper.

53 That is the case in the Search conference methodology and other available methodologies.

Consideration of the two approaches

I previously presumed that our two examples differ significantly, regarding the differences approaches to innovation and in action research approaches. In the table below have I tried to sum up some differences between the two examples.

	Indirect	Direct
Strategic importance	Important to change the organisational culture	Important to solve a certain problem
Purpose of the action taken	Shape a development oriented staff	Solve certain specific problems
The way of work	Institutionalized	Uninstitutionalized
Role of Action Researcher	Training officer	Project-team member
Purpose of interaction from the action researcher	Enabling personnel to participating in development projects	Contribute in internal development project
Arena in use	In network of enterprises	In single enterprises
Initiator	Network steering committee	The Management & Unions in the single enterprise
Method	"The arrow" a toolbox for stepwise improvement	"Process improvement" a method for organisational reengineering

Fig.1

The first example, as described above, was characterised as a more indirect action research approach to innovation. In this example no significant new innovation, either product, process, organisational entity, market opportunities or raw material were created. The main outcome regarding innovation was the facilitation of possible innovation to take place, while the innovations themselves were left out to other occasions. This case illustrates an indirect approach to innovation. The AR approach used in this case has accordingly been called an indirect AR approach. Looking at the second example on the other hand, I highlighted the process that was supposed to lead to the creation of a new organisation in a department of an enterprise and looked at it as

54 This methodological approached is an approach often used by action researchers at RF. There has been developed a certain method based on the concept of Business Process Reengineering called "Practical Process Innovation". This method combines the BRP-approach with Norwegian tradition of co-operation in work life (Gandrud et al 2000).

a definite innovation. This illustrates then the direct approach to innovation and at the same time an AR approach named accordingly. Is it possibly and fruitful to highlight these distinctions? Would these distinctions first and foremost fulfill an analytic purpose?

Creating a new organisation was experienced as something new among the participants in the second example. The participants experienced an opportunity to really make a contribution and a difference in the creation of a new organisation. What was then different in the opportunities given the participants in this example, compared with what took place in the first example? Was there any difference in principle regarding the creation of space for training?

In the first example, one of the main objectives was to create some sort of network collaborative entity among the enterprises located in the context of Hardanger. With little or no prior experience in network collaboration, this was felt as an opportunity to create something that could give a possible competitive advantage (Porter 1990 a and b, Reve 1992 and Reve & Jacobsen 2001) for the participating enterprises. To create space for training for the internal supervisors was seen as an opportunity to prepare for both internal and joint innovations. For the action researchers this was felt as a new challenge. None of the participating action researchers had previous experience in building this kind of specific network collaboration among enterprises[55] from scratch. Neither did the action researchers have specific knowledge of anyone else that had been involved in this specific task.

Although creating the network collaboration among enterprises could be characterised as new and innovative, the first example emphasised the use of an indirect approach to innovation. This was more facilitating for innovation, than an actual innovation by itself. On the other hand it might be difficult to make clear cut distinction regarding what are innovative actions, and what is facilitating innovative actions in these two examples. An important aspect connected to this distinction is the degree of systematic control over these actions. “Facilitating” often means that the processes happen within a system, and are characterized by being some kind of continuous change process.

55 For examples of network collaborations I have in mind here, see Gustavsen 2001 and Levin and Knutstad 2003.

A continuous change process is more controlled, systematic, and is applying well known tools and models (Juran 1954, 1988, 1992, 1995/1964, Imai 1986, Ishikawa 1982 and 1985). This is characteristic of the kind of TQM processes we have initiated in many of our action research projects at Rogaland Research. We have experienced that action research is well adapted this structured and bureaucratic approach. On the other hand Hammer and Champy (1993) initiated a reaction against this bureaucratic systematic approach to enterprise development. They put greater emphasis on unbureaucratic, creative and more spontaneous approaches to enterprise development. Many projects connected to this philosophy experienced diversity and conflicts that in many cases led to destructive results. I find that the role of action research in this type of approach is both unclear and challenging at the same time.

I have actually experienced the tension these two approaches entail. Through the network collaborations, I face SME's that have been established as a result of unbureaucratic, spontaneous processes. The management in such enterprises are often sceptical towards systematic and bureaucratic approach. They will often look upon the systematic, bureaucratic approach as obstructing innovation as they look at as more spontaneous processes. One the other hand these managers often express the need for more structure and systematic processes. This is due to their experience with failing innovative processes cause by lack of systematic and structured approaches[56].

In the first example, many equivalent TQM techniques and models were used in order to facilitate and create the intended space for training. The first example thus could be characterised as a more structured process of facilitating training for succeeding innovation processes. The challenges with the first approach in relation to the establishment of a network of industrial businesses will probably be the differences in attitude towards this systematic and bureaucratic approach. While among the SME's there is scepticism towards this approach, this is not the case in larger enterprises.

56 RF co-operates with a number of networks within the VC2010-program. One of them, The Industry Network in Sunnhordland (IfS), has as a part of the VC2010-program started a project called "Position as responsible for development in SME's". Eight SME's within the network participate in this project. The main target for the project is to develop a new role/function within the enterprises responsible for putting development systematically on the strategic and practical agenda in the enterprises. The program is designed as regard to the need for development skills in SME's. Considerations done after finishing an evaluation report lead us to the conclusion of what the project had to focus in the final phase of the project; the tension between the structured and the more spontaneous phases in innovation processes. Gandrud, Haga & Tønnessen *Pilotprosjektet "Utviklingsansvarlig i SMB"*, RF 2004/010

Within these enterprises, they are used to handle systems and bureaucracies and look at this as the best way of working.

In the second example, difficulties and great efforts put into the process of shaping a new organisation could be due to the experienced diversities and possible conflicts associated with unbureaucratic innovative approaches. Conducting action research according to this direct approach to innovation required a firm hand guiding the muddling through processes.

The analytical distinction regarding the two examples can be illustrated as follows:

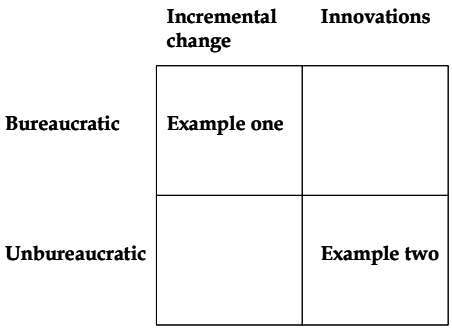

Figure 2

As I can see from the illustration above, the two examples are placed in different categories. Is this model an oversimplification of what goes on in these to examples? As I already have noted, the creation of a network in the first example can, as an alternative, be regarded as something new and innovative. In the second example the building of a new organisation alternatively can represent a space for training facilitating the experimenting with; (a) new organisational model, (b) new demands for skills and competence in the employees, (c) exchange and building of new knowledge among the employees etc. It might them represent an oversimplification characterising the examples and different approaches according to the illustration above.

Alternatively I could view the two examples and approaches on some kind of continuum between bureaucratic/mechanistic and unbureaucratic/organic and between incremental changes, more TQM-like, and innovations, more BPR-like. Juran emphasis different stages in development activities, between innovative “breakthroughs” and more structured and controlled processes (Juran 1995/1964). This is an attempt to see both phases of an innovation process in close connection to each other; (a) the dynamic, creative and intuitive phase and (b) the well structured, planned and controlled phase. I

have, based on the experiences from the IfS-project mentioned above, made this illustration of the same dilemma between structure and dynamics.

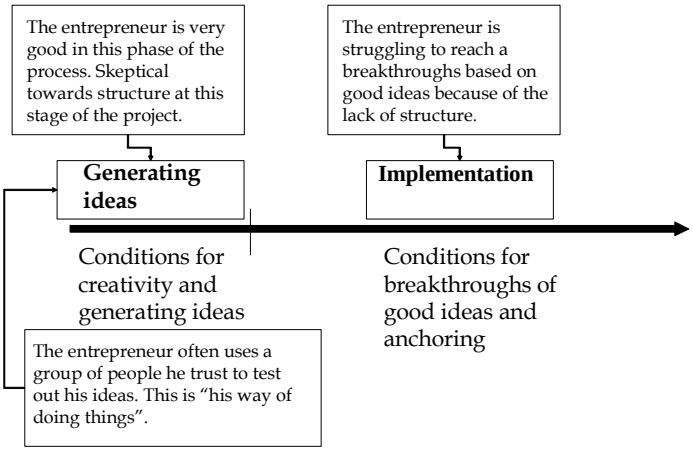

Figure 3

This perspective raises several methodological challenges to action researchers. On the one hand training space has to be created for dynamic and creative activities within the organisations. Facilitating change and innovation has to be emphasised at some stage. On the other hand there would have to be some kind of bureaucracy or structured approach to follow-up the first phase. In total this creates a *systematic* innovative process. The creation and utilisation of training space within an organisation will aim at creating space for innovative activities. I face more of a continuum between a direct and indirect approach to action research, illustrated below.

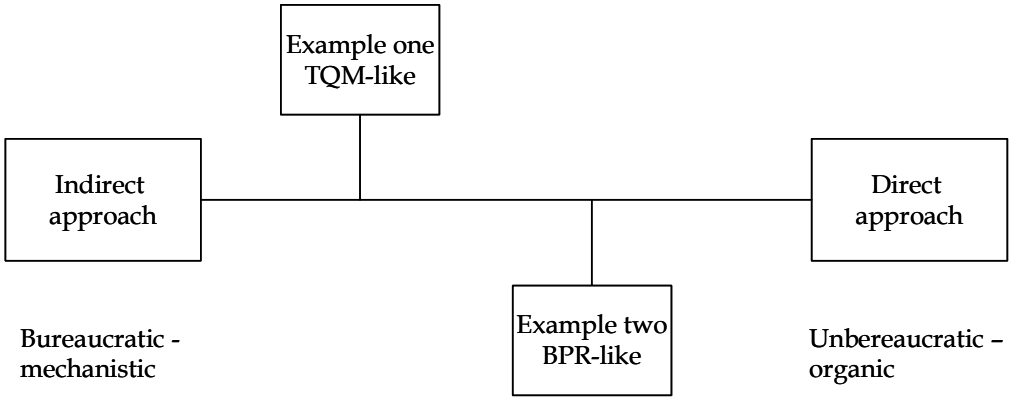

Figure 4

An innovation process will depend on individuals that use their experience and other impressions to combine elements or ideas in new ways. This might happen individually within one person, an entrepreneur or an intrapreneur, or this might happen in a social setting where new ideas arises from the contribution of many individuals (Schumpeter 1934, Cooke 2002). It is hard to set up a clean cut between these two approaches because even an entrepreneur will appear in a social setting. Still at the one end of the continuum the entrepreneur will develop solely alone an idea based on all kind of impressions he has received. On the other end of the continuum ideas will be developed in an open dialogue between colleagues. In both of the examples the collective contribution is the driving force in the innovation process. As I see from fig.2 the innovation processes where the entrepreneur or intrapreneur develops his idea on his own and make the idea availably for just his inner circle is harder to access. Obviously there is a dilemma between to (a) prepare for the "lonely" entrepreneur and (b) to prepare for innovative processes based on the common contributions of many individuals.

	Collective contribution	**Individual contribution**
Bureaucratic	**Example one**	
Unbureaucratic	**Example two**	

Figure 5

As I have presented through the two cases the construction of space for training either in an enterprise as in example two or in a network of enterprises as in example one, favour innovation processes based on collective contributions. The constructions of arenas where employees can initiate new initiatives or reflect up on new initiatives encourage broad participation. On the other hand the knowledge obtained through more collective activities might be utilized by individuals. In this way the construction of space for training space might foster processes initiated by individuals and by a collective of some kind.

Action researchers are faced with different approaches towards innovation processes and they appear in different roles. This can be illustrated by a summing up of the roles used in the two cases presented;

Different roles	Indirect	Direct
The Enterprise Developer		Yes
The Organizer	Yes	Yes
The Process consultant		Yes
The Trainer	Yes	
The Advisor	Yes	

Figure 6

As the table indicates, the emphasis of certain part of the general role of an action researcher will differ when using different innovation approaches. These observations indicate that action researchers may emphasise certain roles according to the innovation approach when entering the field.

Different actors might have different and perhaps contradictory opinions on the ways of participating in innovation through action research. A more practical and pragmatic consideration of how to do action research related to innovation, might be to utilise differences along a continuum, as considered above. I thereby also avoid being trapped in questions of whether the specific change process is innovative, or merely a stepwise change in a more continuous development process. A continuum as illustrated above might also diminish some of the differences between the direct and the indirect approach emphasised through the way our examples were presented. At the same time the action researcher will meet the challenge to both serve the lonely entrepreneur and innovative groups.

As illustrated above, action researchers might have an advantage in innovation process regarding their possibility to exercise a more neutral role as “friendly outsiders” (Elden & Levin 1991). In this respect action researchers have the opportunity to guide processes of muddling through, where differences of interests and power relations threaten to articulate conflicts destructive to the processes.

This aspect of action research does on the other hand have possible contradictory effects regarding innovation. Directed towards consensus, action research could stress the efforts of balancing between differences of interests in such a way that this will hamper possibly creative aspects of innovation related contributions from diversity of interests and opinions. This resembles the way that bureaucracy and control could hamper creativity in the innovation dilemma. Here is an aspect of doing action research in innovation processes that requires attention, training and personal passion in order to balance the creativity of diversity with the necessity of balancing differences of interests, in order to encourage sustainable innovation processes.

Concluding remarks

In this paper I have raised questions regarding how different approaches to innovation may be a way for action research approaches to handle major challenges connected to innovation processes: (a) the challenge of the innovation dilemma, (b) the significance of innovations (c) the dilemma of how to conduct innovation and (d) the relation between training and innovation. Through presenting and discussing two examples I have tried to illustrate how the creation of space for training is relevant for the two different approaches to innovation introduced earlier in the text and to action research. In addition I have tried to present some ways of handling the specific challenges facing innovation processes where action research is conducted.

I distinguished between two different approaches to innovation, and accordingly two different AR approaches, a direct and an indirect approach. The distinction between these two AR approaches is closely associated with the two different approaches to innovation and the way I stated the innovation dilemma.

In the example of an indirect approach a way to facilitate and structure innovation processes was emphasised. One important aspect of this facilitation was to create space for training in order to encourage innovation processes to appear. Here the example from The Industry Network of Hardanger (INH) was utilised in order to illustrate ways of building competence, creating arenas, motivating and negotiating interests among participants, and shaping network relations. These were among the important activities intended to promote innovation capabilities in the specific network context. Among the participants this was seen as an important opportunity to strengthen their competitive advantage, both among the employers and employees.

The example of a direct approach, on the other hand, highlighted a total renewal of the organisation in a department in an enterprise as an important innovation. The project was initiated by the enterprise and became part of the national VC2010 programme through the participation of the enterprise in INH. The project evolved through close co-operation between the internal employees responsible for the project, local external resources and action researchers. In this example the purpose behind the creation of training space was to support one major innovation, the creation of a brand new organisation based on a new set of organisational principles.

First I addressed the question of whether or not the analytical distinction between indirect and direct is valuable. In the first example the creating of space for training was closely linked with the shaping of network collaborations, a possible new and innovative task for action research to engage in. An important task in the second example was to facilitate the renewal of the organisation in one of the departments in one of the enterprises in INH.

Both examples included facilitating the creation of space for training, as well as innovation through the creation of new arenas. It seems to be mostly what is emphasised in my presentations, making distinctions between direct and indirect approaches to action research in innovation processes most significant.

Secondly I raised the possibility of viewing the distinction between direct and indirect as a continuum where practice positions itself somewhere in between. This was presented as a “solution” to the critical discussion rose above. To equalise differences along a continuum, risks becoming a “Winnie the Pooh” solution. It makes it difficult to get clear cut guidelines on how to decide among different approaches, when making a scope for a specific project.

Thirdly I asked what is distinctly new and innovative compared to more stepwise incremental changes. Here too I ended up questioning the possibility of operating with distinct categories classifying what is typically innovative compared to stepwise. The critical points made in the former bullet point are also relevant here.

As a fourth issue I questioned whether there can be a drive in action research towards too much emphasis on consensus and homogeneity, eliminating diversity, and differences of interests/opinions that can be important dynamic aspects of any creative innovation processes.

As a fifth issue I pointed out the challenge facing action research when engaging in innovative projects regarding the tension between dynamic and structure. On the one hand there is a need for a dynamic phase to raise new ideas. On the other hand, there is a need for a more structured phase to commercialize new products or services, develop new markets or develop new organisations.

These summarising statements are important critical issues to consider when doing action research. They might be viewed as statements encouraging critical reflections on action research approaches to innovation, rather than definite solutions to basic subject matters regarding action research and innovation.

Innovation might have to be viewed as a participatory collective process in any respect, just as action research. Society consists of systems of social relations where it is impossible to view an individual action in isolation (Luhmann 1997). The same can be stated regarding innovation (Burns & Stalker 1961), as well as action research (Greenwood and Levin 1998). Making clear cut distinctions, regarding what is innovative and what is not, might be an impossible task to accomplish on an individual enterprise level. I might have to consider the working of a national economy through totally different approaches, in order to determine in any fruitful way what is to be regarded as innovative, and what is not (Sfraffa 1979).

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7.3 Attachment III

7.3.1 Paper 3: The role of development agents in company innovation in Norway

Author(s):	Trond Haga
Status:	Finished
Published:	Part of an anthology edited by Richard Ennals, Bjørn Gustavsen and Barry Nyhan; 'Learning together for local innovation: Promoting learning regions', Cedefop, Thessaloniki
Data of publishing:	February 2007
No of pages:	11

The role of development agents in company innovation in Norway

Introduction

When innovation first started to attract attention as a key issue in economic development, much of the focus was on how to utilise bright ideas from bright individuals for economic development purposes. In so far as the organisation of activities was touched on, it dealt to a large extent on how to organise the commercial exploitation of scientific innovations. However, as the discourse on innovation gained momentum, there has been a widening of the circle of actors considered relevant to innovation. One consequence is that more and more groups and layers of an enterprise are entering the scene, so that concepts like the 'learning organisation' now focus on the innovative potential of the enterprise as a whole (see Chapter 16 by Asheim in this volume).

With this widening of perspective, questions on how to mobilise employees have entered the picture together with a range of issues associated with employee participation and innovative forms of work. This chapter deals with issues that have emerged in this context, but in particular the question of how training can contribute to innovation. With the recognition that classical forms of training have many limitations, there has been a mushrooming of efforts to find new ways to use training, focusing on

content and methodology but also addressing the questions who is be trained and for what purposes. The aim of this chapter is to present and discuss the training of ‘development officers’ or ‘development facilitators’. Before undertaking their new tasks, the future development officers/facilitators undertook a training programme, the main purpose of which was to enable them to take up new roles. The main new task to be undertaken by these actors was the facilitation of work colleagues to join in organisational development processes to share competence and knowledge across their organisations.

The chapter presents two cases both of which started the process of training development facilitators recruited from inside enterprises. In both cases these enterprises were participants in broader networks for inter-enterprise cooperation and exchange. Indeed, one of the exchange topics was on the use of development officers/facilitators. The reported cases took place in sequence, meaning that the second case was able to draw on the experiences of the first. In both cases, researchers played a role in training the facilitators and in the design and implementation of the innovation efforts in which the facilitators were to play their roles.

The two cases are from two different networks of manufacturing enterprises in Hordaland County, the first the industrial network in Sunnhordland (IfS) and the second the Hardanger industrial network (INH). This county, located along the Norwegian western seaboard, is one of the most heavily industrialised places in Norway and is vital to the Norwegian economy. There are several small regions in the county and the networks are located in two of these regions, respectively Sunnhordland and Hardanger.

Sunnhordland case

The Sunnhordland industrial network was founded in 1989, with 14 engineering companies as members; the present figure is about 20 and there are now close to 5 000 workplaces (Claussen, 2001). Six of the companies participated in the national Enterprise Development 2000 programme (ED2000), a forerunner to the national Value Creation 2010 programme (VC2010 - Gustavsen et al., 2001). The aim of the programme was to improve the ability of companies to develop and change against the background of international competition and the continuous emergence of new waves of development such as total quality and business process re-engineering (Claussen, 2001, Claussen, 2004)

The main focus of this programme was on:

- total quality management, integrated with Scandinavian work life and work environment traditions;
- business process re-engineering;
- developing new health and safety procedures;
- improving cooperation between labour and management ;
- promoting broad employee participation in work improvement and innovation processes (Claussen, 2001).

A particular challenge for the Sunnhordland network was to provide SMEs the time and space necessary for development and innovation projects. These enterprises had great difficulties in giving development and innovation projects sufficient attention, so it was in this context that the idea of development agents/facilitators first emerged. The aim was to establish a new role within each enterprise. The employees filling this role were responsible for continuously analysing and assessing the development situation within their enterprise and taking whatever new initiatives were needed.

To be qualified for this role it was necessary to have : a) knowledge of the business sector in which the enterprise operated; b) the ability to take the lead in internal development processes; and c) the competence to facilitate cooperation between the enterprise and external development staff (Gandrud et al 2004). Furthermore, the development facilitators needed to work in close cooperation with management to have an influence on decisions. To develop actors to fill this ambitious role, a training programme was launched. (See Figure 1 for an overview of the training programme.)

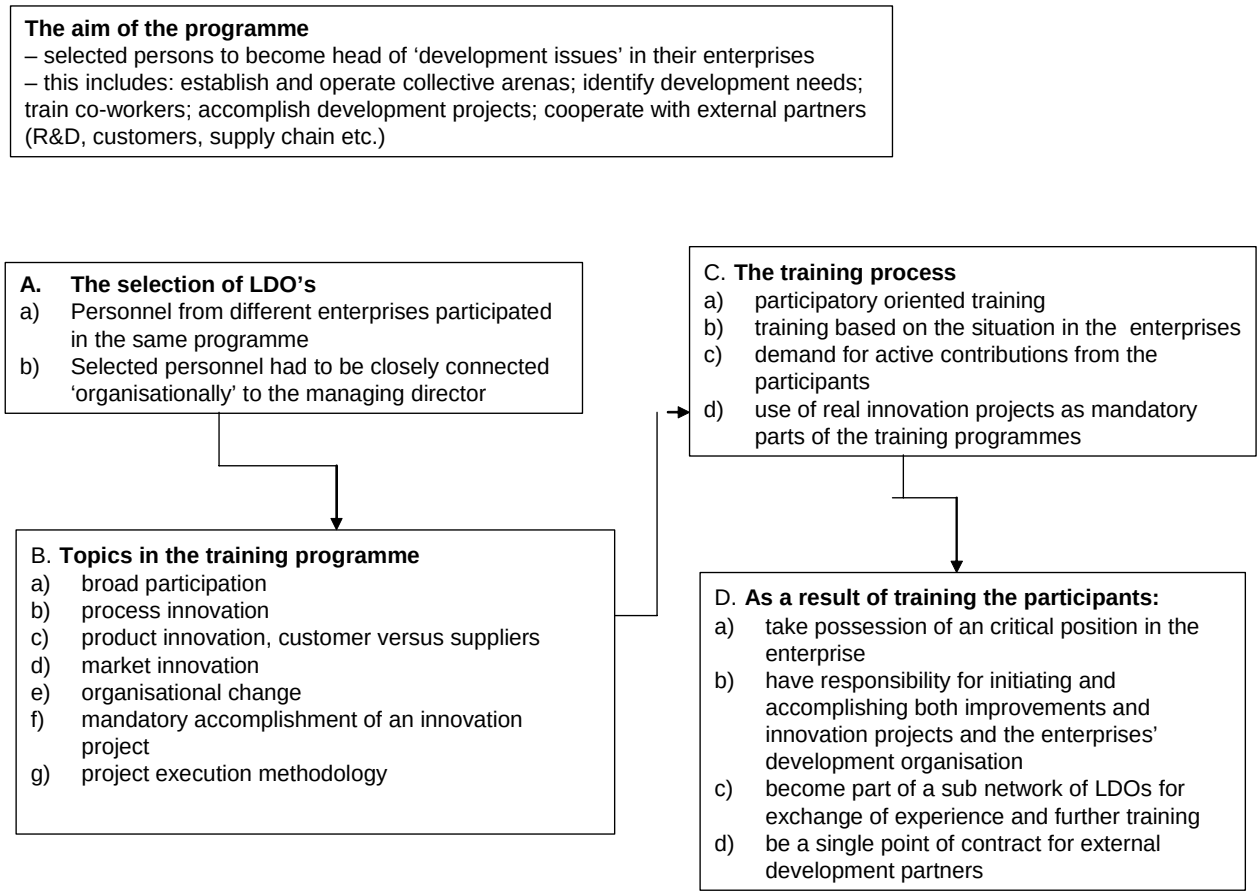

Figure 1: Training programme for 'lead training officers' (LDO)

To enable the people chosen for this role to carry out their tasks, two measures were introduced. First, it was decided that the development officers spend as much as 50 % of their time on the task. Second, it was decided to create a common arena where the facilitators in the different enterprises in the network of companies could meet to exchange experiences and discuss new ideas (Gandrud, 2002). The network dimension was crucial. The introduction of an arena for sharing experiences opened up dialogue between the development officers that in turn created close relationships between the participating enterprises. While this could be reported as a success, it was found that when the researchers withdrew from the network, the development officers were not able to fully carry through the necessary development activities.

The researchers engaged in the project had charge of the training programme as well as the organisation of joint arenas for exchange and discussion. They also assisted the facilitators in their work, took minutes of meetings and wrote progress reports on the overall development of the enterprises.

Hardanger case

The idea of using 'internal facilitators' to increase the innovative ability of enterprises was transferred from Sunnhordland to Hardanger by the researchers working on the former network. Bringing this idea to bear on a new network was a major objective in setting up the Hardanger network (Gandrud et al, 2004). Another objective was to place greater emphasis on local or regional cooperation between enterprises, as many enterprises needed to develop new business areas. With offshore sector activities declining rapidly it became urgent to develop new products and markets. The Hardanger network consists of eight enterprises that differ in many ways regarding sector, size as well as role played within the network. Two of the largest enterprises are in the process industrial sector, while most of the others provide supplies to the sector.

The network was established as an initiative of the regional labour market bodies (employer and employee representative organisations) and supported financially by the VC 2010 programme, the labour market bodies' development fund ([57]), Hordaland County and the regional branch of 'Innovation Norway' ([58]). It was one of many efforts to foster enthusiasm and promote economic growth in response to negative local trends. The first enterprises approached reacted differently to an invitation to participate in a new network, with reactions varying from enthusiasm to scepticism. However, one of the large process industry enterprises showed great interest in the network, becoming its 'industrial locomotive' and as a result many of other enterprises who were originally reluctant joined the network.

A network coordinator (project leader) was appointed and IRIS research (formerly Rogaland research) began to work closely with the network coordinator playing the role of the network's R&D partner. The main goal of the network was to launch development projects within individual enterprises, as well as joint projects between two or more enterprises. All activities, within and between enterprises, are in line with the principles of broad participation and cooperation between the labour market bodies

(57) The employer and trade union bodies operate a joint development fund to support initiatives in their enterprises or networks of enterprises that aim to promote broad participation among employees.

(social partners). There was a common understanding among management and trade unions about the need to mobilise their members to participate in the network's activities.

The steering committee emphasised the importance of training certain personnel in the participating enterprises to become 'internal facilitators' who would play a key role in promoting projects within and between enterprises.

The main tasks of the 'internal facilitators', to be trained, were as follows: establish arenas where the employees could discuss issues relevant to their situations; train their fellow co-workers in development project methods; and facilitate development projects. Selected employees from all the participating enterprises attended the same formal training courses. The initial selection of employees, which was crucial, was jointly undertaken by management and unions. The aim was to select 'informal leaders' who had the capacity to promote development work.

As a part of the training programme, participants analysed the 'development project' described in Box 1 was undertaken.

Box 1. 'Development project'

One of the participating enterprises in the network was a zinc works. The operators in the foundry found that they had to constantly replace elements of the downspout in one of the foundry lines. They discovered this by comparing their line with another line in the foundry which needed to replace just a quarter of the elements. Based on this information the internal facilitators launched an improvement project to reduce replacement costs. Through providing the people concerned them with a methodology to identify problems and draw up proposals for remedial actions (based on a cost-benefit-analysis) they were able to eliminate the replacement problem and costs were reduced by more than the 50 %.

(58) An important actor in the field of regional development is 'Innovation Norway', a governmental agency with branches in the different counties in Norway. One of the most important new tasks recently assigned to the counties (second governmental level between the federal and the local authorities) was to manage the development of industry and commerce within the counties.

As a result of participating in the same programme, the ground was prepared for exchanging experiences between enterprises and for devising common development or innovation projects. Within the main network, a special sub-network was set up for the internal facilitators themselves. The main goal of this sub-network was to provide an arena where the internal facilitators could exchange experiences about their practice, engage in further training, and create and monitor joint projects.

The 'Internal facilitator programme' is outlined in Figure 2.

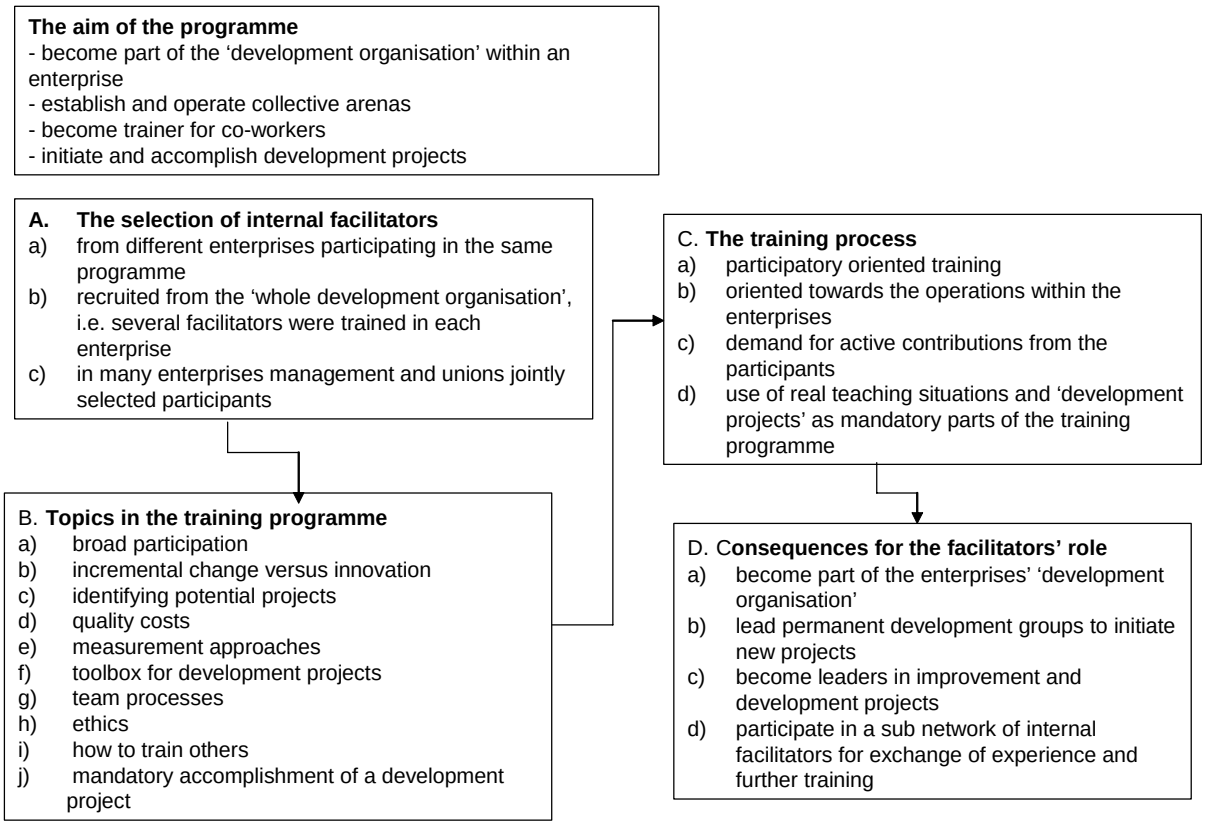

Figure 2: Training programme for "internal facilitators'

An example of a joint project was the development of a procedure to enable a zinc producer make use of the wastage (in the form of environmentally dangerous dust) created by the producer of titanium. This could be done provided a series of problems were solved. The facilitators not only assisted in helping to identify the actions to take place in each of the plants, but due to their common training and shared outlook, coordinated the cooperation process between the enterprises. Although this project and the other ones tackled in the network were not dramatic in that they representing breakthroughs of global significance, they were important to the enterprises concerned.

Most process industries operate with narrow margins, and the ability to come up with an innovation of the kind indicated above can mean the difference between profit and loss.

The concept of a 'development organisation' and role of research.

It is important to note that in training the development facilitators, the focus is not on technology nor on the problems technology may give rise to, but on development and learning. The point is to create learning spaces for themselves and their workplace colleagues. What sort of training did they undertake to equip them for this?

First, practical cases played a major role, an example of which was presented briefly above. The facilitators learnt how to enable workplace actors engage in a process where they can look at problems, explore possible causes and find ways to deal with them.

Second, the training drew attention to the significance of a 'development organisation'. While the notion of work organisation is well-known and has a long history, the concept of 'development organisation' is of more recent origin. The 'development organisation' concept draws attention to those aspects of an enterprise, including its external relationships, that are decisive in carrying out development and innovation, for instance, introducing work organisation changes. In fact, the difference between the two above mentioned concepts is mainly analytical; they both refer to the same reality but from different angles.

Third, within the notion of a 'development organisation', the relationships between internal and external resources is emphasised in order to make each enterprise aware of the advantages to be gained from using external resources such as other enterprises and research agencies. This is consistent with the trend towards building multi-actor clusters, networks and innovation systems in recent thinking about innovation (see Chapter 16 by Asheim and Chapter 15 by Cooke in this book).

Research played a key role in the whole process. But it was research that set out to make a contribution to practical processes within enterprises or across enterprise boundaries. This kind of research support that can be called 'action research', 'interactive research', development research', or research with 'hands-on' functions, played a central role in training the facilitators and setting up the network. In fact, a researcher designed the training programme for the development facilitators and functioned as a teaching supervisor. The selection and design of the learning cases in

the facilitator training programme was one of the key tasks performed by the research support personnel. Research also played an important role in providing advice about creating learning spaces within an organisation and in moderating interactions between enterprises and other external bodies. In the Hardanger network there are special networks for managers, union representatives, as well as for the development facilitators, which meant that research was involved in discussing a wide range of issues having an impact on the success or failure of the innovation activities.

Dilemmas and challenges in work place learning

The different approaches used in the two networks in Sunnhordland and Hordaland raise questions about the best way to diffuse development knowledge and skills within and between enterprises. Both networks used a development facilitator training programme as a starting point, which meant training one individual from each of the participating enterprises. However, in doing this, the networks used different strategies. In the Sunnhordland network, this individual was someone close to management who was to distribute knowledge in a top-down fashion. It is clear that for such top-down processes to be successful, there needs to dialogue to create a common understanding between management and employees.

While the facilitators in the Sunnhordland network worked top-down, those in the Hardanger network operated in a horizontal fashion. Thus, success in the Sunnhordland case was measured in terms of the ability of facilitators to make employees understand and support management policies. In contrast, in the Hardanger network success was measured in terms of the number of people the facilitators were able to involve in the development process.

The difference between the two approaches is outlined in Figure 3.

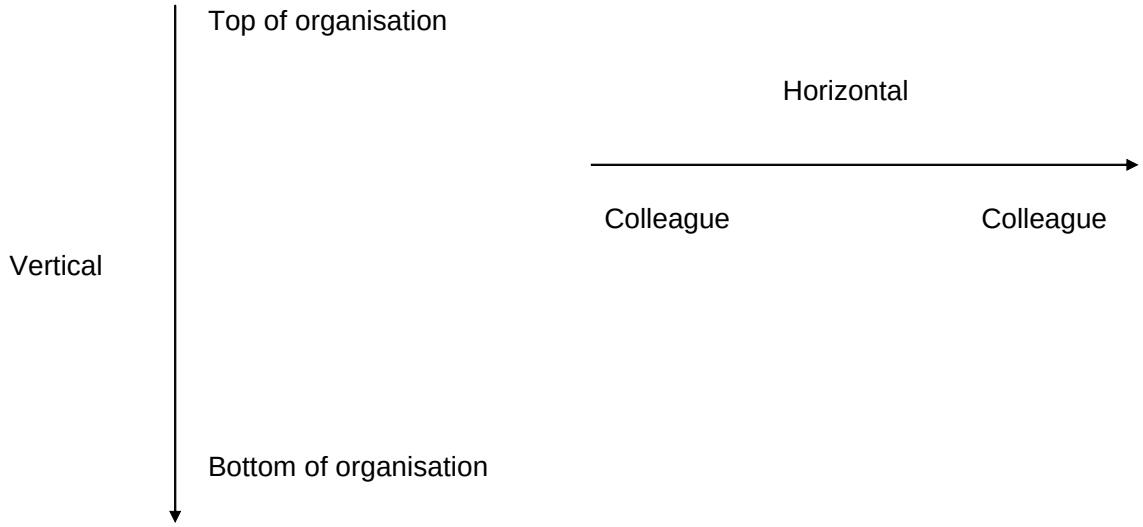

Figure 3: Two models of knowledge diffusion

While the previous Norwegian ED2000 programme focused on incremental improvement, in attempting to change direction towards more ambitious innovation objectives, the VC2010 programme ran into difficulties in not providing sufficient opportunities for employees to participate in innovation activities. The development facilitators' project tried to find a balance between these two objectives through launching improvement projects of limited scope, while also focusing on major innovation projects. The facilitator programme thus resulted in both large innovation projects and improvement projects involving as many employees as possible as a deliberate strategy (Cole, 2001).

Concluding remarks

Redirecting innovation from being an activity that involves a narrow range of actors towards one that mobilises a broad base within an enterprise, means confronting issues pertaining to participation, cooperation and communication within workplaces. In this way, organising innovation processes becomes interwoven with activities under such headings as 'participation' and 'learning organisation'. Thus, the question of 'how to organise for innovation' loses its clear-cut and specific nature and becomes entwined with a broad range of issues.

The cases discussed here indicate that there are real dilemmas to be faced, one being that the development of a strong 'innovation core' in each enterprise may be

counterproductive from the perspective of the limited active involvement of employees at all levels. Furthermore, such ‘innovation cores’ can easily collapse when the impulses that have led to their creation are weakened or disappear. In the long run it may be more advantageous to go for a broad base from the beginning and face up to the wide range of interlinked challenges. The advantage in this is that the basis for innovation becomes more stable. With the active involvement of all levels of the organisation, in principle there will not be any forces to undermine innovation efforts.

The diffusion of ‘development knowledge’ and skills by means of the facilitator programmes is, first and foremost, about developing facilitators who are skilled in promoting ‘collectives’ and relationships. The more successful the training, the better the development facilitators can organise learning within their organisations. In network settings like the two cases presented above, the development of collectives and relationships cannot stop at an enterprise’s boundary as they have traditionally done. A common development language and development methodology provide the foundations for establishing collectives and relationships that go far beyond the boundaries of an individual enterprise. The distribution of development knowledge and skills, through common network training programmes for personnel from different enterprises, may thus open new arenas for innovation, collectives and relationships.

In one of the networks, there was a noticeable change in the way that many enterprises looked at their operations. As a result of the training and networking between the enterprises, they are now exploring new opportunities together. New innovative projects involving several enterprises have been launched and successfully implemented. From a situation where each of them struggled with developing their enterprise individually, they are now doing so collectively through network collaboration.

While adding inter-enterprise networking to the challenges associated with the internal mobilisation of an individual enterprise might seem to create more problems, the cases presented here indicate another picture. Under certain circumstances, cooperation between enterprises can make the handling of challenges easier rather than more difficult. The main point in this context is that networking between enterprises is a process between equal partners: it is horizontal rather than top-down. When network experiences are fed back into processes going on within individual enterprises, horizontal links and ties are strengthened. When issues are transferred from an individual enterprise to a network arena, new questions appear.

Many innovation programmes are regulated by law and, in particular, by agreements, where it is assumed that 'the enterprise' is the actor and not the 'network'. To handle these problems the active involvement of the labour market bodies is crucial. In the Value Creation 2010 programme, the Norwegian Confederation of Business and Industry and the Confederation of Trade Unions are not only partners on the level of the programme board, they share responsibility for the operational side as well. However, there is also a need for active support from research to help construct viable regional partnerships that give potential for restructuring decision-making processes in working life (Tønnessen, 2001).

It follows in turn why regions are of growing importance as units of development and learning. To handle internal challenges, individual enterprises need to join forces and form networks. For such formations to emerge there is a need for a supportive infrastructure and the redesign of decision making processes. However, neither infrastructures nor new decision making processes can be developed overnight; nor can they be developed separately for each network of enterprises. A wider arena is needed where the main interest organisations can meet and launch processes that are, in some respects, political in that they imply a broader reframing of major issues concerning work and enterprise policies.

Acknowledgement

This chapter is based on experiences within the R&D programme 'Value Creation 2010' (VC 2010) in Norway. This programme is funded by the Research Council of Norway, 'Innovation Norway', the Norwegian Confederation of Business and Industry and the Confederation of Trade Unions. The main aim of the programme is to support enterprise development through partnerships and networks.

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7.4 Attachment IV

7.4.1 Paper 4: Norwegian blues, enabling structured improvisation

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Status:	Draft III delivered by Sept. 1 2006
Published:	Not published
Date of publishing:	
No of pages:	18

Norwegian blues, enabling structured improvisation

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Abstract

This paper asserts that for research to play a prevalent role in contemporary knowledge production calls for researchers able to construct and operate in the collaborative space, linking various organizations in joint work. Thus, the researchers need to be able to orchestrate networking processes as well as slip into certain processing roles. Contemporary knowledge production, whether it relates to technological innovation or to desirable social change, calls for adaptation of networking processes initiated as a response to the needs of the participating enterprises and processes that merge "the language of research" and the "language of practice". The role of research, we argue, becomes one of mediating these two worlds, and complying efficiently with this function requires researchers who act as multi-functional translators able to integrate

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various interests and perspectives across different organizational and institutional boundaries. This challenge is not structural, but is a question of orchestrating processes that link collaborative structures to organizational interests. Operating successfully in this immensely complex process landscape requires engaged researchers skilled in making compositions of independent notes.

Key words: networking processes, orchestration, processing roles,

Introduction

As organizations vertically disintegrate, processes of creating links to external organizations and institutions become increasingly important for handling complex development tasks. In the body of networking literature, numerous attempts to conceptualize network and networking mechanisms almost match the numbers of networks operating (for an overview, see e.g. Podolny & Page 1998, Grandori and Soda 1995, Ebers 1997, Oliver & Ebers 1998, Grabher, G. 1993, Grandori 1999). Whatever concept these contributions lean on, they all tend to conceal the fact that networking, in practice, is about immensely complex social processes of enabling different people with various interests and experience to discover common ground. How these processes of merging various social worlds take place in practice and how research can play a role in processing network-based innovation are issues rarely addressed by the networking literature.

To develop advanced knowledge about how to construct and support innovative network processes calls for researchers who possess knowledge about how to bring initiatives from ideas into networking processes ending in robust innovating projects. This includes knowledge of a set of instruments or enablers vital to such processes, and the ability to utilize them. Individually, these enablers are not able to support networking processes. Therefore, the researcher's ability to orchestrate enablers, arranging for networking processes to happen, is most important. This is, thus, about making research-based knowledge applicable in the field of practice. Such a perspective on the role of research relates closely to Lewin's (1946) field experiment, in which social changes occurred due to researchers' ability to make general theory about networking processes relevant in a practical context. Accordingly, the idea behind the contextual field experiment was to link theory and practice in relation to the situations

that occurred when researchers and practitioners jointly engaged in solving practical problems.

When researchers become involved in restructuring social practice in the inter-organizational terrain, there is a call for processes that integrate various stakeholders' perceptions and interests into a joint actionable platform. Understanding processes that make networks effective in relation to practical change as well as how these structures contribute to contemporary knowledge production calls for researchers who possess the capacity to bridge discourses and link people to each other through the creation of shared meanings (Gustavsen 1992). However, these processes of restructuring and integrating discourses cannot take place unless a link to the practices and everyday language of people is created (Gustavsen 1992).

This interactive approach to knowledge production and change calls for extensive processes of developing knowledge about enablers and the orchestration of networking processes, as well as the ability to translate various perspectives and interests, in ways that allow new social practice to occur. With this background, our intention is to explore how these processes take place, and to conceptualize the new role of research in network innovation processes.

The Role of the Researcher in Network Innovation Processes

Although few attempts have been made to elaborate on the role of research in network innovation processes, some efforts have been made to conceptualize general roles important for networks to function as knowledge producers. Schøn (1971) acknowledged networks as learning systems, and argued for significant networking roles such as: 'the *Broker'*, '*the Facilitator*', and 'the *Network manager'* (Schøn 1971).

The *broker* role implies linking various actors to a common development framework. In this bridging process, the broker identifies needs and channels information to other supportive actors located outside the configuration. The *broker* is regarded as a central node in the configuration, because he/she is assumed to provide reliable access to external resources, information, and knowledge about relevant actors. By translating the needs of a local network into the strategy of actors located in the external environment, the *broker* operates as a translator. This implies that the broker regulates the interplay between a local network and actors in external global networks (Callon 1986). Cutting across various organizational and institutional contexts, the *broker* is considered to be

the one who bridges actors into a joint domain. The latter signifies that performing the broker role presupposes sufficient legitimacy to carry through these processes, and requires shared values with the network and personal skills to establish and maintain development relations (Schøn 1971).

The role of the *facilitator* is process-oriented. The facilitator role signifies interpretation and integration of the various participating actors' experiences in ways that enable sustainable networking processes. Although this role inhibits elements which are important for processing networks, it is inward-oriented, and is, therefore, insufficient for promoting network-based innovation, which conversely requires extensive processes of enrolling external actors in the configuration by means of translation (Callon 1986).

As outlined by Schøn, the *network manager* keeps track of the threads, and therefore, he/she secures the continuity of the networking activities. Schøn (1971) defines the *network manager* as someone who: 'oversees official networks activities and elements, assuring the flow of information, the processes of referral, tracking and follow-up, and the provision of resources required to the network to operate'(p. 199). In other words, the network manager monitors the networking activities, which makes him/her a social node in the networking structure.

Although we recognize that all of the roles outlined by Schøn are significant for understanding the varieties of roles important for the networking processes, we will claim that activating sustainable processes in networks and processing network innovations requires researchers able to *orchestrate* a set of enablers that support networking processes. Such enablers may be perceived as very different, but include: the organization and operation of network meeting places or network arenas, the construction and operation of training programs, the introduction of a joint development language, the utilization of leadership in "industrial locomotives", network management, and lastly, the utilization of certain processing roles. How such enablers are activated is dependent on the context. Thus, they may appear as predominantly context-dependent. However, the importance of having a set of enablers to orchestrate is crucial. How the orchestration of these enablers is performed is, however, dependent on the local context. It is important for the researchers not only to enter into processing roles, but also to focus on the overall input of instruments to handle the total networking processes. To slip into such a position, focusing on the network's strategic developments and sustainable networking processes, the researchers must have earned

the enterprises' confidence. This often develops through joint project execution, where the researcher contributes to the accomplishment of the project.

To earn confidence, the researchers operating in networks are dependent on being able to enter into different processing roles. Being able to combine facilitator and broker roles seems to be most important. Therefore, it is necessary to explore these two roles in a practical context, and on that background, address how researchers become significant in network innovation processes. We will explore the content of these roles by comparing the practice of two researchers operating two different industrial networks in Norway. The case stories below will display episodes, tasks, and roles that the researchers undertake. These have, over time, proved essential for developing networks with innovative capacities. Both cases exemplify how researchers, by orchestration and integration of various perceptions and interests, have proved essential for achievements that otherwise would have been more difficult to obtain.

Background of Research

The empirical cases presented in this paper are collected from the Norwegian research program 'Value Creation 2010' (VC2010). The program's main focus is enterprise development, emphasizing: improvement and innovation, network collaboration, networking, and development coalitions (Claussen 2001, Ennals & Gustavsen 1999). The program is divided into several principal projects covering certain geographical areas. The cases elaborated below are collected from two different principal projects located in Eastern and Western Norway.

Hardanger is a small region located around the Hardanger fjord in Western Norway. Smelters and their suppliers, located in one-industry towns, dominate the industry in this region.

Horten is a municipality on the coast, and is 100 kilometers South West of Oslo. In this region, we find some of the world's leading electronics enterprises. Since the mid-eighties, the electronics industry expanded and evolved into a cluster which today is composed of approximately 50 SME's within ICT and micro electronics.

The Hardanger case: Are border spanning innovative projects in industrial networks a possible market expansion or a distant dream?

Firstly, we will present a product innovation project. It is about developing a new process in the foundry of a zinc smelter located in the region, including the development of a new fully automated foundry station accommodated for zinc works. The existing process was inefficient and contained several HES and quality challenges. However, the project is also about innovative, participatory working methods within networks.

The ground work

The researcher had been the hub of the regional network construction process, and had prepared for the appearance of different network arenas and the operation of these arenas. Establishing dialogues between representatives of the enterprises was the main aim of these arenas. However, to start dialogues about development and innovation, someone had to challenge the established relations and the way the enterprises operate. The researcher orchestrated what occurred within the different network arenas, and was vital in initiating dialogues that could bridge relevant discourses.

The different actors in the network had different interpretations of the situation at hand at the time of the construction of the network. The suppliers were unanimous in the network meetings regarding the issue that "the ongoing expansion project at the zinc smelter had excluded the local suppliers from obtaining sub-contracts due to them not being able to compete with sub-contractors from low-cost countries." The response of the customers[60] was that "we have to use the most inexpensive sub-contractors to make us competitive in the world market." In this situation, the researcher had to address for the smelters "what could possibly be the new role of the local suppliers." The smelters' response to this challenge was that "we would like to see local suppliers taking substantial responsibility for introducing new efficient technology that challenge the smelters' operations." To encourage development in such a direction was of vital importance for the network and the participating enterprises. Thus, addressing for the suppliers the message that their customers had a set of new expectations of them was encouraged by the researcher. He ensured the communication of this message to the

60 The local smelters are, in the following, called customer(s).

suppliers at different network arenas. Different types of personnel attended the different arenas, meaning that not only the suppliers' managers got this message, but it was also spread throughout the suppliers' organizations.

Launching an innovation project

The project of developing a new fully automatic foundry station came about when one of the suppliers acted on a request from the customers. When given a routine maintenance task in the customer's foundry, personnel from one of the suppliers detected a potential new technological solution. The supplier developed a proposal and presented it to the customer. Although the project represented a risk for the customer due to the suppliers' lack of experience with major innovation projects, the customer responded positively to the supplier's initiative.

Even if the supplier had received positive and encouraging feedback from the customer, further clarification was needed. It was necessary to find approaches and funding mechanisms that made the project so attractive that the customer wanted to participate. In this phase of the project, the researcher worked closely with the initiating supplier's management to generate approaches and suggestions.

Immediately after initiating the project, the initiating supplier met some serious challenges. Firstly, this was a border-spanning project, involving not only the supplier's organization, but also several others. How to establish such a project became an obvious challenge. Secondly, to accomplish such a project is very costly, and how could such a project be funded? What possible contribution could the researcher give to such a project?

Membership in the network enabled the initiating supplier to take advantage of the network structure established. By utilizing the resources in the network, the local network coordinator and the researcher, it was possible to mobilize enterprises other than the initiating one, and to establish a project team consisting of personnel from four participating enterprises and the researcher. Even though proximity was present, and these enterprises had made business with each other for years, this project was different from what had previously been present. To accomplish such a project, they had to act as development partners rather than as parties to a contract, displaying for each other their internal processes and procedures, agreeing upon risk distribution, and so on.

Processes of translating interest and bridging discourses

The participating enterprises established a project with a project manager, a project leader, a steering committee, internal project teams in each of the participating enterprises, and a joint project team, which the researcher joined. The members of the latter team knew each other, but they had not previously cooperated as a development team. It was important for the project team to quickly come to an understanding about the content of the project: the distribution of responsibility, risk sharing, sharing of economic responsibility, and so on. Thus, to bridge the different interests and write a project description containing a text reflecting a joint understanding was important.

The position of the supplier was that: “We will have to get the customer to take as much of the risk as possible. That is fair, due to their considerable economic strength as part of a large international consortium. They should be able to put risk capital into this project since they themselves may make profit on the foundry station later on.” The supplier added: “The customer could guarantee for the first delivery where most of the development costs are included.” On the other side of the negotiating table, the customer responded with: “The foundry station will have to meet our technical demands and be competitive in the international market.” Additionally, they added: “We cannot subsidize this development project openly, due to the fact that our enterprise is part of a consortium operating in a number of local communities.” By introducing the possibility of partial governmental funding to the project, the researcher carved out a way to bridge the different discourses and find common ground.

In the process of reaching a common understanding, the researcher acted as a kind of bridging moderator. The different actors perceived the researcher as neutral, without any economic interest in the project, acting to launch the project to the benefit of all of the partners of the project. Therefore, the researcher was able to neutrally introduce an interpretation of the different actors’ positions, and relate these positions to the demands from the governmental agency regarding partial funding as well as other parts of the package. In this way, the researcher was able to start processing the application, writing down a joint project description or compromised agreement.

This project involved a customer, which was part of a large consortium, a rather large enterprise itself with around 360 employees, and three rather small suppliers. The suppliers would like to see that the largest actor took the largest risks and largest share of the necessary funding. From the customer’s point of view, this was not obvious. The

researcher's task, as a mediator, was to interpret the positions and signals from the different actors, and contribute in order to find acceptable and operational solutions. The researcher wrote, in co-partnership with the suppliers' project manager, the project description based on the decisions taken by the participating enterprises. The researcher also brought in the governmental funding agency (Innovation Norway – IN), established a dialogue with them, and explored, together with the agency, opportunities for funding. The governmental funding of the project was an important contribution for finding common ground.

Why did the project partners accept the researcher as a partner in the first place? This was probably due to the researcher's role in the network, providing the enterprises with useful tools, methods, and legitimacy for change and development. The researcher was looked upon as a "neutral outsider", able to balance the different interests. The researcher's presence was important in the early phases of the project, to get the foundation in place and the project in motion.

Using the project to establish sustainable networking processes

The network arenas were important as points of departure for joint innovation projects, and these arenas were partly operated by the researcher. To get the networking going, there was a need for feeding experiences from individual projects back to these collective arenas. This foundry station project is a major innovation project in this network. The way the project came about, the wide employee participation with the customer and the suppliers, how the project is organized and funded, the market possibilities, and so on, are all features that are very important to share with the rest of the membership enterprises. The manager of the initiating supplier presented the project several times, internally in the local network, at different network arenas, and for external visitors, emphasizing: "the existence of the network structure, network resources, joint network methods and the desire from the participating enterprises, as key elements behind the launching of the project." By ensuring that these experiences were played back to all of the membership enterprises at the different network arenas, the researcher could enable the participants to close the learning cycle. The experiences from this project can, thus, be a point of departure for reflection and searching for innovation projects.

The Horten Case: the process of translating various perspectives into a common actionable ground

In 2001, the VC2010 project in Vestfold initiated a process of constructing a manufacturing network composed of eight of the dominant electronics firms. Interfirm collaboration was, among the practitioners, considered important to improve operational performance. During the process, the actors launched an initiative directed at the creation of an e-Learning portal tailored for the needs of the electronics industry. The process of accomplishing this project illustrates how the *engaged researcher* contributed to convert an idea into a fact by means of translating new actors into the networking configuration.

E-learning: creating a link to the suppliers' strategy

Partly as a consequence of addressing team-based organizations, several of the SME's, in collaboration with the researcher, launched organizational change processes directed at the development of self-regulating working groups. Increased autonomy had contributed to new calls for more flexible, but also less expensive, training and certification routines. Due to the SME's lack of staff arrangement, e-learning was regarded as a possible solution for simultaneous reduction of costs, boosting processes of in-house training, and speeding ongoing change processes. The researcher was asked to follow up this idea and to develop a plan for accomplishing an e-learning portal relevant for the firms' business strategies.

The researcher established a contact at Atlantia, an e-Learning enterprise with a strategy to become the main supplier of e-learning solutions for the electronics industry. During the first meeting, the researcher argued that participation in the project would provide an exceptional opportunity for Atlantia to display their services for the electronics industry as a whole, and hence, it would provide a significant occasion for realizing their business ambitions. It was also argued that participation would enable a link to a strategic partner, the University College of Vestfold. Atlantia considered these arguments of interest, and it was agreed that 50% of the development costs should be taken from Atlantia's budget, while the surplus amount should be provided by external funding institutions. At the following network meeting, Atlantia's CEO discussed e-learning as a way to speed in-house training processes. The practitioners approved a suggestion to set up an e-learning project, and the researcher was asked to organize a

process to guarantee that the content of the portal complied with the firms' interests. However, this did not turn out to be a straight-forward task.

Focusing the development task: Translation and the problem of dialogues without a center

To find a funding institution, the researcher contacted the University College, and was allowed to participate in an innovation project with the aim to develop an innovative infrastructure between industry and research. The Norwegian Research Council funded the project. University College looked for potential innovative projects, and the researcher looked for funding. By supporting the University College in forming the application, it was possible to establish money for launching the e-learning project. The researcher called for a network meeting to inform members about the progress.

Although the project plan had been distributed beforehand, it was unexpectedly difficult to enroll the firms into the project. In addition to the network participants, two persons from Atlantia and the secretariat leader from the member organization, Electronic Coast (EC), attended the meeting. The practitioners had previously agreed to make the project relevant for the electronics industry, and hence, the representative from EC was invited. The researcher started the meeting by presenting the project, but was soon interrupted.

A, who previously had been one of the key supporters for the project, raised his hand, claiming that the process was running too fast, and that the firms' obligations had not been sufficiently cleared beforehand. **B** followed up, maintaining that he felt somewhat provoked because the application, which the researcher had prepared, presupposed that the firms engage in the project without clarifying the amount of work. **C** rose his hand, claiming: *"It looks like Atlantia gets the money while the firms get the work."* The CEO of Atlantia quickly responded: *"We are willing to put many unpaid hours into the project"* and that their participation mirrored an honest interest in becoming a long-term supportive actor for the industry. The representative from EC claimed the project plan was too vague*: "It is quite unclear who the project owner is and moreover, the amount of work expected performed by the firms is not mentioned. Your initiative is good, but the project formalities are not sufficiently clear, and I understand the firms' reluctance to support you on this issue."* The atmosphere was tense, the project was at risk, and the researcher was forced to apologize for the non-participatory approach in forming the application. The research then turned to the practitioners, stating *"Based on our former discussions addressing operational performance and your own experience with the*

problem of improving the production workers knowledge, I would like to hear your assessment of this project's potential to solve some of these practical challenges." This question forced the practitioners to individually take a stance. The following round resulted in statements such as: *"I think this project is a good idea, both as a means for developing our network and perhaps we can provide all our employees with courses, in contrast to the contemporary situations where only a few operators, and then the most eager workers get access to such privileges."* The next claimed: *"This project is, of course, in our interest, but we need to be consulted more in beforehand."* Such statements, as they moved around the table, constructed a link to the participants' practical needs and, hence, the former discussion focusing on the imprecise application was transformed into a debate judging the portal's valuable potential and the practitioners' eagerness to launch the project. By displaying the practitioners in need, this generated a new *situational awareness* that changed the *language game* (Wittgenstein 1958), addressing the application's lack of formalities into a discourse inquiring the project's potential benefits. This situation clearly demonstrates how a single question, by constructing a link to the participants' 'life worlds' (Wittgenstein 1958), generated a *moment of recognition* (Shotter 1998) that brought the debate into a different and more productive track, which made new statements about the need for the project, and how to approach it in practice, appear. The atmosphere became more relaxed, and when the meeting ended, some of the participants, in a friendly voice, clarified their initial scepticism with the CEO from Atlantia.

The second round: Merging various interests and the role of practice

Although we had reached an agreement on developing an e-Learning portal, some looked at the researcher, stating that the premises for launching this project were still too unclear, and that it was hard to accept the project's financial model. We agreed to set up another meeting for the purpose of clarifying these issues.

During the next meeting, a comparable discussion arose, related to the price the participants were supposed to pay for using the portal. Atlantia's plan was to earn money by selling licences to the firms, while the firms, on the other hand, were eager to get licences either for free or for a reduced price due to their participation in the project. A: "*I think that we should get licenses for free since we enable you* (pointing at the CEO from Atlantia) *to get access to our group and to the market of electronics firms*." CEO: "*I understand what you are saying but I need to take into account that I am building an*

enterprise and I need income to secure the working places." These two quotations mirror a prolonged discourse featured by 'status quo'. To avoid a rejection of the whole project, the researcher suggested postponing some of the incendiary questions to the next network meeting. *"I understand Atlantia's consideration, and I also agree with you that to participate in the project should be beneficial. However, I do not think that the CEO is able to give you a price here and now, and continuing this debate does not bring us anywhere. We should rather use this meeting to agree on the portal content-wise."* As this episode illustrates, the researcher's role involved translating different viewpoints and agendas by focusing the practical tasks and avoiding debates which detach the actors in superficial word games. To ensure that the portal complied with specifications relevant to the firms, tasks were delegated to different working groups composed of participants. After the meeting, the researcher, on behalf of the practitioners, negotiated an acceptable deal with Atlantia, which guaranteed the firms a reduced price.

Continuous translation and the institutionalization of the e-learning portal

Displaying the relevance of the portal in the business environment enabled the enrollment (Callon 1986) of novel actors, and a subsequent expansion of the project. To reduce cost, and also to develop the education at the university college, the researcher decided to enroll students into the project. The idea was to appoint students, studying the combination of multimedia and micro-system technology, to develop a new program addressing clean room behavior. Consequently, the researcher contacted the Dean of the Department of Science and Engineering, and argued that the development of e-learning programs was relevant for the education of engineers. The researcher requested that the Dean provide written material for the project, support a course in multimedia, and make available a supervisor responsible for the participating students. If the department was willing to support the project, the researcher assured free access to licenses. In addition, the researcher promised to create a version for English-speaking students. The Department of Science and Engineering agreed on these conditions and became a project partner.

Due to several initiatives and parallel activities developing various web solutions for the electronics industry, it became vital to coordinate the various ongoing activities. It was necessary to make the initiative visible in a broader industrial context and, hence, the researcher initiated a meeting between various actors aimed at developing a joint web

umbrella which would contribute to institutionalizing the e-learning portal among the electronics industry.

The role of the engaged researcher in processing dynamic networks

Networks, as a means for integrating research-based knowledge and innovation, require researchers skilled in occupying numerous different and partly interlinked roles (Schøn 1971). However, the cases demonstrate the need for further conceptualization of potential roles in making networks efficient knowledge producers, and specifically, "What makes researchers particularly competent/skilled to perform these roles?"

First, when comparing the two cases, a core issue relates to the researcher's ability to orchestrate networking processes. This is about linking the development needs of the enterprises and designing and constructing networking processes that respond to these needs. At the same time, the researcher's ability to facilitate and renew networks' dialogues by creating links to the enterprises' discourses is necessary. To relate enterprises' changing needs to networks as a supportive development structure has been possible in both cases, due to the researchers' participation and engagement in several enterprise development projects. Consequently, the researcher's ability and legitimacy to intervene or facilitate networking processes has been a consequence of substantial knowledge gained by actively processing projects in the network's sub-domain. In accomplishing these activities, an important function is related to the researcher's ability to enroll relevant actors and resources located outside of the collaborative platform, or in what Callon (1986) has termed a 'global network'.

Renewing inter-organizational discourses and expanding networking activities by means of enrollment calls for researchers skilled in translating various perspectives and interests into a joint actionable framework, and with a capacity to utilize resources, tools, and knowledge at hand in a well-orchestrated interplay. In the function of bridging and integrating various actors' perceptions and interests, and orchestrating network processes and projects, we find the new role of research that simultaneously contributes to desirable change and complies with requirements from social science.

Orchestrating networking processes

Successful orchestration of network innovation processes requires that a link is constructed to the participants' development needs. To create sustainable networking

processes calls for, we will argue, strategic orchestration with the purpose of creating a joint actionable framework. Efficient networking processes depend on such a framework negotiated among the participants, and the presence of a set of interacting tools, methods, structures, human resources, research-based knowledge and locally shared knowledge, and the enablers. However, neither the framework nor the enablers are static. They are changing due to external influence and internal knowledge generating processes, which require a reflexive space promoting experience-based learning. Thus, such a context is not pre-fixed, but is rather something made possible by continuous processes of negotiation and by means of participants' involvement in expansive experience-based learning cycles. As the Hardanger case displays, the initiation of the foundry station projects was not accidental, but was part of a thoroughly considered networking process. The construction of several network arenas enabled the large enterprises to send out their call for a new proactive supplier to a number of different actors within the supplier's organization. Simultaneously, a training program was launched for internal facilitators, managers, and union representatives, introducing common development concepts and methodology. We find the same pattern in the Horten case where discourses addressing team-based organization led to the expanding e-learning project. The utilization of a single enabler would in neither of the cases have caused the projects to occur. The strength of the development projects is found in the length of the networking associations (Latour 1987) and the quality of the process of interconnecting these various networking associations.

Broker as facilitator in the construction process

Productive processes call for time and space for reflections over established practices and achievements. Like playing billiards, one seldom knows in advance what other billiard balls, in addition to the target ball, will be affected by the shot. In the Hardanger case, it was impossible to foresee the effect on the suppliers of sending out the message in the network of the need for suppliers taking a newly expanded role. Similarly, it was hard to foresee that organizational change processes among the SMEs in Horten would end up focusing e-learning. The consequences of actions taken by a network are, therefore, impossible to know in advance. Accordingly, a prevalent research function, in both cases, has been to orchestrate reflexive processes, making new ideas occur as an outcome of succeeding cycles like movements, where experience from an action taken has generated new development tasks and cyclical processes (e.g. Heron 1996). In both

cases, these reflective processes enabled the participants to detect new possibilities, revitalize discourses, and bring new lines of action within reach.

Expanding patterns of dialogues and activities have, in both cases, occurred as an outcome of the researchers' abilities to discover and construct links to a manifold number of perspectives, activities, and resources. In the Hardanger case, the suppliers were forced to reconsider their roles, from adaptation to customer demands, to take a leading role in the relationship. In the Horten case, the researcher, by preparing for dialogues about team-based organization, led to the formation of an e-learning portal. In other words, operating innovative networks requires interpersonal skills enabling the participants to generate new patterns of dialogue. Streamlining the discussions or reducing access to perspectives will limit networks' abilities to address a broader set of developing tasks. Limited access to diverse sources of experience and recourse will constitute a hindrance to innovation, and will restrict opportunities for local knowledge production.

A means for developing networks which revitalize capacity, and hence avoid relations becoming introverted, has been, in these cases, to expand the discourses by continuously constructing links to actors in the global network. We have seen that topics of practical relevance are seldom known in advance, but emerge over time as a consequence of interconnecting the various perspectives existing in the local, as well as global, network (Callon 1986). Therefore, a crucial issue in both cases has been to enhance the networking processes by means of instigating inquiries linking various actors in joint development tasks.

However, the processes of revitalizing the networks by bridging new actors, activities, or resources has not been accomplished without tension or conflict between different interests, economic motives, and expertise among the different stakeholders. The foundry station project in Hardanger was a result of a self re-evaluation process of one of the suppliers in this network. This re-evaluation process made the enterprise utilize its collaborative links to recruit partnership enterprises with complementary knowledge and skills into the innovation project. The enterprises had not participated in such a project or collaborated with other enterprises this closely before. In the EC case, the e-learning portal generated conflict between, the firms demanding free access and the supplier in need of money. In both cases, the researchers took a role in orchestrating

processes that enabled translation and, hence, the negotiation of new actors into the configuration. The latter accentuates the importance of brokerage.

The researcher acting as a broker

The cases demonstrate that a network's capacity to expand and transform an idea into a fact seems to be a consequence of how the flow of resources and knowledge is directed (Latour 1987). In the Electronic Cost case, the researcher appeared as a broker (Schön 1971), playing a prominent role in enrolling novel actors into the networking configuration. The success of the project depends on close relations with enterprises and organizations outside of the network. Firstly, making an e-learning portal requires specialist knowledge design and operation of such a web site and secondly, it requires funding. In this specific project, the action researcher searched outside of the network to obtain relevant partners for performing the project. The researcher utilized his skills and knowledge by negotiating necessary skills and funding into to the project. In this case, the process of enrollment is not an incident that happens once, but is a continuously expanding process. The establishment and the number of development associations (Latour 1987) enabled the accomplishment of the project.

In the other case, the project's need for risk capital made partial governmental funding a tool to explore common ground. The specifications connected to the funding program became a point of departure for establishing a joint understanding among the networking participants.

An essential part of the researcher's role has been, in both cases, to improve the innovative ability of the networks by channelling flows of resources and knowledge between the networks and actors in the wider business environment. To accomplish the innovation projects, it has been crucial for both of the networks to bridge a diverse numbers of actors, resources, and various development tasks. These bridging processes, negotiating recourses and actors into local projects, have been accomplished by researchers occupying a passage point (Law & Callon 1992:42). By occupying this central node, the researcher constituted a common point of reference that made it possible to coordinate various actors in joint action, in both cases. The networks' cases converged with notions of a 'bridging organization' (Brown 1991), with an inbuilt capacity to integrate various actors, resources, and activities into a joint framework.

Occupying a passage point does not, however, signify a centralized networking process. On the contrary, by occupying this position, it was possible for the researcher to extensively delegate tasks and distribute power within the configuration. If we, for example, focus on the Hardanger case, it is reasonable to claim that when task complexity increased, an extensive delegation of roles and processes of participation in the planning and decision-making processes resulted. It was impossible to operate the network activities from the center. If a network's achievements are a consequence of the participants' social obligations, it is reasonable to claim that it calls for extensive involvement of the participants in the decision-making processes. In the Hardanger case, the researcher has played a prominent role in setting up arenas involving the participants into the processes. On the contrary, the example from the Electronic Coast evidently illustrates how the process got off track when the participants experienced themselves as excluded from the process.

Performing the broker role has enabled researchers to translate convergent and coordinated meanings of projects to new actors. In addition, by acting as a passage point, the researchers could find a position from where it was possible to negotiate and expand the local network autonomy in relation to actors in the global network. The latter means that the researchers, in both cases, have negotiated the use of money and the design of the various projects integrating the interests of various stakeholders. In other words, to support network innovation processes, we assume that it is crucial for researchers to get a legitimate position from which to orchestrate processes of bridging actors, resources, and activities.

The new production of knowledge

The cases clearly demonstrate how networking processes create space for distributed knowledge production (Nowotny, Scott & Gibbons 2001). For the researchers to utilize this space calls for extensive processes of translating various perspectives and interests into a joint actionable framework. It is reasonable to claim that how these processes are orchestrated will determine the quality of the outcome - the new knowledge. Although the networking participants' perspectives and practices differ, the core issue in these cases has been to develop a maneuverable space enabling the construction of applicable knowledge that will enable the expansion of the networking activities.

The cases show that theoretical concepts cannot be applied in a mechanical fashion, but must be reformulated and adapted according to the situation at hand. This calls for researchers not only able to translate between the language of practice and the language of research, but also able to translate and integrate various languages of practice. Such processes of displaying and integrating various perspectives into a comprehensible framework calls for researchers with substantial knowledge about the problem at hand and who possess interpersonal skills that enable participation in manifold numbers of discourses. However, these interconnecting discourses are not evolving as nature. In one way or another, they have to be orchestrated, and are subject to facilitation that creates a link between various actors and their development needs.

Concluding remarks of the role of the engaged researchers

Researchers collaborating with enterprises in networks may play a considerable role in generating desirable social change and making significant contributions to social science. However, the outcome of such collaboration, as we have argued, is dependent on the researcher's ability to orchestrate networking processes and enter specific and situationally conditioned roles as part of the social interplay taking place in a networking setting. To get into a position from which to solve real life problems, the engaged researcher, in one way or another, must merge the language of practice and the language of research. Thus, our point of departure for generating research-based knowledge has not been to inform practitioners about the best theory available, but on the contrary, to construct situations that enable relevant stakeholders to meet and purposely share experiences and to develop applicable concepts for handling practical problems. The point is that neither the practitioners nor the researchers know in advance how to solve a practical problem. Their complementary perspectives, however, make it possible to develop new patterns of communication that enable new practices or solutions to occur. The most prominent role of the researcher in a networking setting is to make situations enabling various perspectives and resources to become translated and utilized in relation to concrete development tasks. Achieving such a position is only possible if the researcher possesses interpersonal skills that enable the development of trustful relations with the individual actors in the field. Pure engagement is hardly sufficient to establish such relations, it also requires personal skills that make it possible to access and connect the various perceptions regulating individual actors' movements in the inter-organizational terrain.

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7.5 Attachment V

7.5.1 Paper 5: Nordic benchmarking of regional development

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Status:	Draft II
Published:	Part of an anthology edited by Richard Ennals, Bjørn Gustavsen and Øyvind Pålshaugen; 'Innovation in open landscape'
Data of publishing:	Summer 2007
No of pages:	34

Nordic benchmarking of regional development

12/06/2006

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Introduction

All countries and regions are, in one way or another, trying to organize themselves in order to create economic growth. This can be done in many different ways, but collaboration between industry, politics, and R&D has been seen as a prerequisite for innovations and economic growth in the new economy. However, such collaborative processes vary due to historical, political, and cultural conditions. Recognition of these conditions has an important impact on the role of research in the region, and also more specifically on collaboration between industry and R&D. To make these conditions' impact on the interplay in regional development processes visible will be of major interest. Comparison of collaborative processes in different regions in different countries will, most often, accentuate regional features and are an efficient approach to

revealing the differences between the regions. In addition, such an approach can be the starting point for learning processes between regions.

This was the origin of the Nordic joint benchmarking project "Benchmarking of innovation processes in the Nordic countries". The aim of the project is: (a) to study and analyze different ways of organizing and managing regional development and innovation processes, and (b) to compare the results in order for the networking actors to reflect and learn from each others' experiences and approaches. Benchmarking is, in this context, seen as a suitable form to compare different networks in different countries and regions, and the role of different actors in these systems. To establish learning processes between various actors of the field of regional development, on the other hand, call for more than benchmarking. Using identified differences from benchmarking between several regions was supposed to be the point of departure for constructing learning processes within the individual region.

The aim of this article is to describe the benchmarking process with a specific focus on the role of R&D in regional development and innovation processes.

Concepts

Within the new growth-oriented innovation approaches, a variety of new concepts and terms have been developed. Some are used by politicians and authorities by, in what German is called *Leitbilder,* or guiding visions, in order to guide organizations and individuals when implementing political programs and goals (reference). Others are concepts developed in the academic discourse where they, depending on the different theoretical frames, are used as more or less precise concepts in order to describe, analyze, and explain such phenomenon (Etzkowitz and Leydesdorff 2000).

Indicated earlier is the outspoken policy promoted by most politicians on national and regional levels to support and promote a growth-oriented policy based on innovations. To prepare for innovation is, thus, a cardinal activity for the regional development authorities. Innovation policies based on common national approaches have turned out to be less efficient. Concepts based on regional characteristics have been regarded as the most efficient and targeted (Brulin 2002). Thus, examining what kinds of innovative approaches are selected in a region and how these approaches are utilized will be of major interest. Understand the interplay between the different actors in the field will be the core issue to study.

The central concept used in the comparison of our four regions is innovation. How innovative activities are organized, managed, and transformed into sustainable patterns are central. However, innovations can be of different kinds, such as radical innovations, new combinations of existing knowledge, products, processes, and so on. We make no clear distinction between smaller developments, incremental change or improvement, and more considerable developments and innovations, in contrast to Schumpeter. He argues that he only will regard the latter as innovation developments (Schumpeter 1911/1934). Schumpeter uses the concept of development rather than the concept of innovation. Developments can, according to Schumpeter, be classified into five different types: (a) new products, (b) new methods of production, (c) new sources of supply, (d) the exploitation of new markets, and (e) new ways to organize business (Schumpeter 1911/1934). We would like to add, to broaden the understanding of the latter type, new ways to organize business. Innovations can also include organizational innovations, which can be understood as new organizational means oriented toward improving the effectiveness of organizations (Schienstock 2004) As the literature on organization indicates, organizations and companies deal with a number of issues, such as: making effective use of available resources, improving innovative adaptability, balancing vested interests of stakeholders, and fulfilling societal demands. Enterprises have generally struggled with these issues on their own. Going beyond the border of the enterprise to solve such internal issues has not been common, but this is due to change.

Innovation processes are often seen in a *systemic* perspective instead of the long-promoted linear perspective. As Kline and Rosenberg pointed out, few innovations stem from scientific breakthroughs, but firms normally innovate because they believe there is a commercial need for it. The linear model ignores the many feedback loops that occur on the different stages of the process (Kline and Rosenberg 1986). A more realistic model for innovations – product, process, and organizational innovations – is, therefore, the model of an innovation system. Such a system consists of various collective or individual actors and their relations. Participating actors and their importance will differ depending on the type of the innovation and the stage of the process.

In Sweden, we find a variety of concepts, where some are typical guiding visions with the aim of promoting a specific development. VINNOVA (Agency for Innovation System) and NUTEK (The Swedish Business Development Agency) are using the concept of *triple helix,* which is collaboration between three otherwise differentiated spheres: business, academia, and state (Leydesdorff and Etzkowitz 1998). The concept

should be used as a typical guiding vision, but is used by VINNOVA as a normative concept in a top-down manner. NUTEK, the other agency in this field, uses *cluster* as the main concept and promotes different cluster attempts.

Both agencies are part of national programs, similar to the Norwegian attempts in *Value Creation 2010 (VC2010)* and other programs. The main idea in using concepts such as triple helix and clusters is not only to spread financial and other resources to individual projects, but also to support collaboration between many actors in a region. In terms of creating a sustainable structure, one could also talk about *co-evolution* of a structure. Such collaboration is organized not only on the level of *individual companies, other organizations, or networks* in a region, but also on a more general level. The ensemble of such attempts can be labeled as a *Development Coalition* (Ennals and Gustavsen 1998). Such a development organization consists of a variety of actors and their interrelated relations, but also includes a variety of specific measures like meetings and arenas for open dialogue, the creation of new ideas or programs, and the development of new innovative initiatives.

The concept "development coalition" is a bottom-up, horizontally-based cooperation between different actors in a local or regional setting, such as unions and management within firms or in a network of firms or their organizations at a local or regional level, but also generally the mobilization of resources in a broader societal context. The issue at stake for the coalitions is to initiate learning-based processes of innovation, change, and improvement (Asheim 2001). In such development organizations, it is possible to make a distinction between *strategic* and *operative* levels in their work. The first is the coalition’s main concern since all of the actors that may influence the funding priorities made in a community or region are present. The latter is equally important for the coalitions, but the operative program or project management is often transferred to a network of enterprises or to other operative project-oriented collaborative bodies. The development coalitions are more of a partnership between interest organizations like governmental support system organizations, industrial associations, municipalities, counties, local or regional worker union’s, and so on.

Development coalitions and every network attempt deal with two processes, one of strategic character and another more task-oriented. The challenge for every form of development collaboration, such as networks, development coalitions, or clusters, is combining these two processes. On the one hand, there is a *strategic process* that calls

for broad participation from all of the participating actors. On the other hand, there is a *task-oriented process*, where the aim is to execute definite activities. This last process will be, most likely, organized according to the principles of project organization with a more narrow number of participants. The project form of organization takes into account that there are a limited number of tasks that can be executed, the time period is restricted, the resources available are limited, and so on.

Innovation systems, being called Triple Helix or other concepts, include at least three spheres with a variety of collective and individual actors. The sphere called academia includes organizations like universities and R&D organizations, but also different functions within those organizations. There are at least two such functions. Researchers and research groups can, together with firms, develop new products or processes which can be defined as *direct* participation. Others can contribute to organizing the collaboration between several different actors, which can be defined as *indirect* participation (Haga 2005). In this latter case, researchers collaborate with the governmental support system, unions and business organizations, universities, and firms constructing development organizations. Even this division is now challenged by the trend to transform the university into an entrepreneurial university where functions will now be mixed (Etzkowitz 2002; Jacob & Lundquist et al. 2003).

The aim of this study is to compare the measures used for cooperation between these spheres in Norwegian and Swedish regions. An appropriate method to accomplish such a study is benchmarking. The benchmarking of processes between enterprises, where the origin of the concept can be found, differs from the benchmarking of processes embedded in a regional context. Benchmarking of processes in enterprises is often done by comparing the ratio of more or less standardized measures, where the management can take immediate action. Benchmarking of processes in a regional context is different. There are a variety of actors, and their functions are different and can be fulfilled differently. In contrast with a company, measures following benchmarking are not easily implemented. Actors in regional innovation and development processes are acting in, and sometimes transcending, institutional frames and restrictions. Development and innovation processes include different types of knowledge, mainly tacit knowledge acquired in praxis.

Learning in benchmarking projects needs to not only compare differences and similarities, but also means reflecting and discussing the different ways of organizing.

Therefore, learning in regional networks is heavily dependent on personal contacts, dialogues, and "learning-by-doing". The benchmarking project between these regions is not only about collecting data, and describing and analyzing pattern of development attempts, but is also about giving input to a "benchlearning process" where joint seminars, company tours, and workshops are organized to improve practice in regional networks.

Context

Swedish industry and trade politics and industrial development politics have changed direction during the last few years, from a centralized system to one that is more decentralised, where regional actors have more responsibility for both development and implementation. This attempt also included the establishment of two government agencies, VINNOVA (Agency for Innovation System) and NUTEK (The Swedish Business Development Agency), which are expected to collaborate with regional actors. Both are important for initiating and organizing new innovation initiatives. There are also initiatives for organizing regional development councils or county administrative boards responsible for developing and implementing industry and trade politics in the regions. Together, there are a lot of activities to promote the economic growth and employment in the region. The starting point is, as a rule, a *regional growth agreement program* (RTP) that began in 2004 and will end in 2007.

In the Norwegian landscape of regional developments, there have also been some recent changes, and one can see the same development in Sweden. The counties that played a minor role in regional development issues have now been placed in the center. The Norwegian government has decided to give the counties the important role in regional development, which means that the counties have to elaborate a competence and develop relations with the rest of the players in the field.

Even if Scandinavian countries are seen as relatively similar in social, cultural, and political aspects, the practical efforts can vary. There is one similarity which is also found in all other countries: innovations, being product or organizational, incremental or radical, are developed in an interplay among a variety of actors. The concepts used can be different, such as innovation systems, triple helix formations, cluster, or networks, but all refer to a systemic approach which is often, but not always, embedded in a regional context. The regions compared in this paper are Halland/Gnosjö in Sweden and

Hordaland in Norway, where two networks from each country have been chosen to participate in this benchmarking project.

First, a description of the two regions and the networks is given to create a better understanding of the context. As indicated, innovation and development processes are embedded in regional contexts with their own history and social and cultural characteristics. That the regional contexts surrounding the networks will differ from country to country is obvious, but the regional contexts within a country also differing and influencing development processes is not that obvious. Even within a regional setting, the local context that the networks operate within will differ. This local milieu is important for the initiation and set-up of networks. Thus, to understand how the different contexts affect network set-up and network collaboration, there is a need for an analysis of these contexts.

Gnosjö-region

The most famous Swedish case when it comes to describing an *industrial district* has been Gnosjö, which, in turn, has been compared with Emilia Romagna in Italy. The region of Gnosjö includes four municipalities, Gislaved, Gnosjö, Värnamo, and Vaggeryd, and there are 85,000 inhabitants in the region. The region of Gnosjö is known for its many small companies in the manufacturing sector, with a total of approximately 1,200 manufacturing companies in the sector. The proportion of inhabitants in the region working in the industry varies between 45 and 65 percent in the different municipalities. There are also many immigrants in the region, especially in the municipality of Gnosjö, where 25 percent of the inhabitants are immigrants. Unemployment in the region varies between one and three percent – compared with 5 to 6 percent for Sweden – and economic growth in the region has constantly increased, although this increase has not been as high during the last year.

Gnosjö is facing some major changes, and the structure of the industry has changed in a relatively short amount of time. The companies in the region face challenges and threats by competition from Eastern Europe and now from China especially. The answer for the companies is an overall restructuring, sometimes with outsourcing and tough demands to specialize and profile the companies, which means that the companies have to increase their activities when it comes to the use of knowledge and research. Many family-owned companies tend to be sold to Swedish investment companies or venture

capital investors. The problem with companies that have owners outside the region is that the companies can be reduced to production units only, which can easily be substituted. In this way, the companies' managers can be distant from the region, in contrast to the traditional Gnosjö companies and their spirit, where long-term thinking and a presence in the home district is highly valued and of great importance.

To describe the educational level and connection between industry and research, one can say that the region of Gnosjö is characterized by a low level of formal education, and a high level of competence acquired through learning at work. To manage the demands that come with the changes in the sector, it is necessary to employ more workers with higher formal education. At the same time, it is also important to raise competence among the established labor force. To manage the demands of education and training, competence development, product development, and so on, there is a need for more extensive and deeper collaboration with R&D institutions.

Skärteknikklustret

Skärteknikklustret (cutting technology cluster) in Gnosjö includes about 1,350 employees in 30 companies. *Skärteknikklustret* is the result of an initiative to start a competence center - The Metal Cutting Technology Centre – which came into operation in 1999. This center, along with another one - Polymer Centre – came out of the initiative of a local organization, *Industriellt Utvecklingscentrum i Gnosjöregionen AB* (IUC; industrial development center in the region of Gnosjö), which was established in 1996 by a group of entrepreneurs who saw the need for joint services, which the individual company could not afford. In due course, the initiative came in contact with the concept of IUC, which was promoted even in other regions, and the more formal IUC organization was established. Today, IUC is a company owned by 68 shareholders representing the enterprises in the region. Only five of the shareholding firms employ more than 200 employees. IUC is involved in different projects and offers process management, product development, and training courses involving different companies in the region. Another minor part of the organization is acting as a consulting department, helping firms with the organization of strategy days, providing general material about networking, and arranging kick-off seminars for municipalities and industry associations.

The Metal Cutting Technology Centre is comprised of 25 firms as shareholders, where IUC is the main shareholder with 51% ownership. In addition to the shares, each firm pays an annual service fee depending on the number of employees. The center developed a business concept that focused on helping companies increase their competitiveness. More specifically, the aims are to increase productivity, raise the competence level, and develop technology within the companies. These areas overlap and services in these fields are offered not only to shareholders but also to other firms within the metal cutting technology field (Eriksson 2005).

Halland-region

Halland is a small county with 280,000 inhabitants situated on the west coast of Sweden between two large and expansive regions, Gothenburg and Malmö. As in the region of Gnosjö, there are many SME's in a variety of branches. With the exception of the paper and pulp industry and a large nuclear power plant, there are only a few medium-sized companies, and there are no dominant branches in the region. The small enterprises in Halland do not demand highly qualified labor, and consequently, the educational level of both management and workers in the small companies is low compared to the rest of the country (Företagens villkor och verklighet NUTEK, 2002). A typical cultural trait is, perhaps, as described by Johansson (1999), a reminiscence from the traditional rural society. A characteristic feature of a person from Halland is that s/he is practical and careful. It is, for example, hard to get acceptance for the need to commit and put resources into something new, especially research, theoretical knowledge, or information technology. In other words, the process of transforming Halland into a knowledge society is not so easy. In this respect, Halland is similar to neighboring Gnosjö.

There have been some changes in Halland in the patterns of education and R&D. One reason for this is the establishment of a university in the region (Högskolan i Halmstad). Together with institutional changes, e.g. the establishment of the so-called Halland regional development council (Region Halland), which focuses on development questions in the region, formal and informal networks have been organized. Even though the enterprises in Halland do not demand highly qualified labor, the number of inhabitants in Halland with higher education is relatively high. This means that the labor force and labor market in Halland do not exactly match, but there seems to be a potential for establishing new and more knowledge-intensive companies. There are few

companies in Halland with their own R&D capacity. However, there is now an ongoing change, with increasing collaboration between the Halmstad University and companies, even if some part of the business sector and a lot of the companies in Halland have never been in contact with a university. The regional university is well-known for its ability to help students with start-up companies and through its variety of activities to promote innovative capability to students.

Hälsoteknikalliansen

Hälsoteknikalliansen (The Healthcare Technology Alliance; *HTA*) is located in the southwest part of Sweden and is relatively new. This network has approximately 50 membership enterprises. Other members of *HTA* are Halmstad University and organizations from the public sector. *HTA* was, from its start in 2002 an answer to the political focus on innovation systems and cluster, where VINNOVA played a particularly important role. Halmstad University, due to its early involvement in network building, has been perhaps the most significant actor in organizing and getting *HTA* started.

The aim of *HTA* is to generate new products and services in the rehabilitation and health sector, which is expected to lead to the establishment of new companies and growth in existing companies. The focus is on "every day products and services" which contain high technology. Enterprises, authorities, organizations, and R&D institutions in the southwest part of Sweden work together within the network, and the vision of the alliance is formulated as follows: *"We shall develop and strengthen the innovations system of healthcare technology so that in ten years we will be the leading region in developing products and services within the area of healthcare technology."* Today, more than 50 firms participate, including the university, public service organizations in municipalities, and the Regional Council. *HTA* arrange different activities to reach its goal. The alliance initiates and supports R&D projects, collaborates around the development of new products and services, supports commercialization of R&D, develops new networks between companies and organizations, carries out analyses, and supports companies in internationalization strategies. The intention is also to arrange seminars and lectures, assist companies with competence development, find the right competence and marketing of both the network and the individual companies' and organizations' work.

Hardanger and Sunnhordland

Hordaland County is located along the Norwegian western coastline. The counties are among the most heavily industrialized in Norway (Venneslan, 2000), and is, thus, important for the Norwegian economy. Many enterprises and networks operate across the administrative border between Hordaland and the neighboring county, Rogaland. The counties have agreed to cooperate on several issues. Both counties have a versatile business life and a broad competency basis. This might indicate the existence of a culture for development and innovation.

The business life in the region consisting of the two counties is, nevertheless, marked by the oil industry. The "super-suppliers" for the oil industry are located in the two counties. In addition, there are a wide range of sub-suppliers in the counties. The dominance of the offshore industry in the two counties is the main reason for the high numbers employed in industrial manufacturing. In addition, the maritime industry based on shipyards and equipment vendors is important in the two counties. Easy access to sufficient and inexpensive hydroelectric power has contributed to the construction of several process industry enterprises in both counties. The construction of melting and foundry enterprises has led to the emergence of a large number of sub-suppliers serving these huge enterprises. The new industry emerging, which is given attention by the government, is the sea farm industry.

These two counties have come to be too dependent on this sector after three decades with huge activity. To meet a decline in activity in this sector and the more general challenges the industry is facing, it is necessary to widen the business base in these two counties.

In this contribution, we will focus on two small regions within Hordaland County, Hardanger and Sunnhordland. In these two regions, there are established networks of manufacturing enterprises. The industry in Hardanger is centered on several process industry enterprises. The industrial center in this region is Odda. In this small town with around 7,000 inhabitants, there are two major process industry enterprises. Until recently, there existed three such enterprises, but of one was closed. In addition to these large enterprises, there are a lot of suppliers in town that basically serve the two enterprises. In Sunnhordland, the oil industry is dominant. One of Norway's largest offshore yards is located at the island of Stord in the region's center, Leirvik. There are

about 16,000 inhabitants in the municipality of Stord. In addition, a lot of other suppliers are located in the region.

In Hordaland County and the neighboring county, Rogaland, there are several R&D institutions and institutions for higher education: regional research institutes (2), universities (2), university colleges (2), and a business school (1). The most striking resemblance is that most of these institutions are not very involved in the development of business life or the enterprises in the two counties. If the institutions have contact, those contacts are often based on the relationship between some particularly interested staff members within the institutions or schools and their contacts in the enterprises. Even if the government has urged these institutions to establish a closer relationship with the business life, they have not, to any great extent, responded to these requests. It seems that such relations are not an important part of academic life in these institutions.

Two of the institutions have established a continuous relationship with the different businesses, networks, and enterprises: the two regional research institutes, Christian Michelsen Research (CMR) in Bergen and RF.

Industrinettverket for Sunnhordland

The two Norwegian networks displayed in this paper have different histories and different approaches to network collaboration. The *Industrial Network for Sunnhordland* (*IfS*) has 19 membership enterprises employing about 4,000 people. *IfS was* originally constructed as a technology center in 1987. The center was called "Teknologisenteret for Sunnhordland" (TfS). The initiative for the set up of the network came from the ministry of local government and regional development. In Sunnhordland, the center went through a restructuring when funding from the ministry was stopped in 1991. However, some of the enterprises in the region decided to keep collaborating, but in a different way. The new concept was accepted by ten enterprises, and in 1992, the *IfS* was established as a private company. Today, the number has almost doubled, with a total of nineteen enterprises.

The main aim of the *IfS* network is "to contribute to an increase in earnings (both short and long term) in the participating enterprises". They add that this should be "based on likeness and respect for the single enterprise and single individual". The network has established a permanent arena, "the net meeting", where the enterprises share experiences and receive different kinds of input and new ideas.

Industrinettverket in Hardanger

The *Industrial Network in Hardanger* (*IiH*) has a quite different history. *IiH* has 8 membership enterprises with about 800 employees. This network was started as a result of a R&D program initiative. The VC2010 program is based on enterprise development through network collaboration. The program encourages enterprises in limited geographical areas to participate in networks to gain competitive advantages.

The aim of IiH is to achieve better results, such as better economic results, a better work environment, better collaboration both internally and between enterprises, and better support of incremental change and innovation. To achieve these aims, the network initiates and supports development projects both within and between participating enterprises.

Elements

As indicated earlier, countries and regions are, in one way or another, trying to organize themselves in order to support economic growth. This can be done in many different ways, but collaboration between industry, politics, and R&D has been seen as a prerequisite for innovation and economic growth. The overall aim of the benchmarking project is to compare the different attempts to organize and manage development activities in regional networks.

The focus here will, however be on the role that R&D plays in regional development. We pay attention to the role of R&D institutions in “Triple helix” cooperation in general and in the construction and operation of networks of manufacturing enterprises particularly. The type of role R&D institutions play in development organizations can depend on different factors, such as physical and cognitive closeness between industry and R&D. We identify key emerging concepts as we benchmark activities in regions in Sweden and Norway, and in broader Nordic, European, and international contexts. The key concepts and questions are:

1. What was the source of the initiative in each case?

2. How are the networks governed and organized?

3. What practical results are achieved?

The contributions from R&D will be discussed as part of the first three concepts and separately under the concluding paragraph of the article.

The initiation of networks

Every network has its own history. Still, it is possible to identify some common issues attached to the construction and operation of the networks. We will point to some issues that seem to be important in the networks we are involved in.

First, what kinds of actors are important in the initiation and construction phase of the networks involved? What types of roles do the R&D institutions play in this phase? How important are the R&D institutions in the operations of the network, i.e. the construction of a development agenda, running of training programs, the structuring of the content and form of the collaboration between the enterprises? To what degree is the process of establishing a network dependent on certain resource persons? Is the importance of an "industrial locomotive" present in the network?

These questions are central in our project but cannot be fully answered here. Instead, we will give some indications of the situation in the two cases. The networks have different origins. Gnosjö is well-known for its entrepreneurial spirit and collaboration between companies. In the case of *Skärteknikklustret*, the companies and their organization have identified the needs and possibilities within the cluster. It is the *Industriellt Utvecklingscentrum i Gnosjöregionen AB* (IUC; Industrial development Centre in the Region of Gnosjö) that has organized and been an active part in all of the efforts being made. IUC is owned by 86 of the enterprises in the region and their concern in different projects involving different companies and different products have led to the identification of two types of activities with a potential to develop. One is the large amount of companies using cutting technology that saw common problems and opportunities. The other was the existence of companies working within polymer manufacturing, but this will not be included in this project. Both are formally organized as daughter companies of IUC but can be defined as cluster programs, offering services to companies other than shareholders. It is, therefore, the enterprises themselves that recognize problems when it comes to meeting the competition, but the cluster has been initiated through IUC and its daughter companies.

In Halland, *HTA* has, from its start, been an answer to the political intentions to stimulate innovation systems and clusters, but has rapidly changed into a combined

initiative of enterprise, the university, and the public sector. Halmstad University has been an important actor in organizing and starting *HTA*, and may be the most important actor. The university is one of the Swedish regional universities where the so-called "third task" to inform and cooperate with society, e.g. companies and organizations in the private and public sector, is taken seriously. The university has been working closely with firms in the region by training students and by offering R&D cooperation. The work in engaging companies led to awareness among the companies that collaboration between each other and the university is important.

This initiative is part of a more combined strategy involving both municipalities and other actors in the region. In the autumn of 2000, the municipality of Halmstad started a project to profile the city as "Innovationsstaden" (Innovation City). This process implies collaboration between the municipality, the industry, Halmstad University, and the Schools of the Swedish Military Forces in Halmstad. The vision for Halmstad is to be a natural center for innovative companies and a base for entrepreneurial activities. The work within "Innovationsstaden" resulted, among other things, in a project to identify the strengths and weaknesses in the region, and one of these potential areas was healthcare technology. In 2001, VINNOVA gave notice for a call to apply for financial and support means to organize collaboration projects that were expected to lead to sustainable economic growth. Even if *HTA*, at this time, received only a minor amount of funding, the decision was to continue to build the network. Since then, *HTA* has consolidated and developed. Halmstad University is still a very active part in the network, even if Region Halland is now the main organizer of activities, and the focus of the network is on innovation and developing new products in the rehabilitation and healthcare sector.

IfS was originally organized as a technology center back in 1987. The center was called "Teknologisenteret for Sunnhordland" (TfS). The initiative for the set up came from the ministry of local government and regional development. The set up of TfS was a part of a national program launched by the ministry. The national program failed and most of the centers were shut down. In Sunnhordland, the center went through a restructuring when the funding from the ministry was stopped in 1991. An external consultant evaluated the work done by the center and came up with a new concept for collaboration between the enterprises in Sunnhordland.

In the new concept, the main target for the network was through collaboration to help increasing profits in the participating enterprises. The new concept was dependent on active participation from the enterprises involved. The enterprises had to take the lead and set the agenda for what the network should emphasize for the next period of time. Instead of being told what to do and what to focus on, the enterprises themselves could prioritize and give focus to what they felt was urgent at the time. The new network had no external funding, so the participating enterprises had to finance the network activities and the administration of the network. The offshore industry has been important for Sunnhordland since the mid-seventies, and the most important enterprise within this business in Sunnhordland is Aker Stord. The initiators emphasized the acceptance and active participation from this major player in industry in Sunnhordland. Aker Stord supported the initiative and confirmed its role as the regional "industrial locomotive" in the mobilization of the network. When Aker Stord requested suppliers join the initiative, they could not deny it. The new concept was accepted by ten enterprises, and in 1992, the *IfS* was established as a private company. It is important to emphasize that the construction of *IfS* was dependent on certain key persons in the Aker Stord organization. These persons' active support and promotion campaign for the construction of a network were probably decisive. Today, the number has almost doubled to nineteen enterprises.

IfS has participated in several development programs funded by the Norwegian Research Council and worked closely with Rogaland Research (RF) since 1994/95. This close collaboration between *IfS* and RF and the participation in different R&D programs have, on the one hand, changed the focus somewhat. The main target is still there but the network has moved the focus toward a stronger emphasis on development issues within and between the enterprises. On the other hand, the collaboration between *IfS* and RF has brought momentum into the network cooperation. The connection to an R&D institution enabled in this way has the enterprises within the network cooperate over development issues.

IiH has a quite different history. This network was started as a result of an R&D program initiative. The VC2010 program is based on enterprise development through network collaboration. The social partners, different regional governmental agencies, R&D institutions, universities, and colleges in the Hordaland and Rogaland counties had, as a part of VC2010 program, established a "Development Coalition". The aim of this coalition was to focus the inputs from the participants toward prioritized projects

within the region. In the spring of 2001, a meeting was organized to investigate if the enterprises in the Hardanger region were interested in the set up of a network for industrial manufacturing enterprises in the region. The regional social partners (The Norwegian Confederation of Trade Unions -LO and Confederation of Business and Industry – NHO) and RF took the initiative to accomplish this meeting as a part of the VC2010 program. Representatives from enterprises, both management and union, affiliated with the Federation of Norwegian Process Industries (PIL) and the Federation of Norwegian Manufacturing Industries were invited to the meeting. They supported the idea of a network. Even if these enterprises were a member of one out of the two federations, they still differ when it comes to markets, size, ownership, and relations between each other. RF then took the lead in the construction of the network: (a) a network infrastructure where established, (b) applications for funding were sent to regional governmental agencies, and (c) regular network activities were launched.

In this network particularly, one enterprise strongly supported the network. It was one of the largest enterprises in the region, Tinfos Titan & Iron (TTI). Both the management and the union leader strongly advocated the idea of a network. The enterprise handpicked personnel to help with the construction and operation of the network, and their personnel were dedicated to network activities. In this way, TTI became the "industrial locomotive" in *IiH*. Still, when the network started activities, just four enterprises joined. This number has now doubled to eight enterprises. *IiH* achieved funding from local governmental agencies for a start-up period of three years. After this period, the enterprises will have to fund the network administration and the network activities themselves.

As we have seen, the R&D institutions act as pullers in the initiation and construction phase in three of the cases. It is, therefore, important to define the roles that the universities and R&D can have. We can see two different roles that R&D can have, an indirect role and a direct role. Indirect involvement means, first of all, participating in the organization and the formation of networks, but also preparation for improvement and development activities, i.e. training of personnel and operating arenas for exchange of experiences. Direct involvement means an active involvement in definite activities within the enterprise, such as participating in product development or specific organizational development programs like TQM activities (Haga 2005).

Then, it is relevant to ask: Why are the R&D institutions acting as pullers? What are on these institutions' agendas? If you look at *HTA,* there is one R&D actor, Halmstad University that, as described above, had been very important in the initiation of *HTA*, the puller. Looking at the example of *HTA,* one can point out a couple of important factors that can explain the universities' interest in *HTA* and reasons for acting as pullers.

When you first look at Halmstad University's third task, one could say that collaborating with other parts of society is a mission that the government has given the universities and, therefore, could be a reason for the universities' engagement in *HTA*. If you look at the indirect involvement, another reason can be that researchers interested in studying networks, collaboration between enterprises, and so on can, by being involved, both help and develop the network and collect material for their own research, gaining a better position in the academic world. The researchers with direct involvement in HTA, for example researchers within the area of technology, can, by collaborating and being active in the network, find fields for their interests, and also obtain financial support for further research projects, therefore developing their own positions in the academic field.

Why has RF, as the R&D institution in the Norwegian cases, acted as an initiator to build networks of enterprises? In this institution, a tradition exists for close collaboration with enterprises and networks of enterprises. Some of the researchers in the institution use action research methodology. This means that research is not the only item on their agenda. The action and reflection on action are as important as the research on an action research project. RF participated in the research program BU2000 and developed, through this program (1995-2000), a network approach to enterprise development. Since the network approach became a central element of the successor of the BU2000, the VC2010 program RF has been allowed to elaborate this network approach. This was due to the VC2010 appliance as a research program.

As the stories of the different networks show, R&D institutions are crucial in the construction of two networks, *HTA* and *IiH*. Also, in the *IfS* case, R&D is very important as a partner in the development of the network. On the other hand, R&D has not played an important role in the initiation, start-up, and construction of *Skärteknikklustret*. The puller in the initiation of *Skärteknikklustret* has, instead, been IUC. The reason is obvious - the historical and cultural context in this part of the region is characterized by keeping a distance or reluctance to academic R&D. Like many

traditional industrial districts, the general spirit is one of self-made entrepreneurs acting in an atmosphere of trust and with certain suspiciousness against people coming from the outside with academic knowledge and without practical knowledge of working in SME's. As in Gnosjö, the general spirit in both Sunnhordland and Hardanger was the one of the self-made entrepreneur, but in both of these regions, the very existence of some larger enterprises or industrial locomotives (Macanzoni & Novotny 2000) made the situation somewhat different. Among the SME's, there existed suspiciousness toward R&D institutions in general. In the eyes of entrepreneurs, these institutions represented a totally different culture. The researchers were often regarded as outsiders who were not engaged in the same issues as the SME's, not practically or action oriented, not easy accessible, bureaucratic, not present (located) in the cities, methodical rather than spontaneous, and so on.

In the IfS case, as well as in the Gnosjö case, the enterprises themselves were the driving force in the construction of the network. This was not the case in Hardanger, where R&D and the social partners jointly initiated the construction of a network. Why is it that R&D played an important role in the construction of IiH and the development of IfS in a similar context to that in Gnosjö? There is a major difference between Gnosjö and the two Norwegian regions when it comes to the presence of large enterprises. In both of the Norwegian regions, large enterprises are present, and they were key actors in the construction of the networks.

These large enterprises are, at least in our experience, more accustomed to collaborating with R&D institutions or consultants. It looks like a tension exists between the SME's and R&D that might hamper the construction of networks where R&D is present. This is due to a set of issues:

- The existence of a culture difference between academia and business life – especially for the SME's
- In academia, approaches are developed and adjusted to the situation in large enterprises. Since R&D are more accepted in the large enterprises, their approaches and methods are adapted to fit in here.
- In the SME's, a restricted number of people will respond or are able to communicate or respond to academia. This often comes down to a different agenda. Researchers are often trapped in their own internal academic agendas

and can be looked upon as out of touch with real life. To talk to these institutions and researchers, the SME's will often need to know the researchers' research agenda.

- In academia, there are a restricted number of people who can communicate with SME's and see their needs. The researchers often have limited experience working in SME's and do not know how they operate.

- These double communication challenges for these enterprises and institutions provide opportunities to challenge each other. This is needed to solve the challenges that are arising.

- The collaboration with R&D often results in what SME's will describe as bureaucracy or paperwork. These enterprises are part of a tradition that regards fast decisions and actions as one of their competitive advantages. Collaborating with institutions that are both bureaucratic and slow-moving is not regarded as favorable.

If we look at cases presented in this paper, the approaches used in research or development programs initiated by the government are often the driving force behind R&D initiatives. As we can se from the table below, three out of four networks are directly financed by governmental programs that support network constructions:

	Financed by the enterprises	Financed by governmental programs
Initiative from the enterprises	IfS	Skärteknik-klusteret
Initiative from R&D		IiH HTA

Figure 1 Initiative and sources of support of the different networks

The figure simplifies the idea that the individual cases do not fit the schema exactly, which generally occurs when trying to categorize. *Skärteknikklustret* started as an initiative from the enterprises, but at the same time, the cluster is financed by the firms participating in the center and the activities organized by the center. The initiative to

support development activities in the region is also financially supported by governmental programs.

HTA was, from the beginning, benefiting from financial support from governmental programs, but is now more or less dependent on financial support by the firms. The main initiative to start HTA was taken by the university, but even here, changes are now under way where external actors like the Region of Halland are more important and also finances *HTA*.

How are the networks organized and governed?

All networks need some kind of governing and management. The solution the network selects is adjusted to the organizational structure that is implemented, and the organizational structure is adjusted to what kind of processes take place in the network. As described earlier, we see two different processes that are of current interest when it comes to organizing regional development processes. On the one hand is a *strategic process* that calls for broad participation from all of the participating enterprises and from different levels within these enterprises, as well as from actors in the region. On the other hand is a *task-oriented process*, where the aim is to execute definite activities. This last process will be, most likely, organized according to the principles of project organization and will take into account that there are a limited number of tasks to be performed: the time period is restricted, the resources available are limited, and so on.

All networks have to arrange organizational forms to meet those needs. We will discuss whether the distinction between the two processes outlined above will suit the networks we are dealing with in Sweden and Norway. These two processes are formulated on a more general level, and a closer look shows that there can be different ways to organize these networks. At the same time, the regional context may influence the initiation and operation of the networks depending on whether these networks are part of a larger regional system or not.

These two processes can be studied in both networks and development coalitions, even if there can be a different emphasis on these processes. In the initial phase and sometimes in the following phases, there can be a development coalition formed which includes different collective actors. These actors can represent various local, regional, or national interests, and include more actors than in later stages of the process. In the initial phase, the coalition functions as an arena for strategic discussions and has an

anchoring function. The last function is important in all such attempts and can be seen as a typical Swedish way of organizing programs or projects. Involvement, or with the terminology of the Actor-Network Theory (ANT), enrollment, is important for the success of the endeavor (Latour 1987). Such development coalitions can initiate more project-oriented processes, but are usually still on a more general level, e.g. initiating measures directed to marketing research or common quality programs.

In the following phase, when networks are established, there can still be a variant of development coalition, often with fewer actors, but often there are other forms of organizations where strategic issues can be discussed and formulated. They can also initiate projects more directly, in which all or at least some of the network partners can participate, e.g. projects about product development, increasing competencies, product technology, quality projects, and so on.

The organization of the clusters in Gnosjö is structured in one steering level and one operative level. In the first level, there is one steering group, and two operating groups. In these two groups, strategic and comprehensive discussion about development, design, and related issues are carried out. The *steering group* consists of persons with high competence and knowledge around the development of clusters and innovation systems. It also consists of financiers and representatives of the municipality of Gislaved.

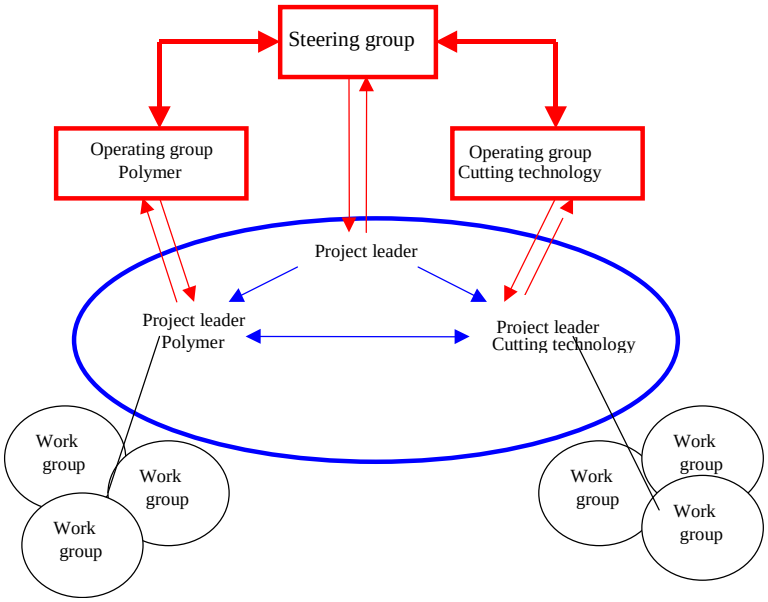

Figure 2: The organization of clusters in Gnosjö

The idea of a triple helix is realized in the operating group of *Skärteknikklustret*, where there are representatives from Chalmers University of Technology, the education administration in the municipality, and leaders from the industry. There are also work groups that work with the different projects and activities. Individuals with competence and experience in the area are represented in these groups. There is also a project leader in *Skärteknikklustret* who works on both steering and operational levels.

In Halland, *HTA* includes a variety of enterprises, organizations from the public sector/politics, and R&D. There are approximately 50 enterprises in *HTA* today. There are also a few actors participating who are involved in their own R&D activities. The most important is Halmstad University, but research is also done in a few companies in certain departments within the county council and Spenshults rheumatic hospital also conducts research. The third category of actors in *HTA* is the public sector with organizations in the health sector and political institutions. The municipalities of Halland are part of *HTA*, both as political actors and with activity in home care and handicap issues. The county council of Halland is also a member of *HTA*. They have a responsibility for healthcare and dental care in the region. Halland regional development council, which is a collaboration organization between the municipalities and the county council in Halland, is another member of *HTA*.

HTA, which is a non-profit organization, has recently changed. It is now organized with a *board*, which consists of actors of the members of *HTA*, and all of the parts of what is called triple helix formation are represented. Altogether, there are seven persons on the board. The individuals representing the board of *HTA* participate, are active, and do not come as representatives of their organization. The board has the role of a support and special interest organization for healthcare technology development. The activities in *HTA* are organized through network meetings and workshops with members. Within these meetings and workshops, new issues are raised and some are organized as projects. At the network meetings, persons from all levels in the member organizations participate. *HTA* is also a part of a larger organization that Halland regional development council runs and is the *process owner* of the regional growth area of healthcare technology. Halland regional development council has a *steering group* where the industry, through the chairman of HTA, Halmstad University, Halland regional development council, and the municipalities of Halmstad and Varberg are represented. There is also a *working group* and a *project leader*.

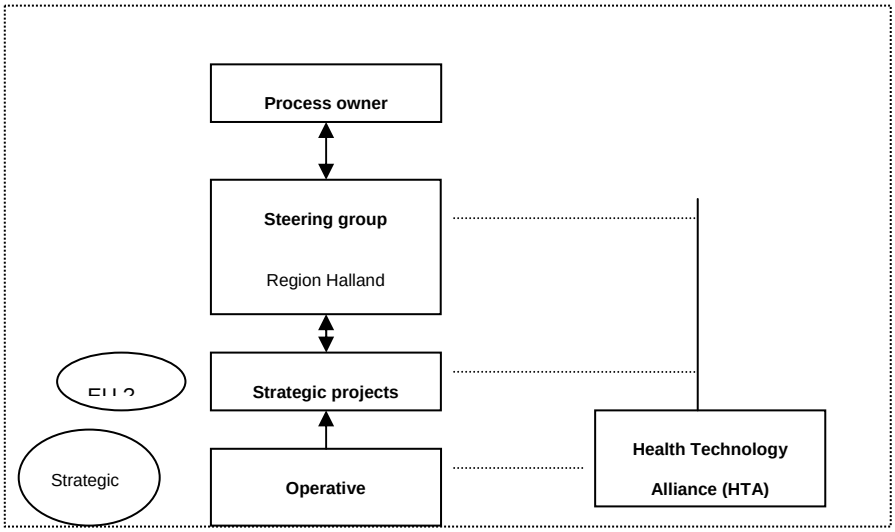

Figure 3: The organization of Healthcare Technology Alliance (HTA)

IfS is governed like a traditional public corporation, with a yearly general meeting and a board of directors. The board of directors consists of representatives from some of the participating enterprises. This board and the general manager do the strategic planning for the network. To ensure that all of the member enterprises in the network are given an opportunity to give input for strategy process, the strategy plan is the subject at a "net meeting". During one year, the enterprises are invited to about eight such meetings.

The network has organized several sub-networks based on prioritized issues such as HES, HR-management, and so on. These sub-networks are active as long as the members feel there is a need for them. The network can also decide to participate in R&D programs, and *IfS* has participated in several. If the board decides to enter a program, their member enterprises can choose whether to join or not.

The network administration consists of a general manager, an enterprise advisor, and a part-time secretary.

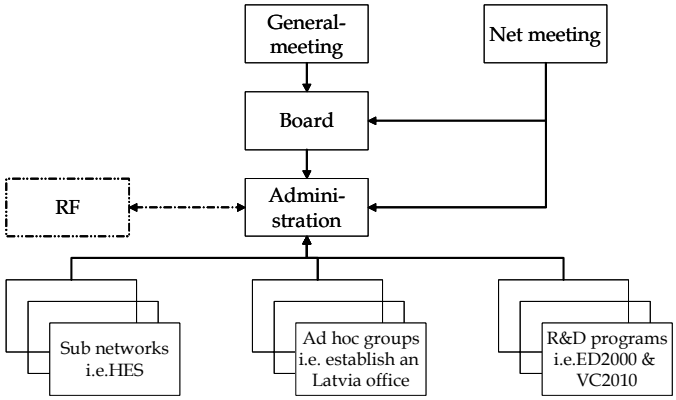

Figure 4: The organization of IfS network

Connected to formal organization is a link to RF, the regional R&D institution. Three years ago, RF decided to co-locate one of their departments with *IfS*. It was an unusual step for an R&D institution to take, moving some of their activities from the institution, out into the field. This co-location has been fruitful and resulted in several initiatives and joint operations.

In the organizational chart, there are examples of relevant R&D programs. These programs represent, in many ways, the operational part of the network. In the ED2000 program, one of the R&D programs that enterprises from *IfS* have participated in, several arenas were established where personnel from the enterprises could meet:

(a) a forum for enterprise development (FFB),

(b) a general manager forum,

(c) a forum for union representatives, and

(d) a forum for internal consultancies.

These were arenas where the different participating enterprises sent their representatives. In this way, connections were established not only between the general managers, but also between employees at other levels in the enterprise.

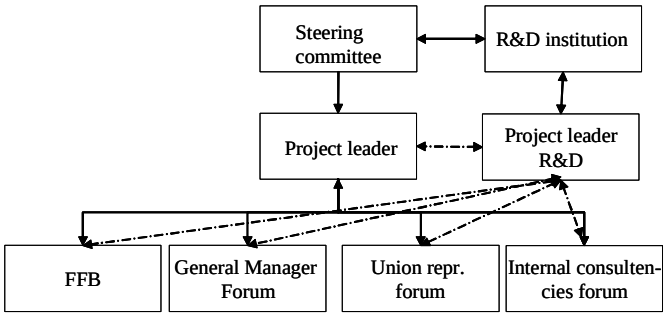

Figure 5: The organization of the ED 2000 program

To govern the development program within *IfS*, a steering committee was set up. In this committee, the following positions were appointed:

(a) representatives from the enterprises, both from management and unions;

(b) one representative from HF[61];

(c) one representative from RF; and

(d) the *IfS*'s General Manager.

It is worthwhile to note that RF also had an internal project leader to govern contributions from RF, both development and research tasks. As the organizational chart indicates, the collaboration between *IfS* and RF was very dense.

The *IiH* network can be looked upon as a project organization. How the network is organized is close to how the *IfS* network organizes its R&D programs.

61 HF is an organization governed by the social partners, LO and NHO. The organization's aim is to support development projects within enterprises and in networks of enterprises.

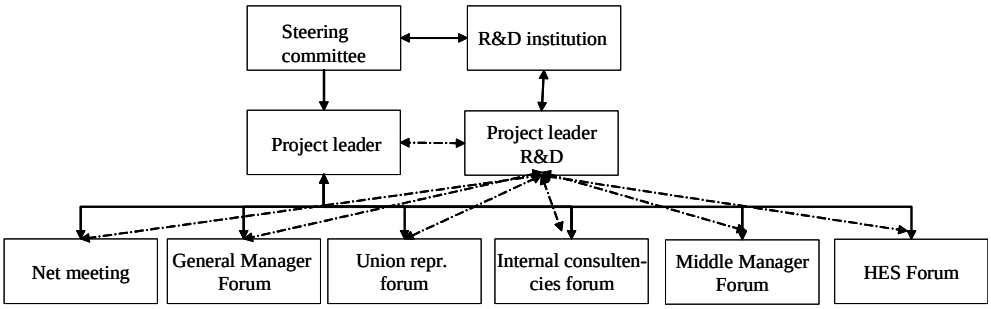

Figure 6: The organization of the IiH network

Still, there are some differences between how the two networks are organized. Firstly, the different forums in *IiH* are not as closely connected to the FFB as in *IfS*. This is due to practical issues. All of the enterprises that participate in *IiH* are located in Odda. The distances between the enterprises are small, so the enterprises do not use much time to travel to meetings, as was the case in *IfS*. So, when the operational design of the network was established, this was taken into account. Secondly, and probably more importantly, is the fact that the organization in *IiH* is a mix of the formal and project organization of *IfS*. So, the steering committee will deal with strategic decisions and run the R&D program. The main difference between *IfS* and *IiH* will be the position of the R&D institution. In *IiH*, RF is deeply involved in both strategic decisions and the operation of the R&D program. Even if RF collaborates closely with *IfS*, the relations with *IiH* are even closer.

The comparison of the different networks very clearly shows the importance of the two processes discussed above. In all networks, there are attempts to organize strategic processes where companies and actors in different functions in the region participate. These processes seem to be organized more or less according to dialogue principles. People come together to discuss and formulate roads for activities and aims for the network. At the same time, networks organize a variety of projects like TQM projects or product development processes. The challenge is to combine them, because successful projects stimulate trust and feed the network with a feeling of having accomplished something together. Some examples of activities are given in the next part.

These two processes indicate the social nature of network activities, organizing and managing such processes, is not a rational or formal activity. At the same time, it is obvious that networks have to establish a formal organization to ensure continuity and

adapt to the demands of the bureaucracy of public authorities giving financial support. The risk is that this formal organization, which can be very bureaucratic, will take over parts of the processes described above. Network relations, which are based on trust, will be substituted by instrumental and formalized relations.

There is always a risk of falling into the trap of being too formal to please the funding institutions. The aim of constructing networks is to create places where people can meet, exchange experiences, and explore possibilities. In IiH, one of the most interesting projects so far was a consequence of improved communication between the enterprises. More importantly in this setting, it was done outside any network arena, just in the communication between employees from the enterprises. The network arenas should function as door openers for more informal collaboration and exploration of opportunities.

The role of R&D in organizing such processes is ambiguous. In general, there is no need for a R&D organization to play the dominant role of organizing such processes. Other actors can play such a role, even if some support is necessary. The Swedish agency VINNOVA offered courses and seminars to network facilitators, which were highly valued by both organizers and participants of the network.

What are the results of the network collaboration so far in the different networks - patterns and characteristics?

The results from network collaboration will be visible in different ways. Some of the results of the collaboration could be easily measured, and those results are most likely to be found in the participating enterprises. Building trust is probably as important as the measurable results. Trust between individuals from different enterprises is built through collaboration in network activities and network projects. The enterprises will, most often, emphasize the immediate economic results of their participation in networks and R&D programs. Second most important is the building of relations with other enterprises and institutions that can represent an opportunity for new businesses or for learning from, or together, with others. Some of the enterprises are also eager to mobilize and involve their employees in developing the enterprise. This involvement of the employees will not, in the short term, have to be a hindrance for the enterprise to be profitable. In the long term, these engagements in networks and programs will have to

represent a potential for the enterprises, strategically, economically, and for employee development.

Several projects have been organized by the *Skärteknikklustret*. One is described below. It was initiated by the companies in *Skärteknikklustret* and was started in 2000. A project group was put together to identify the need for education existing within the cluster. After identifying the needs, they contacted Chalmers Lindholmen, which is a university college within Chalmers Technical University that offers qualified industrial research, training, and education in manufacturing. *Skärteknikklustret* wanted to see if Chalmers Lindholmen was interested in collaborating and starting a competence development program for CNC technicians. By collaborating with Chalmers Lindholmen, they would make sure that the quality of the education was good and get a partner to carry out the program. The content, methodology, and implementation of the program were developed through collaboration among companies and reference persons from the National Partnership for Vocational Training. The education continued in 2001, and the first certified CNC technicians were appointed. In 2001, the development of another training program began, but on a lower knowledge level. The work with these certification courses was noticed on a national level, and from the year 2002, the cluster motor of *Skärteknikklustret* is represented in the industry committee for certification of CNC technicians. This also gave the opportunity to be near important organizations like the union of the metalworkers “Metall”, the engineering company ABB, education provider Lernia, and insurance company Scandia, which are all part of this group as well.

One of the projects within *HTA* is a project called *Easy up*. The project’s aim is to develop an aid for lifting up old people who have fallen in their home. The staff at the home care administration in the municipality of Halmstad felt that they did not have good routines for handling this situation, and therefore raised the issue at one of *HTA’s* net meetings. The staff from the home care felt that the problem was that it took a lot of resources when an alarm sounded as a result of a client falling. Up to three persons were needed to get the person up from the floor, and there were no good aids since they could not bring any heavy equipment. A person from Halmstad University who also participated in the network meeting thought that this would be a perfect student project, and interested students from one of the engineering programs at the university in the project.

While participating in the project, the students worked very closely with the home care staff, and observed how they work, what seemed to be problematic, and how issues could be solved. They developed a few different solutions and tested them, constructed a prototype of the best one, and tested it in collaboration with the home care team, after which some changes were made. This project later received the prize for best degree project in the healthcare technology area from *HTA*. The two students considered starting their own company to continue developing the product in order to sell it, but decided not to do so. Instead, they contacted a company in *HTA*, which bought the product and hired one of the students. The product is not yet on the market, but will be soon, and the home care organization in Halmstad will be interested in buying the product.

From the Norwegian networks, we will use two examples that provide measurable results in the enterprise, and serve as a point of departure for collective reflection in a network setting. In one of the departments at Aker Stord, “the prefabrication of pipes” (PR), through quality control, revealed that the number of pipe spools that were declared ready when they actually possessed severe errors, was increasing. The consequences of such errors are severe. The work not only has to be redone, but firstly they must separate the pipe parts that are welded together. Economically, every error represented an additional cost. AU at PR put together a task force that included employee representatives involved in the prefabrication of pipes, including engineers, foremen, skilled workers, and planners. Through such a design of the task force, it was made sure that the problem was dealt with in a proper way. All of the participants had their own opinions on why we produce such a number of errors. After a thorough investigation, where all of the participants and even some of the groups they belonged to contributed actively, the task force presented a plan of action. In this plan, all of the different groups that were part of the production line had to do smaller or larger adjustments of their procedures. The results of the work of the task force were essential. The number of errors dropped considerably, and the department economics improved. Such task force groups at Aker Stord were often monitored by an internal consultant (IC). The IC prepared the process for the task force, and acted as a process consultant. In the ED2000 program, a training program for ICs was developed. Cases such as the one from PR at Aker Stord were taken back to the sub-network of ICs in *IfS* and were presented for the rest of the ICs. This resulted in discussion and reflection on: (a) the content of the projects, (b) the set-up of the task force, and (c) techniques used by the

IC. In this way, the project that was accomplished at Aker Stord could also have an impact on projects in other enterprises, and vice versa.

In *IiH*, a joint development project was recently completed. TTI experienced a waste problem as a result of the way they its production line was constructed. Dust is one of the by-products, and there are different ways to treat this dust, depending on what kind of components the dust is made of. In one specific department, the dust consists of some toxic components, and among these components is zinc (ca 18%). This dust has been collected and delivered either to a waste storage facility for special waste in Eastern Norway or to Norzink, which is a zinc producer in Odda. Delivering the waste to the special storage area is very costly and the waste is simply stored there. The dust delivered to Norzink, on the other hand, is taken into the production line and utilized as a raw material. So far, Norzink has only been able to receive a portion of the dust produced at TTI. The personnel at Norzink do not fancy these deliveries from TTI due to HES problems connected to them. TTI and Norzink agreed to set up a joint task force to solve this waste problem. The task force included members from both enterprises and from different levels within both organizations. The final report that the task force delivered suggested: (a) an investment at Norzink to enable the enterprise to receive all of the dust TTI produces and remove the HES problems connected to the deliveries, (b) investment in an improved transportation system for the dust, and (c) an investment at TTI to more easily handle the dust there.

Since TTI owns the waste and the problem, they will have to finance all of the necessary investment, and just recently, the Board at TTI agreed on the issue and allocated funds. In this case, ICs were used to monitor the process.

The examples prove that network collaboration can enable the enterprises to accomplish development projects and use internal resources to monitor the process. R&D is not, in the two Norwegian cases, directly involved in the development project. Its role is indirect, related to: (a) preparing personnel for these kinds of tasks, and (b) utilizing the results and experiences from the projects in the sub-network to reflect upon how such projects can be accomplished “back home”.

It is always hard to decide if the results of network collaborations can be credited to the network activities or the single enterprises. In many cases, it is obvious that the network and the activities between firms, R&D organizations, and other organizations will result in specific products or other results, but here, it is important to analyze the earlier

described two-tailed process: the joint broad process where strategic issues are formulated and planned, and the narrow task-oriented process where projects are carried out. The crucial balance of these processes will affect the results. Even the influence of R&D institutions on the results of network performance is not easy to specify. Here, the notion of the capability of an organization is important. R&D institutions are not usually prepared for direct and efficient cooperation with firms, especially SME's. A lot of work has to be done, and, for example, the common traditional liaison offices are probably not the most efficient organizational forms. Still, some contributions from R&D institutions can be specified:

(a) participation in internal development project in different kind of roles;

(b) participation in joint projects where two or more enterprises participate;

(c) training of personnel in improvement and development methods;

(d) operation of different network arenas where both exchange of experience and transfer of knowledge are on the agenda;

(e) serving as the "broker" between the network and external actors, possibly contributing to the network by bringing in new knowledge, new possibilities, or funding; and

(f) serving as a "dialogue-renewer" in the network, which may challenge the participants by bringing in new perspectives and possibilities.

Even if it is not necessary for a R&D organization to be the main actor when organizing network activities, R&D organizations and regional universities can play important roles when it comes to participating in regional development. They are often seen as neutral institutions, but one can strongly question this.

Universities and R&D organizations have self-interests in participating in research activities with individual firms or networks, or in organizing network activities. To be successful in these settings, the R&D institutions and the researchers may obtain funding and, by publishing the results, get a better position in the academic field. The fact that researchers operate in between two value systems, one being the academic world with internationally accepted norms and values for good research and criteria for

advancement in the system, and the other being the business world with other norms, may create serious tension.

There are differences in the extent to which R&D institutions intervene with local enterprises and networks. This is probably connected to the value system that dominates within the institution. If the dominant value system in the R&D institution is favorable to academic values, then we can expect that the connection between the institution and the enterprises is weaker than if the value system leans on the demand from the non-academic world outside of the institution.

Discussion

R&D can, as we have seen, play different roles in regional development and innovation processes. There are at least two roles, the first of which is more traditional and aimed at working together with companies to develop new products and processes, or to support organizational innovations. The other is a more supportive role, where researchers implement and organize networks and support the establishment of development coalitions. The second role could, of course, be played by other actors – and there are many such individuals and organizations – but our experience is that regional universities are seen as more or less neutral and, therefore, reliable and trustworthy. This does not exclude tensions and sometimes conflicts. How these roles are formed and enacted can be very different and cannot be described in this paper. Here, we can only mention a variety of aspects which should be described and discussed, e.g. the capability of R&D organizations to cooperate with firms, and the capability of SME's to do the same with R&D organizations. We know from those networks, and also from a variety of studies, that the difficulties have to do with different organizational cultures, different languages, different time budgets, and so on.

Will the networks become more or less sustainable when R&D institutions have initiated the construction of the network?

Initiators and financiers of network programs or projects normally approach regional universities and R&D organizations to work with such networks. The reason for this can be different, but in Sweden, one of the roles of the universities – the so-called third task – fits those intentions. At the same time, it is quite obvious that at least some of the regional universities have developed both experience and knowledge in this field.

When taking the cases as a point of departure, they appear to be fairly different. However, in some respects, there are similarities. One issue that appears through the cases and that we find worth pursuing is this: In the initiation of the networks, what kind of role did the R&D institutions play? If we look at the four cases, two of the networks can be characterized as being initiated by external institutions, and are located in different countries: The Alliance in Sweden and *IiH* in Norway. Such initiatives can be a kind of response toward one or several specific external influences. These external influences vary, but can be based on different governmental initiatives and programs. The Alliance can be seen as a result of the political focus on innovation systems and clusters as a means for achieving economic growth. The University of Halmstad has been an important, probably the most important, actor in the construction of the alliance. The *IiH* network in Hardanger was constructed as a response to the VC2010 national R&D program. In the construction phase of the *IiH* network, the most important actors were the regional representatives from the social partners and researchers from RF. The two other networks, Gnosjö in Sweden and *IfS* in Norway, were established as a result of a strong engagement among one or several enterprises. These initiator enterprises have invested a lot of time, energy, and prestige in the construction of the network and in the mobilization of membership enterprises. One important issue appears from these differences in how the networks are initiated: What kind of impact will these differences in the way the networks are initiated have on the further development of the networks?

By pursuing this question, several others appear.

When the initiative is driven by the enterprises, will such an initiative have a greater chance to be developed further than initiatives taken by external institutions? The rationale for such an interpretation could be that, when the enterprises invest a lot of time, energy, and prestige in the establishment of a network, they are more eager to get results and encourage continuity when facing different kinds of resistance. An alternative question in this context could be: When the enterprises are offered to participate in a network, is that in itself an attractive and sufficient incentive? Is there a need for some kind of incentive to “sweeten the entrance”, as was the case with *IfS*? Here, we will just point to the fact that both *IfS* and Gnosjö networks have lasted for a significant period of time and the members still support the idea of networking and the use of network partners as a resource. On the other hand, both the *IiH* and the Alliance are newly established, and we cannot draw any conclusion yet.

We will also raise this question: Is the construction of regional triple helix cooperation a prerequisite for the development of sustainable networks? Based on the case stories, the question to ask is "Why are *IfS* and Gnosjö as sustainable as they are?" In the cases of *IfS* and Gnosjö, their sustainability may be understood by the way the initiators constructed the governing of the network and operation of projects. Both networks ensured a bottom-up perspective in the way the networks are organized. The boards in both networks are seated mainly by representatives from the enterprises. Even if the board in *IfS* only consists of representatives from the membership enterprises, the network is operating in triple helix cooperative environments all of the time. When *IfS* runs its programs and projects, triple helix cooperation is constructed with participants from regional located governmental agencies, regional R&D institutions, regional universities and colleges, and the regional and national representatives for the social partners. The latest development program received funding as a result of regional triple helix cooperation. Even if Skärteknikklusteret, to a certain degree, has integrated triple helix cooperation into its formal organization, especially in certain projects, they express the need for support from regional triple helix partners. Skärteknikklusteret "lacks" close relations with both regional R&D institutions and regional government agencies. Despite "the lack" of regional triple helix cooperation, the network has exercised great sustainability. This regional triple helix cooperation is sought after in Skärteknikklusteret. The question is: Would the network have been even better off if there had been collaboration with external institutions? To have a third party represented, like a research institute or Triple Helix involvement, when disagreement appears may, for instance, ease the way out for the participants. We will not elaborate on this discussion, but simply point at this as an interesting issue to investigate further.

Is there a need for an "industrial locomotive" enterprise that can take the lead in the construction phase of the network? In the two Norwegian networks, such enterprises exist in both networks. In the *IfS* case, the largest enterprise in the region took the "industrial locomotive" role, while in the *IiH* case, the second largest enterprise did the same. These enterprises used different strategies in this role: Aker Stord used "the whip" while mobilizing for the *IfS* network. The choice presented by the SME's was either to join the network and the network cooperation, or be left out and not be able to do business with Aker Stord. TTI in the *IiH* network used the results of participation in a former R&D program, the ED2000 a predecessor of VC2010, to convince the other enterprises in the region to join. TTI's strategy was to "sweeten the entrance" by

alluring the other enterprises with the possibility of improving their profit through participation. Still, without these enterprises using their influence in the mobilization of other enterprises for the networks, the set-up would probably have been difficult.

This question is also interesting to discuss in the case of the Gnosjö network and the Alliance. In the Gnosjö case, due to the norms and values in the region, there might be hesitation to rely on companies acting as industrial motors. In the case of the Alliance, there are, in fact, discussions about how far the position of the university as a motor can reach. At least one basic question can be connected to what kind of impact the construction of the network has for the further development of the same. While some choose to involve external actors in the governing of the network, others choose to exclude them. Will this difference in strategy influence the network's openness or eagerness toward bringing in external ideas, actors, and partners? It might be relevant to further investigate if these different strategies will impact where the networks direct their attention, i.e. if the networks are introverted or extroverted.

What kind of roles have the R&D institutions played in the construction of the networks involved? These institutions have been given the specific task by the government to initiate and participate in enterprise and regional development. How do they conduct their task? As we have seen from two of the networks, the Alliance and *IiH*, the regional R&D institutions have played a cardinal role in the set-up of the networks. In addition, such institutions were brought into the governing of the Skärteknikklusteret as well. Particularly in the Alliance and *IiH*, a range of tasks in the initiation and mobilization were conducted to:

(a) prepare a concept for a network,

(b) communicate directly with the enterprises,

(c) plan and accomplish of workshops and meetings,

(d) bring in relevant experiences from and about network and networking,

(e) prepare applications for funding,

(f) document actions and prepare strategy documents for further discussion, and

(g) function as a door-opener to research groups and other resources.

In regards to the *Skärteknikkluster* in Gnosjö, the initiation of the network was a response to economic pressure in the region in the 1990s. When one of the more important companies closed down, the government decided to support the re-organization process in the region by offering financial means to one of the municipalities in the region. The firms and regional business associations decided to start network activities. Due to the tradition in the region, no regional universities or R&D organizations were involved. Later, when activities were planned, universities and training programs were approached.

What happens when the R&D institutions pull out?

The R&D institution is often regarded as a neutral third party. In this way, the R&D institution occupies an important role. The researchers can be mediators between different interests in the initial and construction phases of the network. The mediator role is a difficult role to play for the researchers because they have to balance between different interests among the participants and their own research agenda. As was the case in *IiH*, the researcher can also bring in relevant experiences from other network collaborations. This means that the researchers can contribute certain skills and methods. At the same time, the researchers will often occupy the role as a liaison between the network and governmental funding organizations. As we have seen from the Gnosjö and *IfS* cases, these networks have been initiated by actors in the enterprises within the region. Still *IfS* has been fortunate to collaborate with R&D institutions that have helped with the development of the network. It looks like collaboration between enterprises and R&D institutions can make the construction of a network easier than if the R&D institution is left out.

The involvement of the R&D organization as the organizer or facilitator of innovative networks can be important: the organization is neutral, in a way, but it should not be a permanent partner. One important aim behind the construction of a network should be to create a sustainable network that will be able to operate on its own without constant support from R&D institutions. This does not mean that R&D institutions should be present only in the construction phase, but these institutions can continue to collaborate with the network in certain projects.

This was the case in HTA when, after a reorganization, Region Halland took over the formal role as an organizer. At the same time, the role of the university changed, and

even if it is not yet clear how the role will develop, two clear lines are visible. The first is that the university still represents the academic part of triple helix, e.g. as an organization and actor with its own strategy and visions. The second is the role of the university as a professional organization where knowledge is developed and distributed. The university will, therefore, support contacts with research and development groups who expect to cooperate with firms within HTA.

Conclusion

This contribution includes an overview of the main aspects of the benchmarking project. It is obvious that more questions than answers are discussed, and we will continue with more investigation in the course of the project. Even now, one can clearly see important topics which should be discussed later. The first is, of course, the benchmarking process which has to be organized and managed and which should be turned into a benchlearning process. Second, there seem to be a variety of central issues in such formations, regardless of how they are labelled (innovation system, triple helix formation, cluster, and so on). Even if institutional and socio-cultural conditions are different, reflections based on transfered knowledge from operation of other networks, could contribute to operational improvements of the individual network.

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7.6 Attachment VI

7.6.1 Paper 6: Orchestration of network instruments: A way to de-emphasize the partition between incremental change and innovation?

Author(s):	Trond Haga,
Status:	Draft II
Published:	Part of an anthology edited by Richard Ennals, Peter Totterdill, Tarja Tikkanen and Trond Haga and planned as part of a Strategic Institute Program at IRIS
Data of publishing:	Fall 2007
No of pages:	18

Orchestration of network instruments: A way to de-emphasize the partition between incremental change and innovation?

Key words: orchestration, incremental change, innovation, network processes.

Incremental change and innovation[62] are often regarded as two distinct concepts with different content (Imai 1986, March 1991, Boer 2001). The differences in content are closely linked to two conditions. Firstly, the concept of incremental change has been assigned toward stepwise improvements of products, processes, markets, technology, and organization, while the concept of innovation has been assigned toward more radical changes in organization and processes, and the development of new products,

62 In parts of the literature, a different terminology is used for the same phenomena: *exploitation and exploration.* "Operational effectiveness is based on *exploitation* capabilities, which are embedded in the organisation's configuration of products, market approaches, processes, technologies, competencies, organisation and management systems. An organisation is strategically flexible if it is able to develop new configurations that satisfy tomorrow's customers. Strategic flexibility is based on *exploration* capabilities" (Boer et al 2006 are referring to: March 1991, Boer 2001, Boer & Gertsen 2003)

markets, and technology (Boer et al 2006, Boer & Gertsen 2005). Secondly, the concept of incremental change as an important source for improvement has often, but not unambiguously, been linked to wide involvement and the use of employee's knowledge and skills (Beer & Noriah 2000, Imai 1986), while innovation has been linked to small specialist teams or individuals and these specialists' use of knowledge and skills (Boer et al 2006). Such an interpretation of the concepts makes the underpinning of incremental change more of an important enterprise culture issue. For the enterprises to become more adaptable to change, both improvements and innovations, the employees will have to participate in a way that makes changes possible, which means to be involved in and informed about the change processes. To the contrary, the specialist teams dedicated to a specific development task often seem to exclude the employees from getting involved and from being informed due to large differences between the competencies required to perform exploration (Boer et al 2006).

Strategies for regional development often have elements of either constructing or supporting regional interconnectedness. The purpose of the interconnectedness is to improve the competitiveness and innovativeness[63] within and between enterprises. Thus, interconnectedness is regarded as a development tool for enterprises. Several new concepts have been launched and some old ones have reappeared in order to describe and conceptualize regional interconnectedness and regional development. Examples of such concepts are: network, industrial clusters, industrial districts, and learning regions (Piore and Sable 1984, Ebers 1997a, Grandori 1999a, Cooke 2002, Bardi 2007, Asheim 2007). The understanding of the content of the different concepts is not fully clarified, and the borders between them are not sharp. Some researchers have disregarded the differences and refer to the different forms of inter-organizational cooperation as inter-organizational networking relationships (Ebers 1997b). They prefer that different forms for inter-organizational cooperation are collected under the same notion. In this paper, I prefer to use the notion network about strategic inter-organizational collaboration between different enterprises.

In this paper, I will explore whether it is useful to make a sharp distinction between the two concepts, incremental change and innovation, while operating development

63 Understood as improving the exploitation and exploration capabilities in the participating enterprises

networks of industrial enterprises. Based on the distinct differences between the perceptions of the concepts and the practical approaches prepared as a result of the difference perceptions, the practical linkages between the two concepts within a network setting have not been fully explored. I will argue that well *orchestrated* networking processes contribute to raising the participating enterprises' ability to improve *and* innovate. Furthermore, I will argue that *orchestration* contributes to de-emphasizing the partition between the different concepts. Processes that have either improvement or innovation as a point of departure are not reciprocal, expelling each other as many researchers claim (xxxx); rather, they are reciprocal and support each other.

In the next section, I will elaborate on the importance of the *orchestration* of networking processes in supporting incremental change and innovation[64]. Firstly, I will elaborate on how interconnectedness may function as a development tool for the enterprises to become more innovative. Secondly, I will utilize two practical cases to exemplify how the orchestration of networking processes may influence the way the enterprises handle their development needs, innovative as well as incremental. In the last section, I will discuss whether interconnectedness, as network participation, actually de-emphasizes the differences between the two concepts.

Networking enablers – vital instruments for network orchestration

I will argue that the main purpose behind the enterprises' participation in industrial networks is to improve their competitiveness and innovative ability. Thus, strategic and economic interests and benefits are central in order to engage actors in networks (Levin & Knutstad, 2003). This will not obstruct other aims to influence decisions to participate in networks like improvement of the working situation or improving the working environment. The enterprises participate to get benefits from the network and the networking processes; they do what they believe is needed to improve. The main

64 This paper is based on experiences from working as an action researcher within two development networks consisting of industrial enterprises. These networks participated in a national R&D program in Norway funded by the Norwegian Research Council: Value Creation 2010 (VC2010). The program is organized in regional modules. At the regional level, there are Development Coalitions. Regionally, the triple helix system consists of three different arenas: enterprises, networks, and coalition.

issue at stake is how interconnectedness may influence the enterprises' competitiveness and innovative ability. A further issue to investigate is how the orchestration of networking processes de-emphasizes the differences between the two concepts of incremental change and innovation.

Networks may appear in different forms. However, the main purpose of a network is commonly to involve enterprises in different networking processes. Focusing on the presence of different features or "interorganizational ties" as the basic elements of a network has been done (Ebers & Grandori, 1997). Ebers and Grandori have "focused on the role of resource interdependencies, trust, and catalysts for networking" (Ebers & Grandori, 1997), but they have not offered a complete or systematic test of whether these three kinds of ties represent important building blocks for a theory of inter-organizational network formation. They indicate however, that these ties are important conditions that might lead to and shape the formation of an inter-organizational network. In this paper, I do not intend to pursue the issue of network construction, but rather focus on conditions, "enablers", that enable networking processes to emerge. These are crucial for the processes, but appear as rather different input factors. The enablers embrace the utilization of a set of different actors maintaining different skills and knowledge via training programs focusing on improvement and innovation of the operation of well-functioning network arenas enabling learning. In the rest of this section, I will present a model that contains a set of networking enablers that can jointly support networking processes resulting in incremental change and innovations.

The mere presence of a set of enablers will not activate networking processes. There must be a well-orchestrated interplay between these enablers for such processes to be activated. The different enablers are not able to support such processes individually; the interplay between different enablers must be conscious and carefully governed. Thus, within the network, actors aware of the need for the orchestration of networking enablers must be present. Awareness may not be enough to initiate the construction, or the revitalization of enablers may be needed. I will argue that well-orchestrated networking enablers may lead to processes that do not separate incremental change and innovation, but rather underpin the enterprises' general development ability.

Firstly, I will argue that the mediator or broker is crucial to the network system since the mediator acts as a point of passage to external actors outside the network, bringing in experience and expertise personally or through external resources, and bringing in

knowledge or theories created externally to revitalize discussions and open new dialogues. The broker is also an independent actor in the network and is not part of any of the organizations or enterprises in the network. This makes the broker an 'independent player' in the network setting, and the one who may connect enterprises, support common knowledge creation, and support the initiation and construction of improvement and innovation projects and activities (Haga & Kristiansen, 2006, Haga, 2005b). The broker also seems to be cardinal in many internal improvement and innovation projects in SME's (Haga, 2005c).

Secondly, equally important is the existence of a broker for the building of internal network resources and a network structure (Haga, 2006). Networking processes are dependent on a network structure to arise within, and this structure needs to be governed. The governance of such a structure is, on the one hand, dependent on resources that have knowledge and skills about improvement and innovation processes. On the other hand, these resources are dependent on other types of knowledge and skills: a local individual network, being able to communicate with all of the groups within the different enterprises, being able to communicate with funding institutions regionally and nationally, being able to collaborate with R&D institutions, and so on. These resources have often been trained within enterprises but network coordinators and network resource personnel need to be trained. Part of the governance is also about managing network projects funded from external funding institutions. To govern and manage network projects with the funding institutions following closely is also part of the governance of the network, and must be given attention.

Thirdly, a very important feature in the network system is training. There is a need within most enterprises for skills and knowledge in development methodology, in how to initiate and accomplish internal and joint projects, and how to ensure wide participation among personnel in the participating enterprises. Introducing common training programs in a network system will meet this need, and will probably open new opportunities as well (Haga, 2005c, Haga, 2007). These programs will first gather personnel from most of the participating enterprises. The presence of different experiences, different types of personnel, and different enterprises, both SME's and industrial locomotives, creates tension and has the potential for new opportunities to be launched. The existence of a common methodology eases the transfer of knowledge and allows for the initiation and accomplishment of joint projects where two or more enterprises participate. The training and introduction of a common methodology also

function as an introduction for a common “development language”. This is most important when local development actors are trained in their roles in the enterprises and the network (Haga, 2006a).

The fourth main feature in my model is network infrastructure. When the enterprises do not necessarily have established relationships or have not developed their relationships, there is a need for places to meet and develop relationship, as well as to learn. Many attempts were launched to improve collaboration between enterprises but have been unsuccessful. These attempts have not included a wide span of different types of personnel, and have most often involved top management. To get legitimacy for improvement and innovation activities, involvement is important. Thus, the network system should consist of many arenas where different types of personnel could meet. To send signals from a customer to a supplier or to a set of suppliers (Haga, 2006a), network arenas are needed. These arenas are also needed for the reflection and creation of new ideas within and between enterprises (Haga and Kristiansen, 2006).

Lastly, leadership is needed to operate networks, and this is no surprise. My concern is not the general governing of the network, but rather the involvement and enthusiasm in network collaboration from managers in key network enterprises. I will argue that it is urgent to have an ‘industrial locomotive’ among the networking enterprises where the manager and union leader together act as initiators within the network. Firstly, it legitimates a broad involvement of the enterprise in network collaboration. Secondly, they are able to persuade less enthusiastic managers and union leaders to take part in the network and use the network as a possibility for the enterprises to become more innovative and competitive. Additionally, the union leaders’ active involvement in network collaboration and enterprise development represent legitimacy for the members of the unions to do the same. The union leaders’ participation is important to ensure broad involvement and participation from the employees in the enterprise.

Figure 2: The networking model

This model has been developed as a result of many years of close collaboration with, and active participation in, some networks in Western Norway (Haga, 2005a, Haga, 2005b, Haga, 2007). In the next section, I will exemplify how orchestrated networking processes, utilizing a set of enablers, may stimulate incremental change and innovation. This will be illustrated in the two case stories from the same industrial network.

Cases based on networking processes

In this section, I will present a traditional improvement project. This project is picked not because it is especially important or impressive, but because it is closely linked to a network training program (Haga, 2007) and the network infrastructure (Haga et al. 2007). As part of the program, the participants, who came from several of the membership enterprises, had to plan and accomplish an improvement project important for their own enterprises. The project is also closely linked to the next case, which takes up another project involving the same enterprise and department as this first one.

The second project I use to illustrate how the networking model works is a product innovation project that was still ongoing when this paper was written. The project I will present is based on developing a new process in a zinc foundry, including the development of new fully-automated foundry station model accommodated for zinc

producers. The existing process contains several HES and quality challenges. The project is about the utilization of the network infrastructure (Haga et al. 2007) and certain processing roles (Haga & Kristiansen 2006). However, the project is also about innovative working methods within networks: integrated innovation, including different professions and broad participation in innovation projects. The aim is to develop a foundry station that does not fit only one specific zinc producer, but one that can be offered to zinc producers worldwide. Traditionally, the zinc producer would have sent requests for this kind of equipment to an international tender.

Case 1: "The downspout element project"

As part of the training program developed as a collaborative effort by two research institutes and the some of the enterprises in the network, the participants have to accomplish a development project[65]. The training program is shortly described below in Figure 2. Some comments have to be given first. The training program, as well as the entire network collaboration, was based on broad participation. This was ensured by heavily involving the trade unions in the network collaboration. Based on the national general agreement between the labor market parties, which states that both parties not only have the opportunity to participate, but are obligated to participate in enterprise development activities, the unions were encouraged to become vital development actors within the network. The trade unions perceived the training program for internal facilitators to be a way to ensure broad participation. The internal facilitators were meant to be key personnel in their own organizations regarding development activities. The training program was regarded as a vital part of building a culture for change in the membership enterprises.

65 The two research institutes involved were Agder Researh and International Research Institute of Stavanger (IRIS).

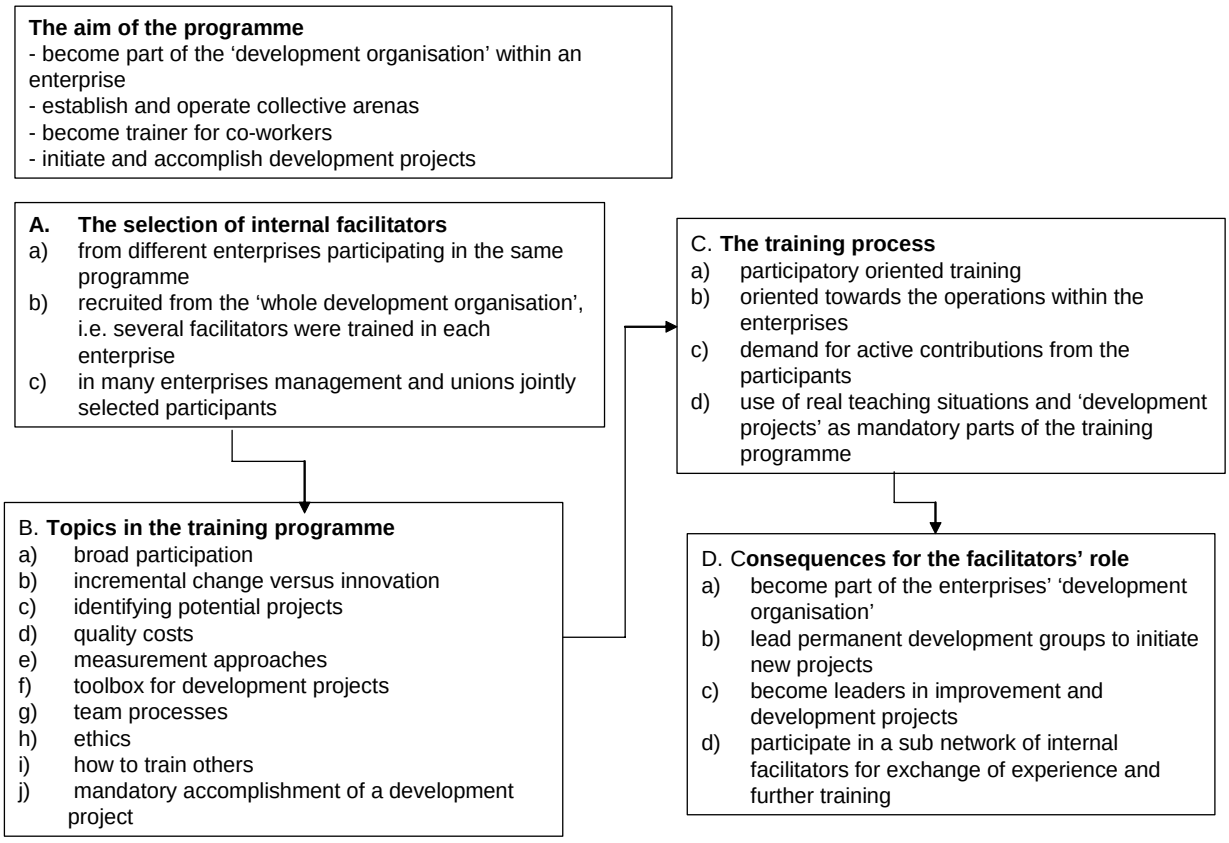

Figure 2: The training program for 'internal facilitators'.

The following example illustrates the types of projects the facilitators launched. One of the participating enterprises in this network is a zinc work.

Project initiation and the enrollment of participants

In the foundry department, the operators discovered that they had to frequently replace elements of the downspout at one of their foundry lines. They discovered this by comparing the need for replacement at this line with the other line in operation in the foundry. The latter line's downspout components needed to be replaced one fourth as much as the other line. The replacement cost was considerable. Based on this information, the internal facilitators launched an improvement project with the target of reducing the replacement cost by 50%. They used common methodology, introduced as part of the internal facilitator course, to discover the possible causes and the core causes. Consequently, the personnel in the foundry who operated the specific equipment were part of defining the causes and core causes. Secondly, they came up with possible solutions before they decided upon their preferred solutions, with considerable help

from the foundry personnel. This was done by analyzing the different solutions regarding their possible effects and the difficulties of implementing such solutions. To convince the foundry managers to finance the preferred solution, the project group had to develop a cost-benefit analysis. This was very convincing, and the management decided to effectuate the project. The result has been a considerable reduction, more than the targeted 50%, in the cost of replacing the elements of the downspout. The project group measured the expenditure cut resulting from the project. Encouragingly, this has shown larger expenditure cuts than anticipated.

Project experiences as a tool for revitalizing the network discourses

The results from this project were presented internally in the enterprise for personnel from other departments and groups. Equally important was the sharing of experiences with internal facilitators from other enterprises in the network. The internal facilitators who were responsible presented the project several times at different network arenas. This enabled personnel from other membership enterprises to reflect and discuss the results of this specific project. The project was the result of a network initiative, and the experiences and results from the project were channelled into the same network arenas in which it was initiated. This completes the learning cycle.

Case 2: Project "The construction of a new fully automatic foundry station"

The project initiation

The project on developing a new fully automatic foundry station came about when one of the suppliers acted on a request from the customers. In the network where three out of four of the enterprises participated, several network arenas were constructed to create dialogues about improvement and innovation. At these network arenas, personnel from all of the enterprises attended, and the suppliers were eager to receive signals from their customers about possible new projects. These signals from the customers to the suppliers include vital market information for the suppliers. This became especially important when the owners of the customer enterprises insisted on getting funds from enterprises outside of the region and even internationally when new offers were sent out into the market. The two customers in the network heavily addressed one issue: they would like to see suppliers that did not just respond to requests from customers, but

instead started to offer new technology, products, and services that challenged their daily operations, including equipment, processes, and so on. This was repeatedly addressed at the network arenas.

The researcher had been the hub of the regional network construction process and is still involved in the operation of the network as a facilitator, teacher, and advisor. This means that the researcher had prepared, in collaboration with local actors, for different network arenas to appear and the operation of the arenas. Establishing dialogues at these arenas became crucial. To start dialogues about development and innovation, someone has to challenge the established relations and how the enterprises operate. Since the researcher controlled the direction of the network arenas, we had to allow for such challenges. Thus, addressing to the suppliers the message that the customers had a set of new expectations was encouraged by the researcher, and research ensured that this message was repeatedly sent to the suppliers. The researcher was able to do so due to his position regarding defining the agenda at the different arenas. The researchers participated in the different arenas and were, in this way, able to repeatedly address certain development issues.

When given a routine maintenance task, the suppliers' personnel detected a potential technological solution. The enterprise developed a prospect and presented it for the customer. The customer responded positively to the supplier's initiative despite the fact that this supplier had no former record of producing such a product. From the customer's point of view, the project represented a risk because of this lack of experience with the suppliers.

The enrollment of participants

The working methods, already established as part of the network collaboration, supported the launching of the project, and framed the project in a way that made the customer willing to take the risk, including: involving the customer in the creative and goal-oriented innovation processes, utilizing the competence of both engineers and operators, and using risk-reducing project management methods.

The challenges for the initiating supplier were revealed immediately. First, this border-spanning project involves not just the supplier's own enterprise, but also involves several others. How do we set up such a project? Secondly, accomplishing such a project is very costly, so how can we fund such a project? The project was constructed

as a network project even if one of the enterprises were not part of the network. The fourth enterprise, which is not part of this network, was recruited into the project, and had weak ties to two of the other enterprises in the project (Granovetter 1985). Membership in the network enabled the supplier to take advantage of the network structure with established methods and resources. Using the resources in the network, it was possible to mobilize enterprises other than the initiating one and to establish a project team consisting of personnel from four participating enterprises and a researcher. Even if proximity was present, and the fact that these enterprises had done business with each other for years, this project represented something different that had not been present before. To accomplish such a project, they had to act as partners, in order to display for each other their internal processes, agree upon the risk distributions, and so on.

When initiatives were taken, support was needed to realize them. Bringing an idea into realization is difficult and demanding, in particular large border-spanning project containing several challenging technological innovations. When the supplier in this case, based on the input from the customer, came up with the idea to develop a new foundry station, the researcher was able to help mobilize the project. Even if the supplier had received positive and encouraging feedback from the customer, further clarification had to be done. The customer organization is large and the project had to be anchored by the project manager for the expansion project to proceed. It was necessary to find approaches and funding mechanisms that would make the project so attractive that the customer could not refuse to participate. In this phase of the project, the researcher worked closely with the supplier's manager to generate approaches and suggestions.

The project team consisted of personnel from four different enterprises who knew each other, but had not cooperated as a development team in the past. Another challenge was that one of the enterprises had only a local branch, and in this rather large project, personnel from the mother enterprise located in the capital had to be brought in. Even if three out of four of the enterprises were network members, a relationship had to be developed. A fourth enterprise from outside the network was also brought into the project. The researcher was a driving force in the network and was, based on the performance here, accepted as a trusted partner in the project by the supplier. The other participants also accepted the researcher as a partner in the project.

Why was the researcher, who had no technological knowledge or skills, accepted as a partner? This was probably due to the leading role of the researcher in the network, providing the enterprises with useful tools, methods, and legitimacy for change and development. This position was most likely untainted by how the researcher operated at the network arenas and in networking activities.

Process of translating interest

The researcher became part of the project team. The project organization was established with a project accountable, a project leader, a steering committee, a joint project team, and internal project teams in each of the participating enterprises. The researcher's participation was especially important in the early phases of the project. This period was characterized by defining the task in detail, writing a project description that all of the participating enterprises could agree upon, and applying for funding. It was important for the project team to come to an understanding on the content of the project: the distribution of responsibility, risk-sharing, sharing of economic responsibility, and so on.

In addition, the researcher helped with conflicts of interest that often develop in such processes. In the process of reaching a common understanding, the researcher acted as a kind of moderator, playing into the discourses the interpretation of the different actors' positions and interpretations of the role of the network in such processes. This project involved a customer that is part of a large consortium and a rather large enterprise itself with around 360 employees, and three rather small suppliers. The suppliers would like to see the largest actor taking the largest risks and the largest share of the necessary funding. From the customer's point of view, it was not obvious that they should tak the largest risk. As a mediator in the project, it was the researcher's task to interpret the positions and signals from the different actors and to find acceptable and operational solutions. In this phase, the researcher was also involved in gathering the necessary information and writing the project description based on the decisions taken by the participating enterprises. This was done in co-partnership with the supplier's project leader. The researcher also brought in the governmental funding agency (Innovation Norway – IN), established a dialogue with them, and explored, together with the agency, opportunities for funding.

Project experiences as a tool for revitalizing the network discourses

In the early phases of this project, the researcher was regarded as a neutral actor in possession of integrity and the owner of a set of working methods that the participants saw as the glue in the project. The network arenas were important as a point of departure for this joint innovation project, and these arenas were partly operated by the researcher. To get the networking going, there is a need to feed experiences from individual projects back to these collective arenas. This project is a major innovation project in this network, where three out of eight membership enterprises participate. How the project came about, participation from engineers and operators with the customer and suppliers, how the project is organized and funded, the market possibilities, and so on are all features that are very important to share with the rest of the membership enterprises. These experiences may encourage new joint projects that open new possibilities for the membership enterprises. By playing these experiences back to all of the membership enterprises at the different network arenas, the learning cycle will be completed. The experiences from this project will be a point of departure for reflection and searching for new projects.

Discussions

However, as illustrated by the two cases, a set of enablers is needed to initiate networking processes that may result in definite development or innovation projects. In the first case, the training program and support from external researchers, and thus, the internal projects, were needed to accomplish the program. In the second case, strategic use of the network's arenas, deliberate use of the industrial locomotives, and support from an external researcher were needed. Both cases illustrate how the learning cycle in the *network* is completed: project initiation – planning – execution - reflection. In principle, both cases, the improvement case and the innovative case, are handled equally in the network. Completion of the learning cycle is equally important in both cases.

However, having all of these enablers or "interorganizational ties" present in a network is not enough. These enablers also have to be *orchestrated*. The different enablers have to be put into play when needed and they have to support each other to achieve the intended networking processes and results. When well-orchestrated, the networking processes will shape completed learning cycles, as illustrated in the model below (Figure 3).

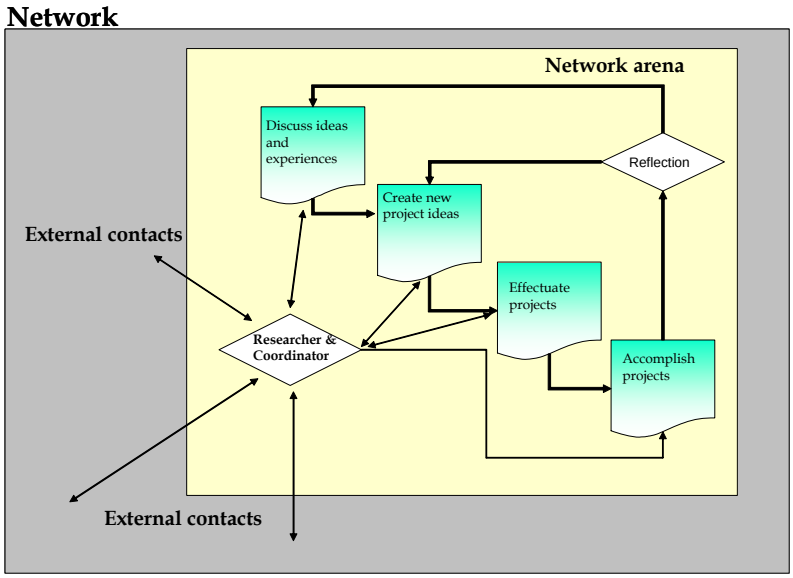

Figure 3: The network learning cycle

At the network arenas, experiences and locally developed knowledge are discussed (Amble & Pålshaugen 2005). The local resource, the coordinator, and the external resource, the broker or researcher, set up the network arenas that enable dialogues, using the actors' experience and knowledge as the point of departure. At these arenas, new ideas for improvement or innovative activities may be created based upon knowledge and experiences from participating enterprises, initiative or input from brokers (researchers), the network coordinator, or external resources invited to the network. The external resource and the network coordinator may also play important roles in taking the project idea to project execution and accomplishment.

However, there are differences between the two cases as well. In the latter case, the translation of interests is cardinal for the establishment of the project, more so than in the first case. The first case is performed within a department in an individual enterprise, meaning that the actors involved in the project are familiar with the problem that is to be solved. In the latter case, the interest of several enterprises, with different points of departure, ways of working, and company culture, have to be translated to the rest of the project team to be allowed. The enterprises, as in the latter case displayed above, may have established business relationships with each other, but no history of development collaboration. However, addressing their interests becomes cardinal for the enterprises in such projects, since innovation may be of significance to the enterprises' future business opportunities. Thus, the translation of interests appears to be of cardinal

importance in innovation projects due to a wider involvement of actors than in less comprehensive, incremental projects.

As I have shown in the cases, the role of the external resource or researchers may differ from project to project. While the researcher played the role of a trainer in the first case and was indirectly involved, the role was different in the second case. Here, the researcher was directly involved as an organizer and process consultant, and the role was characterized by direct involvement (Haga 2005a). The role of the researcher illustrated in Figure 4 below.

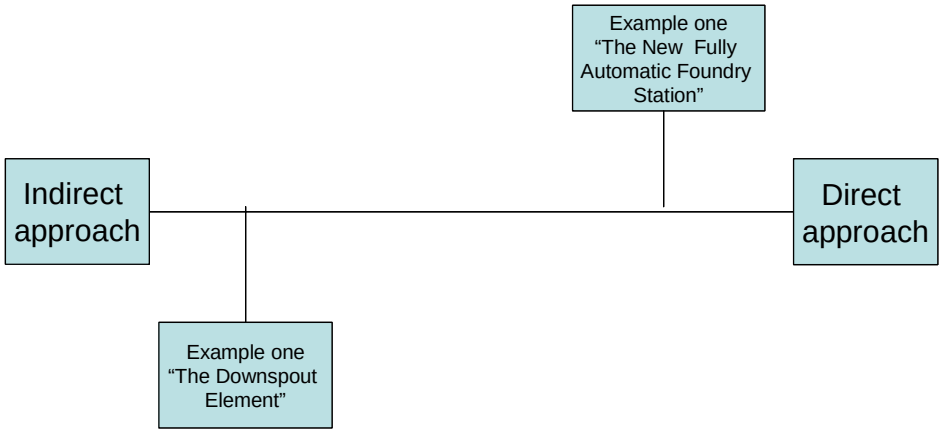

Figure 4 Characteristics of the researcher's involvement

More important for network collaboration is that the experiences and knowledge created through project effectuation and accomplishment are presented for the other enterprises in the network and are used as a point of departure for common reflection. These reflections may later lead to dialogues that lead to new activities and projects. Playing the experiences and knowledge created in the project back into network arenas will complete the learning cycle. As the cases illustrate, the experiences from the projects are played back to the different network arenas regardless of the character of the project. Case stories, both improvement projects and more innovative project innovation, are used as a point of departure for reflection at the network arenas. This indicates that the enterprises do not strongly divide between improvement and innovative projects. The two are regarded as equally important. However, utilizing the networking arenas as a point of departure for improvement and innovative projects and the different enablers as described above calls for *orchestration*. The deliberate use and timing of the use of enablers are crucial for initiating and supporting networking processes. Thus, completing the learning cycle calls for a capable and skilled *orchestrator*.

In the particular network where the cases are collected from, several sub-networks or arenas have been constructed. This is illustrated in Figure 5.

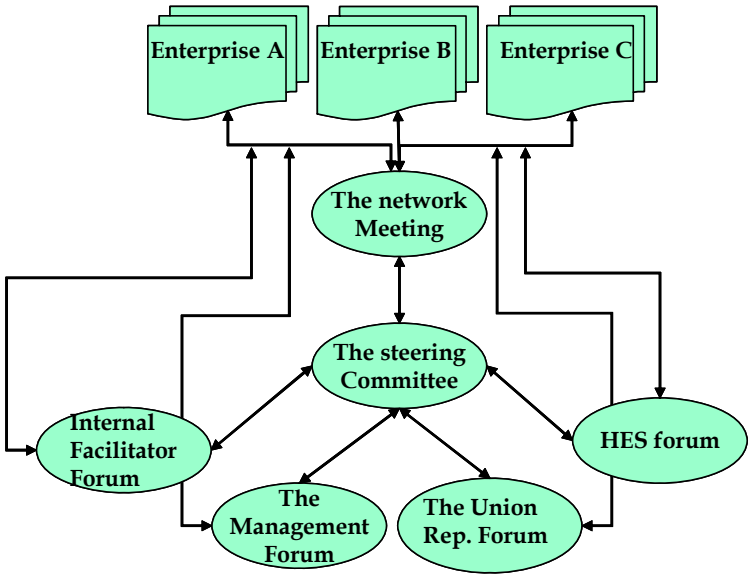

Figure 5: The network organization.

This way of organizing the network signals the strong emphasis the enterprises place on broad participation and collaboration between the labor market parties. How the network is organized affects how the projects are played back to the different network arenas and calls for a tight orchestration of the different sub-networks or arenas. Providing communication and presentations that bring the same message into the different sub-networks and carefully play initiatives back again calls for *orchestration*. To ensure that such a diversified organization supports the enterprises' intention to become more competitive, *orchestration* becomes crucial.

The internal facilitators are basically trained to initiate, construct, and accomplish improvement projects, and this results in a strong focus on improvement projects in the "Internal facilitators' forum". This is not the case in the "The Management Forum" or "The Union Rep. Forum". At these arenas, attention is equally divided between different types of projects, and the attention is more likely to be focused toward the preparation of improvement and innovative projects. Why so? In the rhetoric presented by different actors in the network, the continuous focus on improvement and improvement projects represents a platform for the enterprises to keep up a conscious focus on improvement, change, and innovation. As a consequence of this focus and the

activity this creates, more innovative project will emerge. The answer to the question above is: “Does any connection exist between the level of the ‘bubbling’ of ideas that are exposed in a well-functioning system of incremental change and the ideas that are of a more explosive force that can enable more innovative changes to happen?” This connection occurring in the rhetoric in the network is illustrated in Figure 6 below.

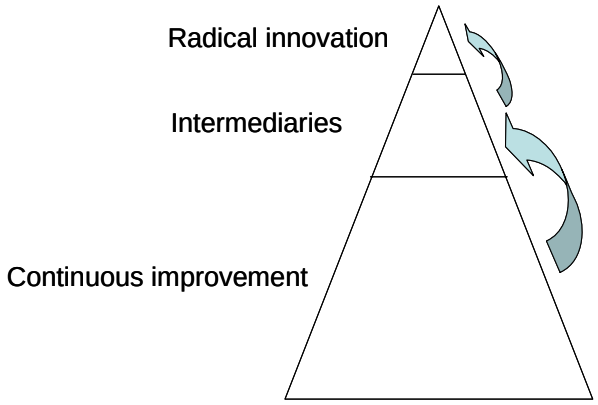

Figure 6: The link between improvement and innovation.

The emergence of an innovative project may also be supported or initiated by other instruments that are available in the network. In the second case, the triggering factor was the message sent from the contractor at the network arenas that they expected the supplier to take another role in the relationship. In another joint project, like the one presented in the second case, the project came about as a result of an initiative from the Internal Facilitator Forum.

I intended to discuss whether it makes sense for the enterprises to make any sharp distinction between improvement and innovation. One of the questions worth asking is whether the approaches used in stepwise changes and in more radical (innovative) changes differ in the network. As the cases display, there are no differences in how experiences from the projects are played back at the network arenas. However, the completion of the learning cycle within the network calls for orchestration. This enables the input or utilization of different enablers at the right time. Timing is crucial in networking processes, as the cases indicate.

Comparing the development methodology used in different types of projects displays, on the other hand, differences. However, the joint development methodology developed and used in the internal facilitator training constitutes a platform for all types of

projects. The innovative projects are generally larger than the improvement projects and more resources have to be used in the loop, such as initiating, planning, developing, and revising solutions. If the project also involves constructing and testing prototypes, this might constitute a large portion of the project, both time and resource-wise. However, the focus on broad participation in the projects seems to be harder to maintain in innovative projects than in improvement projects. This is more relevant for technological projects than for organizational projects. In technological projects, as the one presented in the second case above, involving a large number of people seems to be less efficient at some time in the process. Even so, the enterprises engaged in this particular network are preoccupied by accentuating broad participation as a principle for project execution, regardless of project characteristica.

The projects' experiences are not only played back to the other enterprises when the projects are completed, but also while the projects are ongoing. This means that the discussions and reflections at the network arenas may influence the process in ongoing projects.

Figure 3 above illustrates the interplay between researchers and network coordinators, the presence of network arenas, effective utilization of different network arenas, and the presence of methodology, and trained personnel who enable the enterprises to effectuate and accomplish improvement and innovative projects. Focusing on the presence of different features or "interorganizational ties" has been done (Ebers & Grandori 1997). Ebers and Grandori have "focused on the role of resource interdependencies, trust and catalysts for networking" (Ebers & Grandori 1997), but they have not offered a complete or systematic test of whether these three kinds of ties represent important building blocks for a theory of inter-organizational network formation. However, they indicate that these ties are important conditions that might lead to and shape the formation of an inter-organizational network. More importantly, they emphasize that a more complete analysis of the role of the ties for networking would require the identification of the features of the ties that might prevent the formation of lasting inter-organizational relationships (Ebers & Grandori 1997). A question that has to be raised is: Are the models I have presented context-dependent or context-independent? Such a question will lead to new questions regarding the relationship between different types of development projects, improvement versus innovative, and so on. The networks that I have used as a point of departure are operating in a Norwegian context, within a certain business environment, specific regions with distinctive characteristics, a specific

governance system, and so on. The features or inter-organizational ties that I introduce as part of my model are, in certain ways, context-dependent, because the relationships between certain actors in this field are dependent on how such relations generally function in the specific context. However, the features that are introduced are basically context-independent. Introducing network arenas or brokers, or constructing a training program for personnel from membership enterprises may be done in a way that allows for local conditions.

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